

Population trends inside and outside protected areas: A matched pairs analysis

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We have more parks than ever, so why is wildlife still vanishing?

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DISCLOSURE STATEMENT

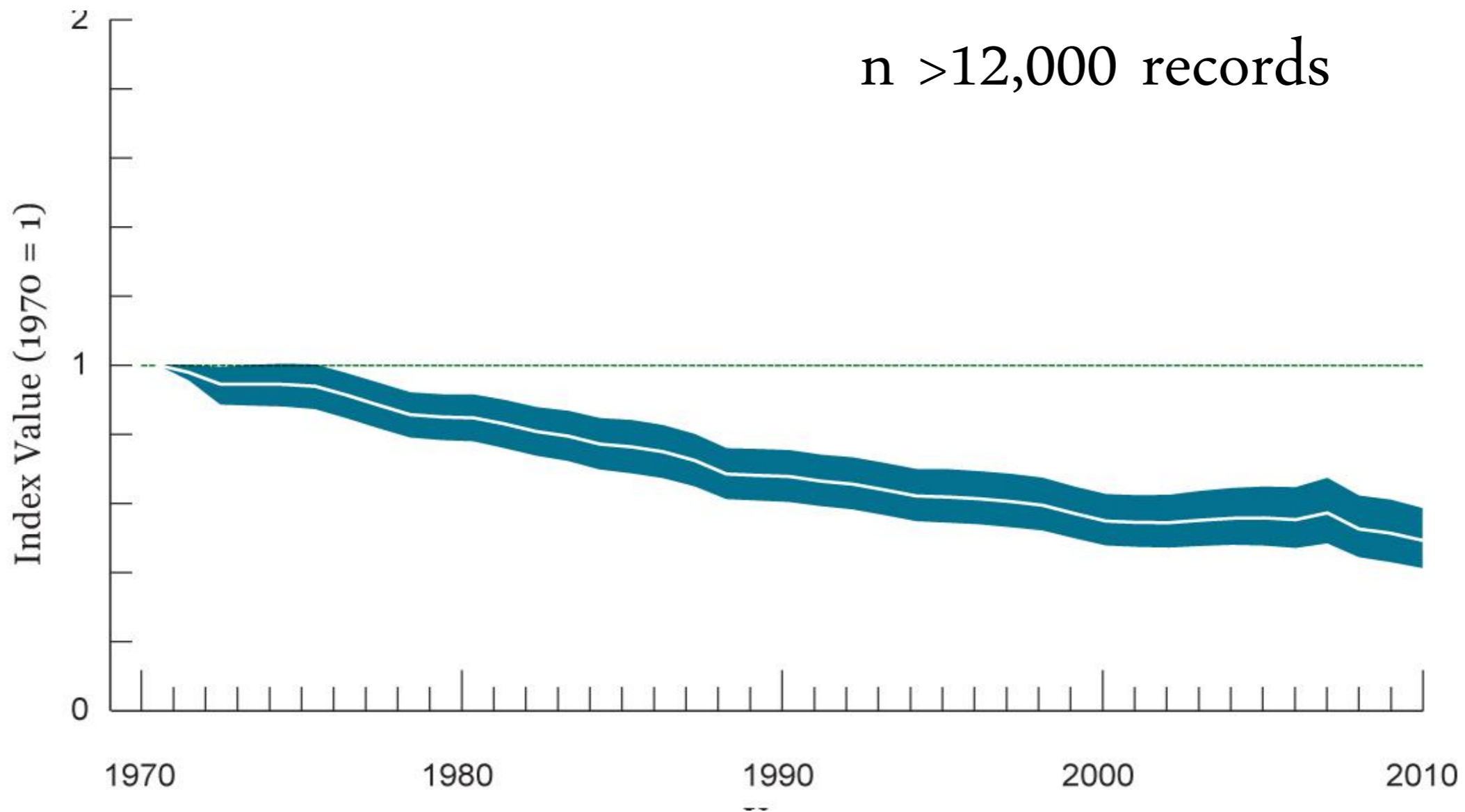
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Kakadu National Park is Australia's largest – but we need to make sure parks are actually protecting wildlife from threats. Rita Willaert/Flickr, CC BY-NC

LIVING PLANET INDEX

The Global LPI shows a decline of 52% between 1970 and 2010. This suggests that, on average, vertebrate species populations are about half the size they were 40 years ago.



Types of data available on abundance trends

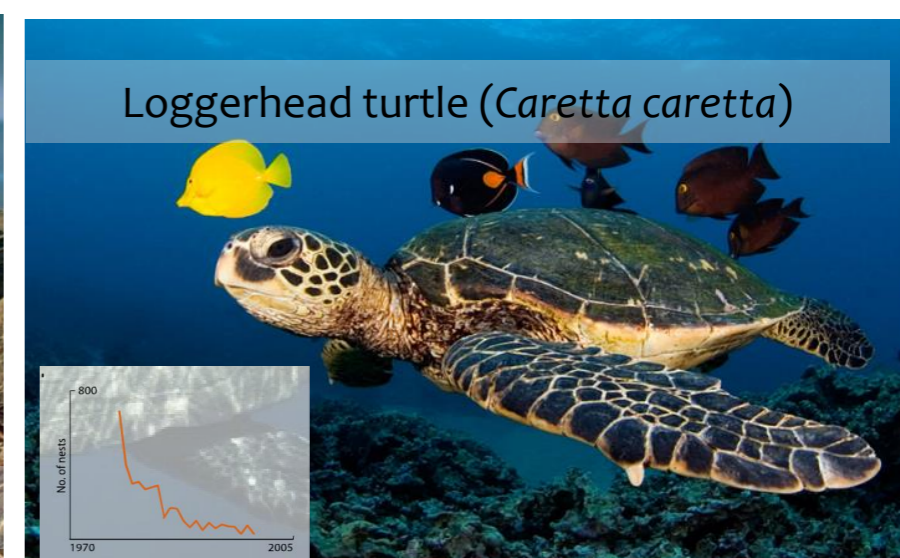
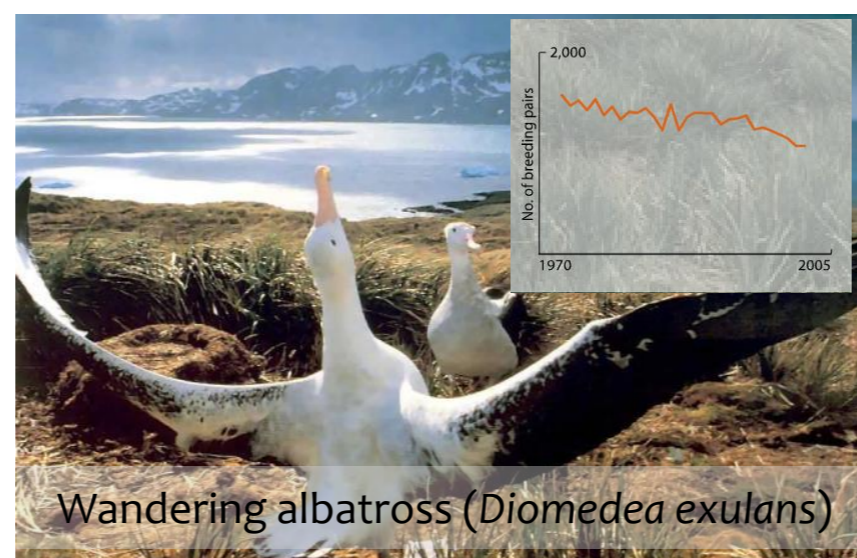
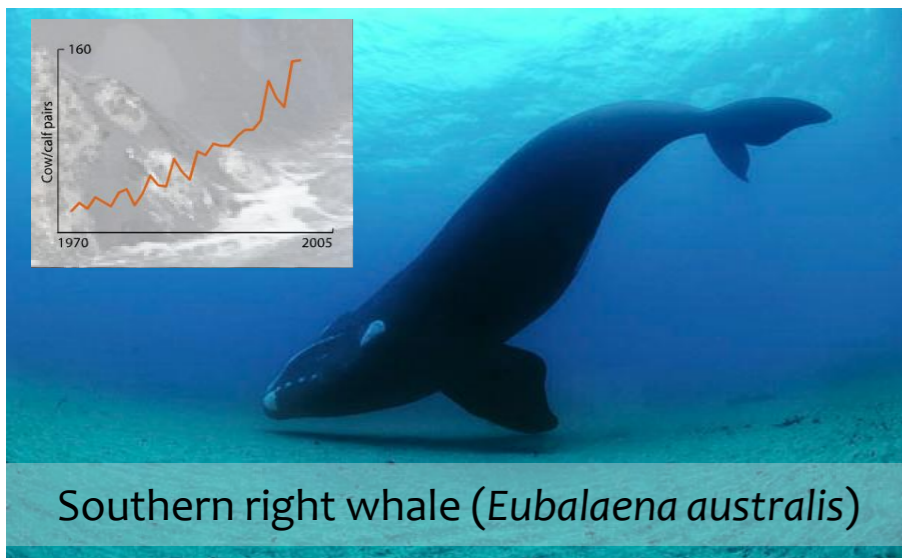
Sources and types of vertebrate abundance data:

- total population size estimates
- density measures, e.g. birds per km of transect
- biomass estimates, e.g. from fisheries data
- number of nests, e.g. marine turtles

Collected primarily from journals, also NGO networks, grey literature, etc...

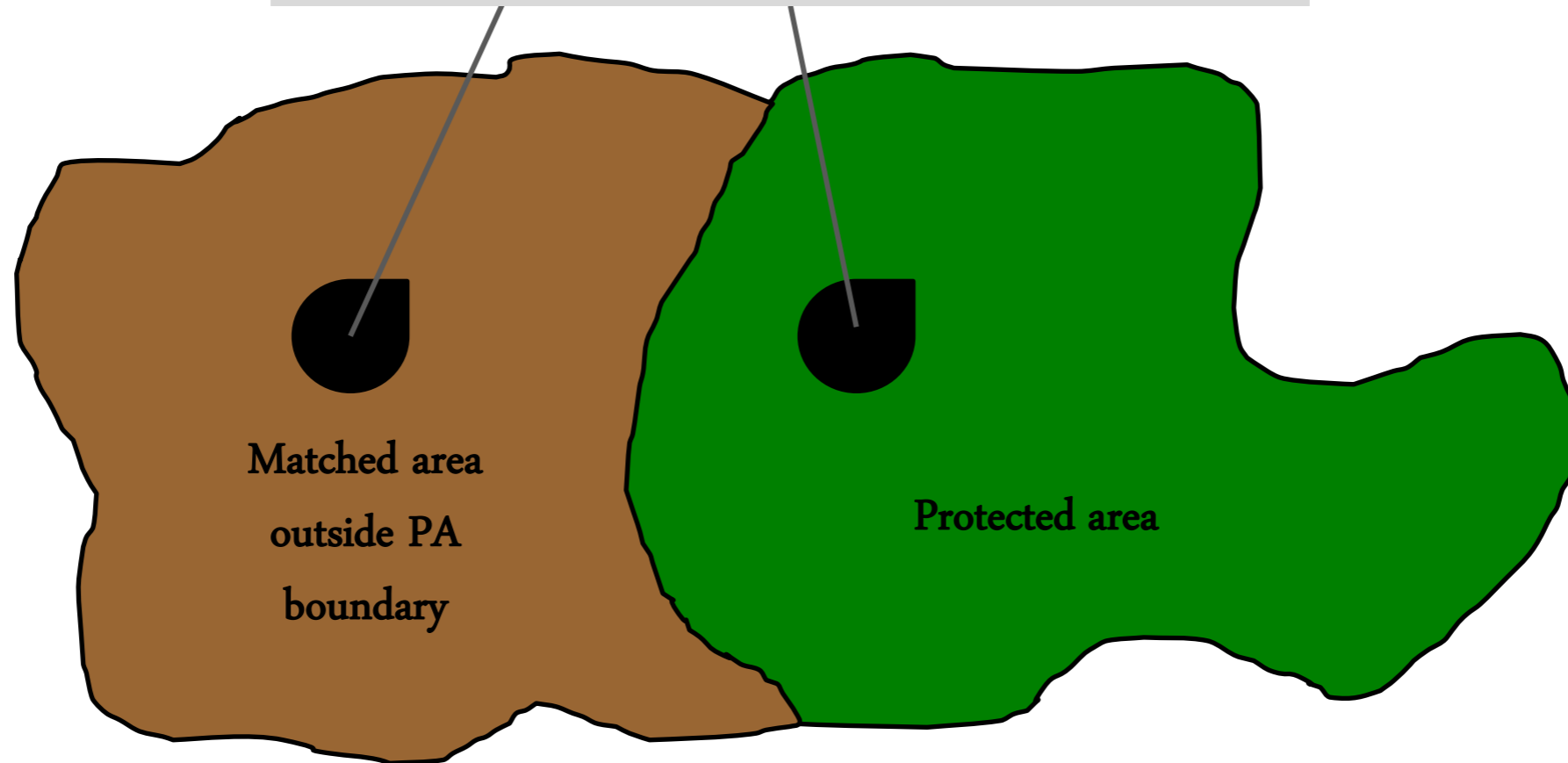
Criteria for selection

- Length of time series, method, location, etc...

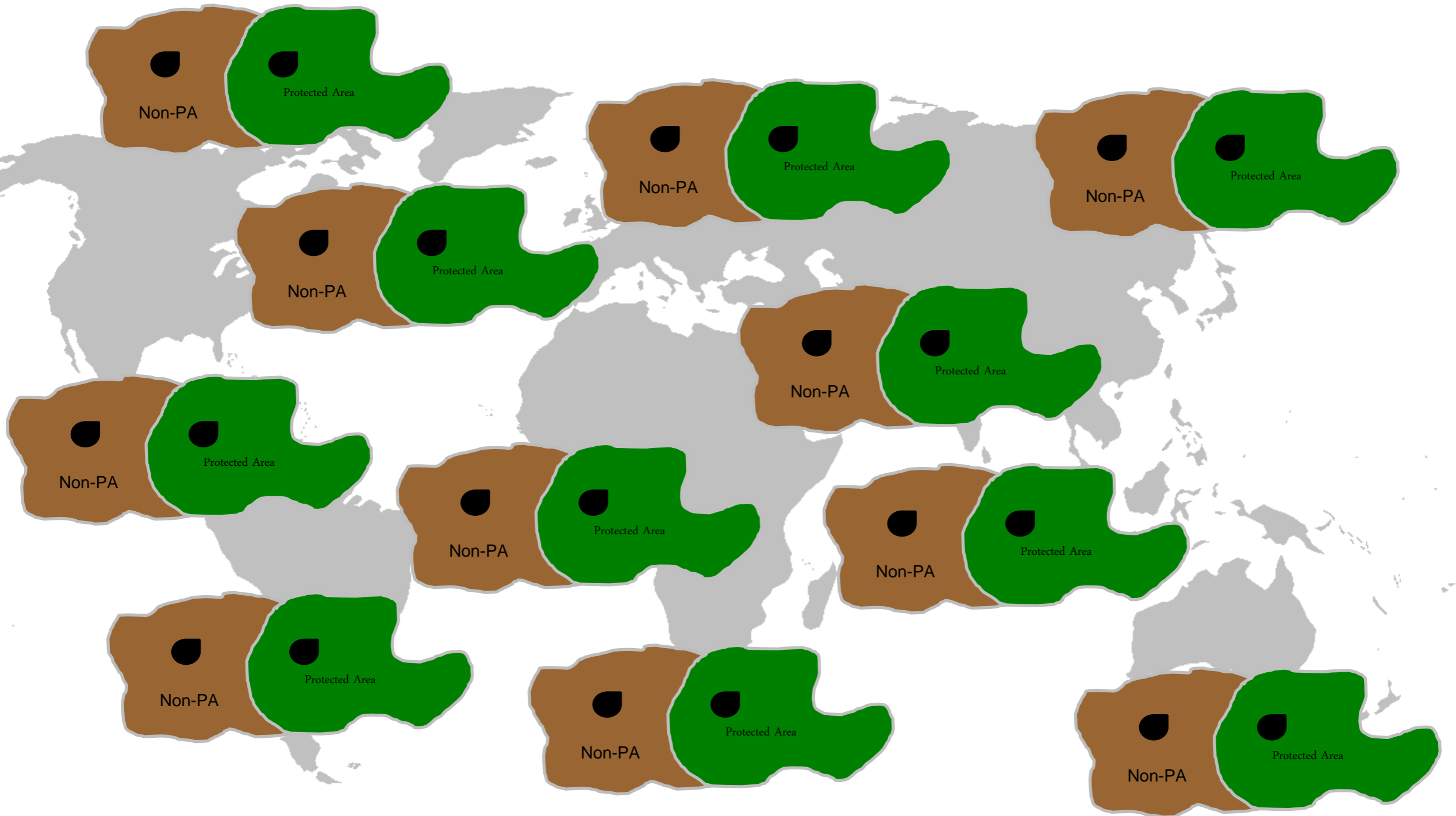


Matched pairs – a powerful analysis tool

Population trend estimates



Matching across the globe



Matching

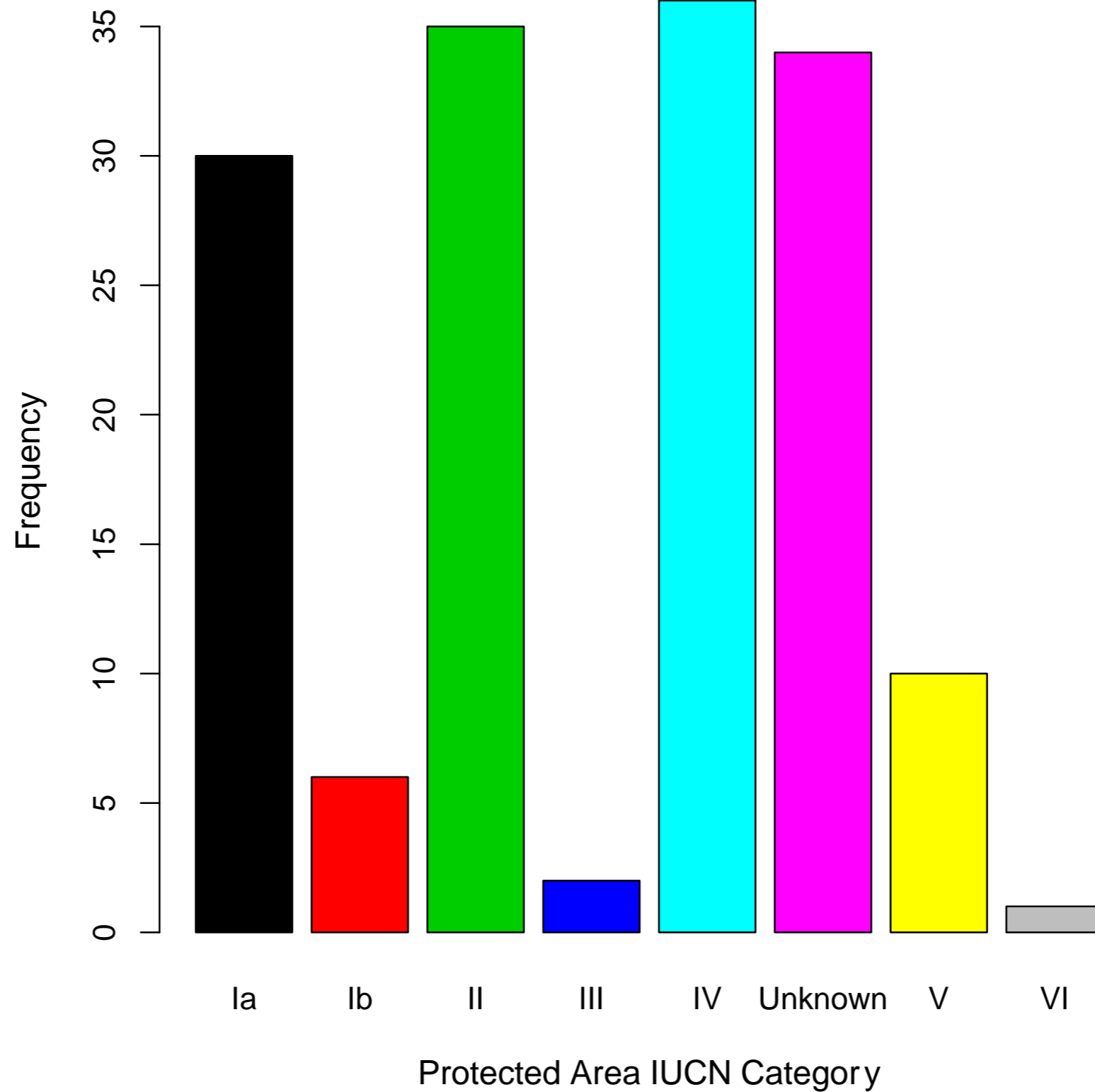
Matching criteria

- Populations of the same species matched on:
- Location: same country and same habitat
- Time frame: occur in the same time period e.g. 1990 – 2000 (overlap)
- Are of *similar* length and have a *similar* number of data points
- Minimise differences in a propensity matching framework

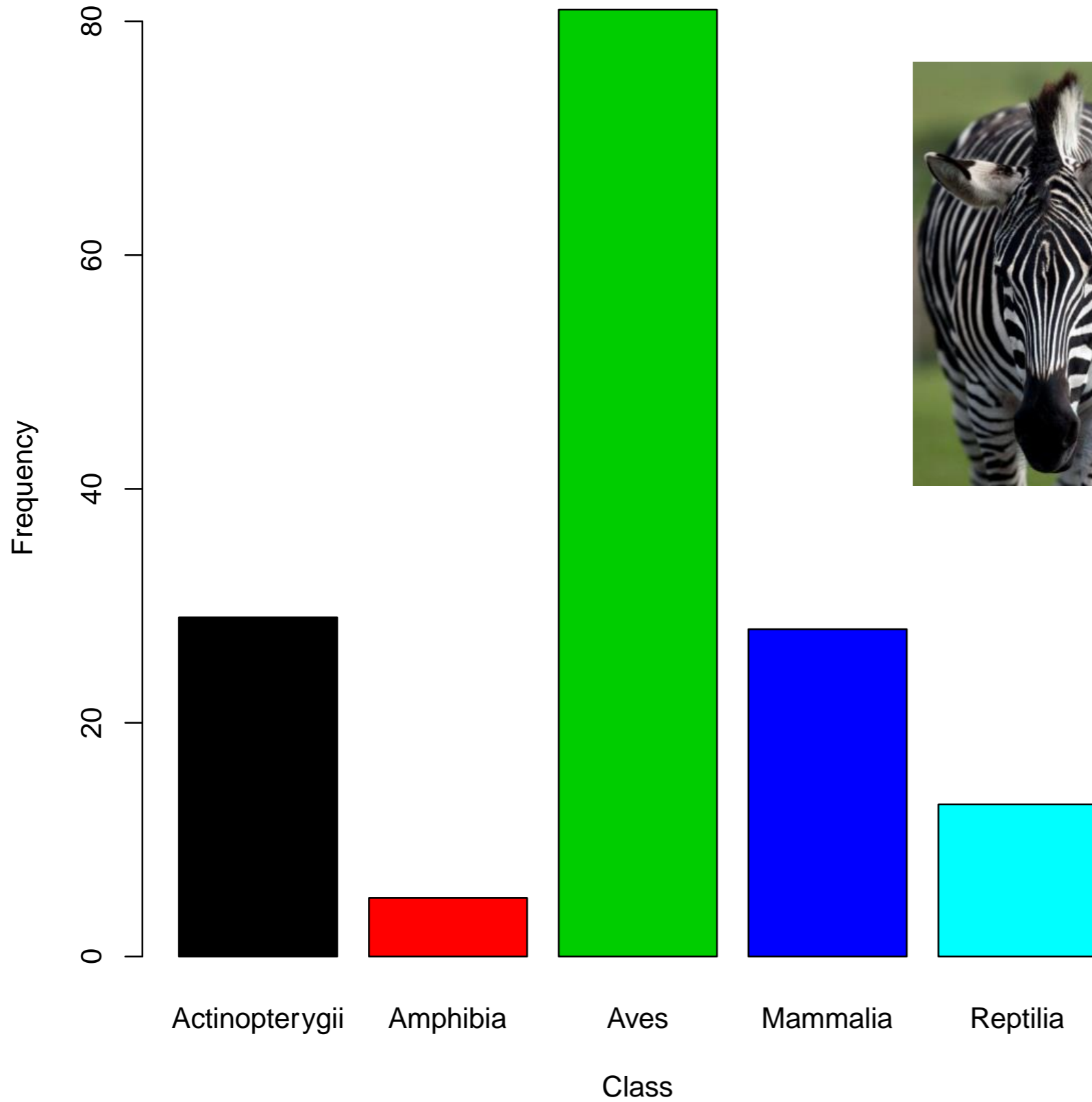
Final matched pairs

- More than 4300 populations in PAs in the LPD
- 156 were suitable and able to be matched with a time series from outside the PA
- 65 Freshwater and Terrestrial
- 91 Marine (including marine birds)
- 96 unique species
- 1/3 data are replicate pairs

Data from a wide variety of protected areas



...and species



Goran Ekstrom

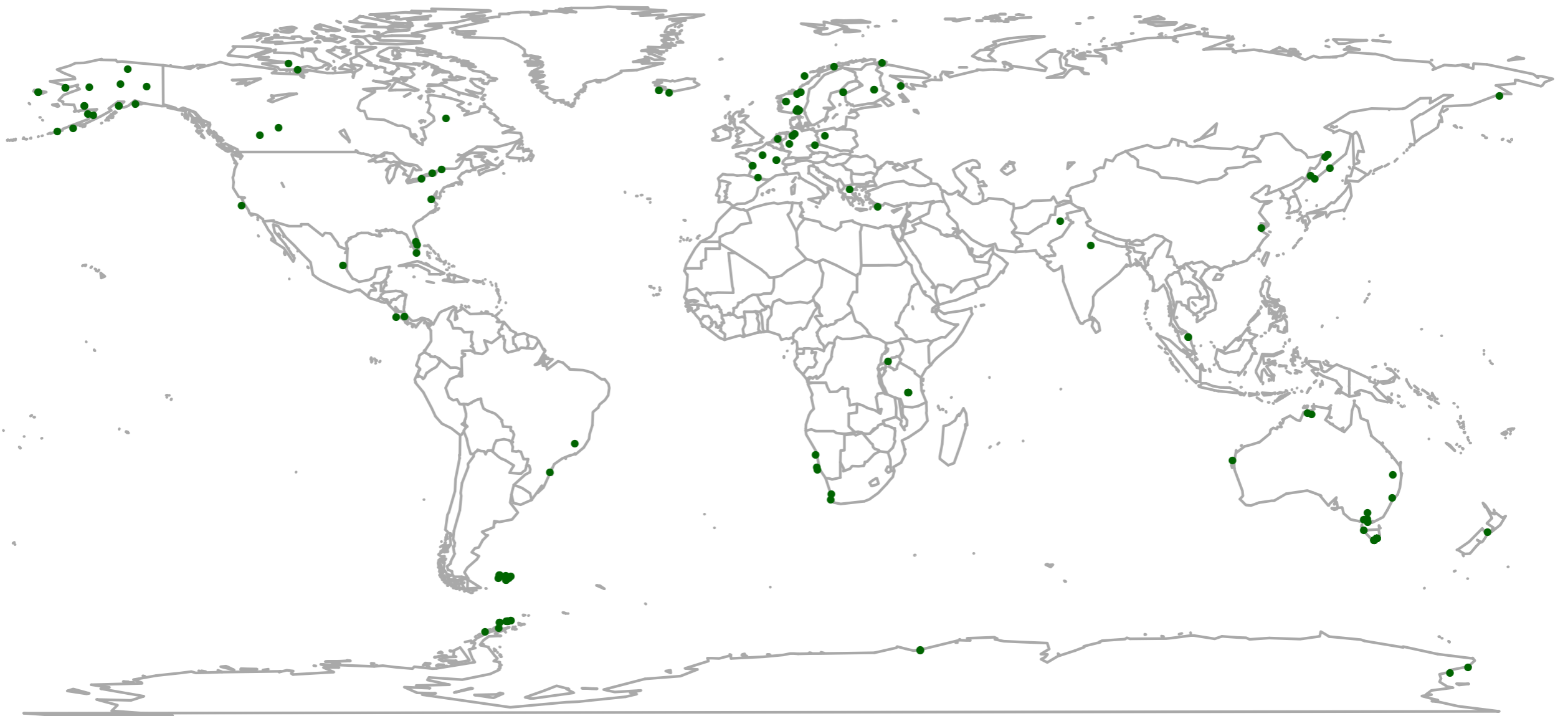


Hans-Petter Fjeld



Felix Reimann

All over the world

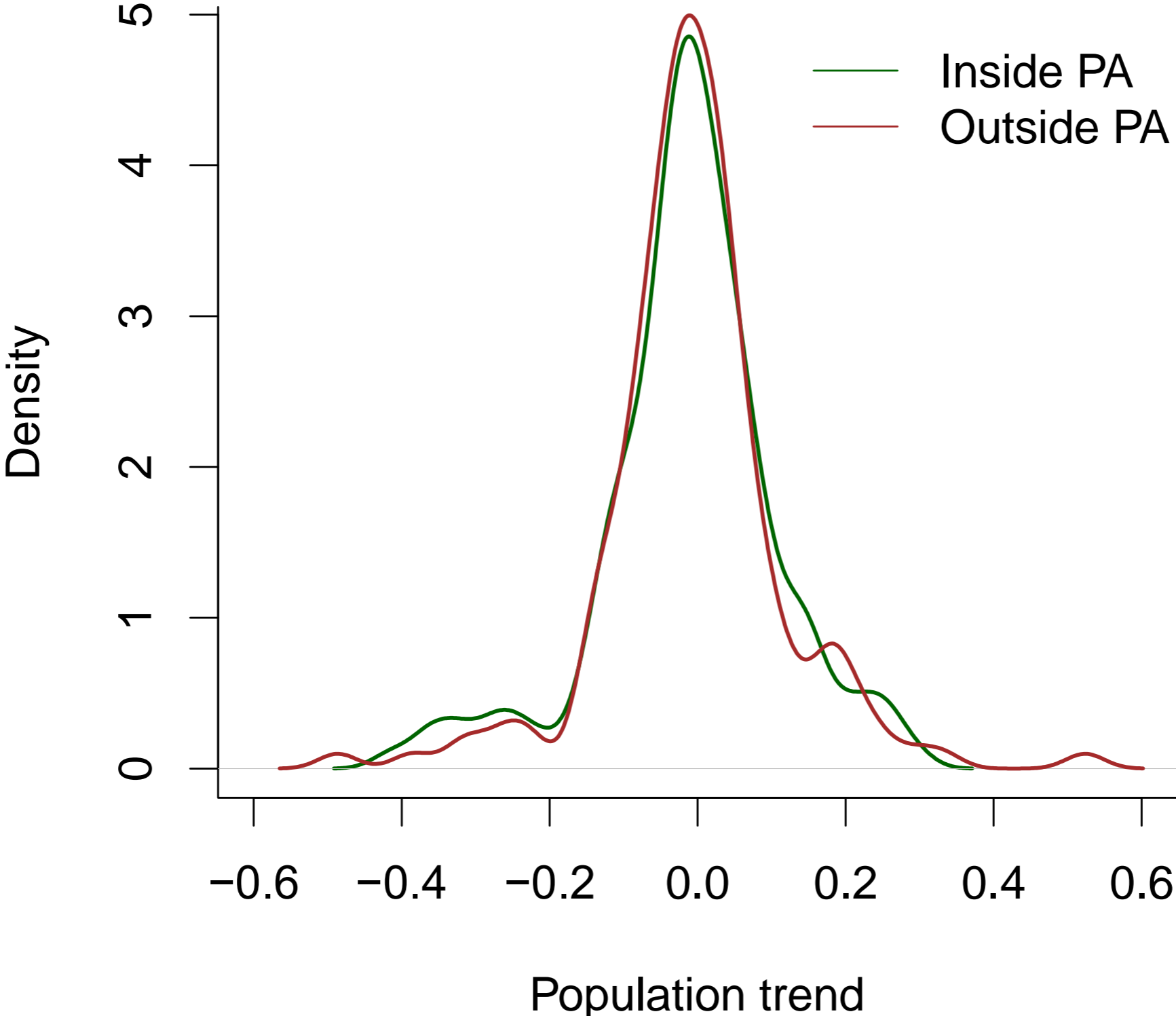


Analysis

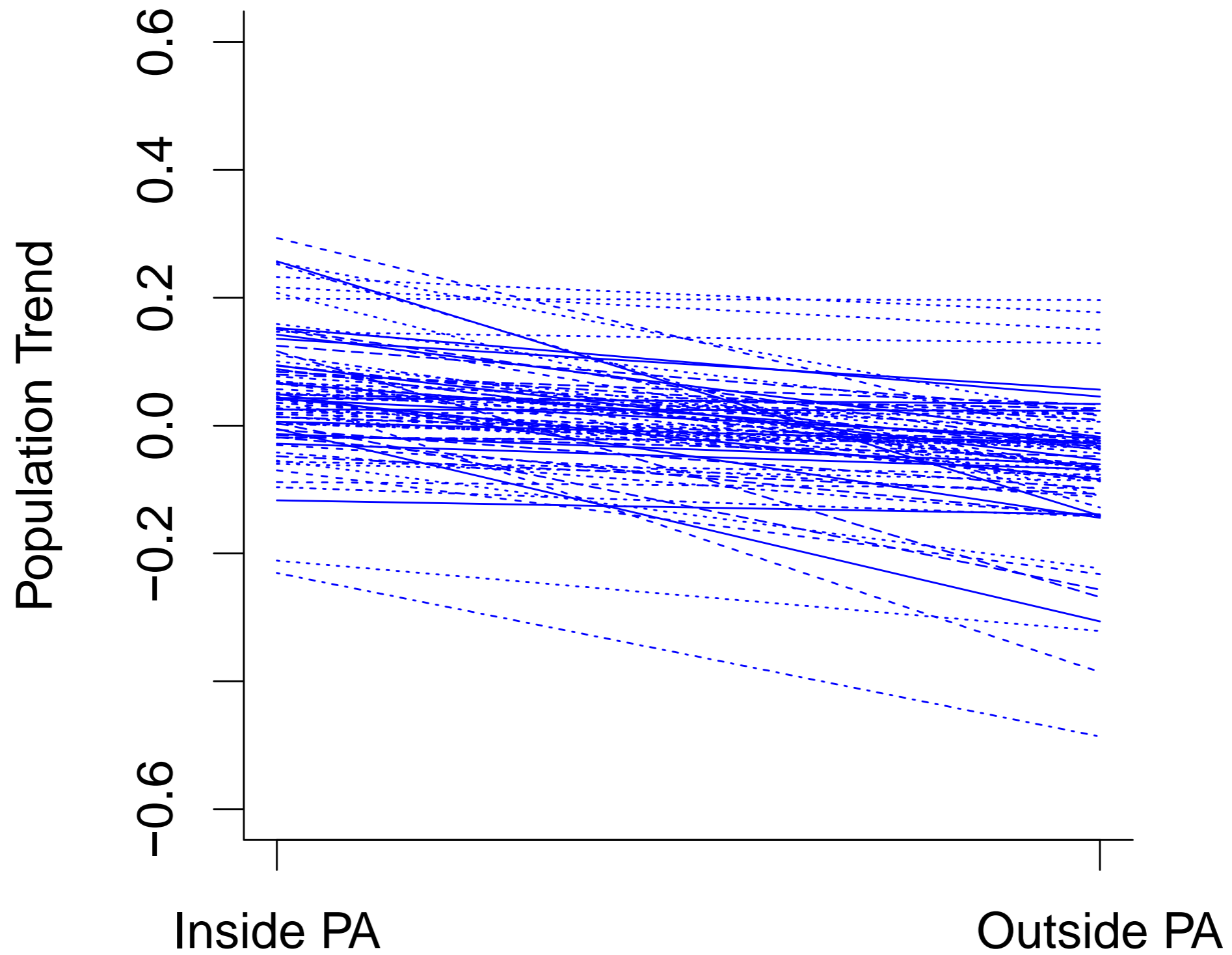
Abundance change metric

- Use a generalised linear model to describe the change in population size through time
- Analysed using a mixed effects model with IN / OUT protected area and IUCN Threat status as predictors and class, system, region and pair match id as random effects

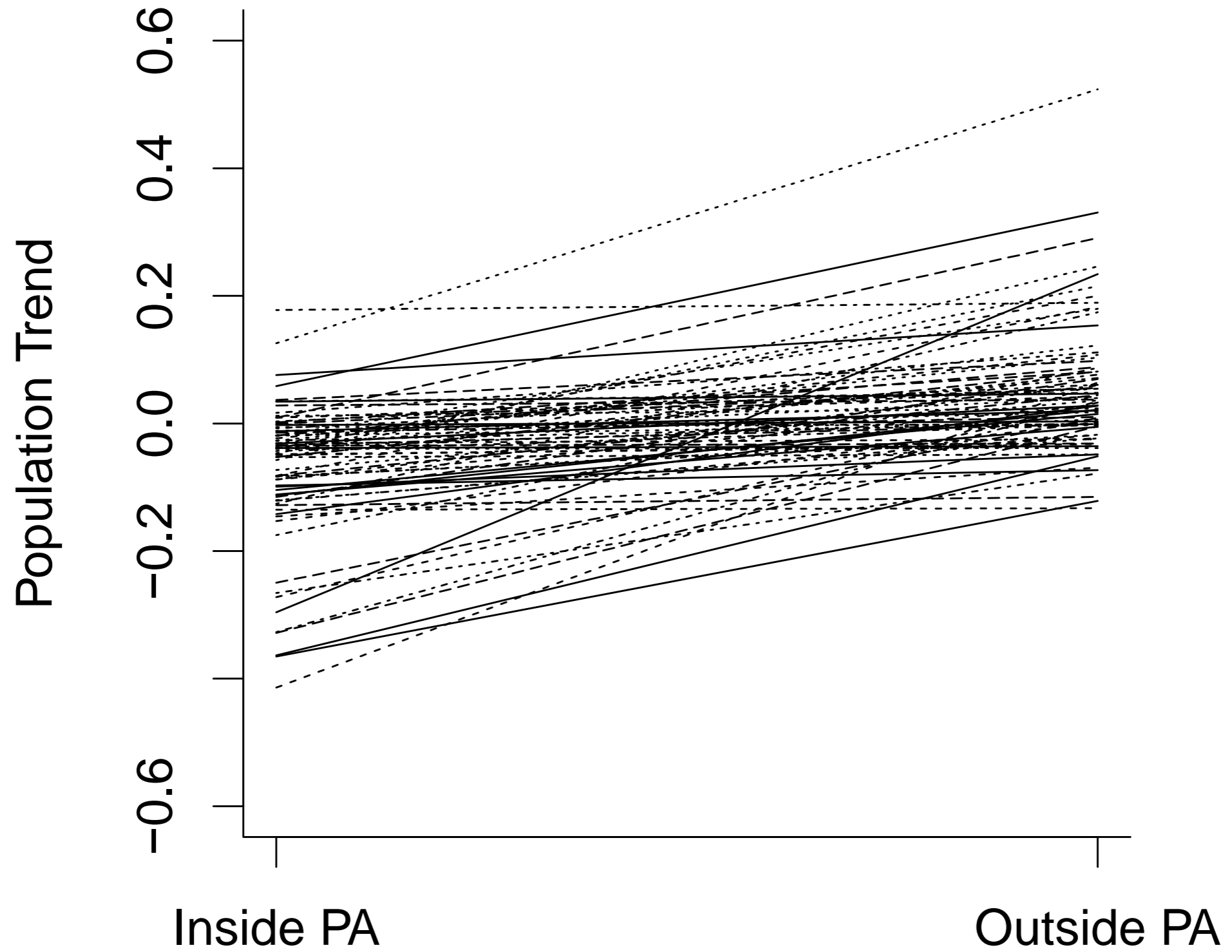
First glance data look similar



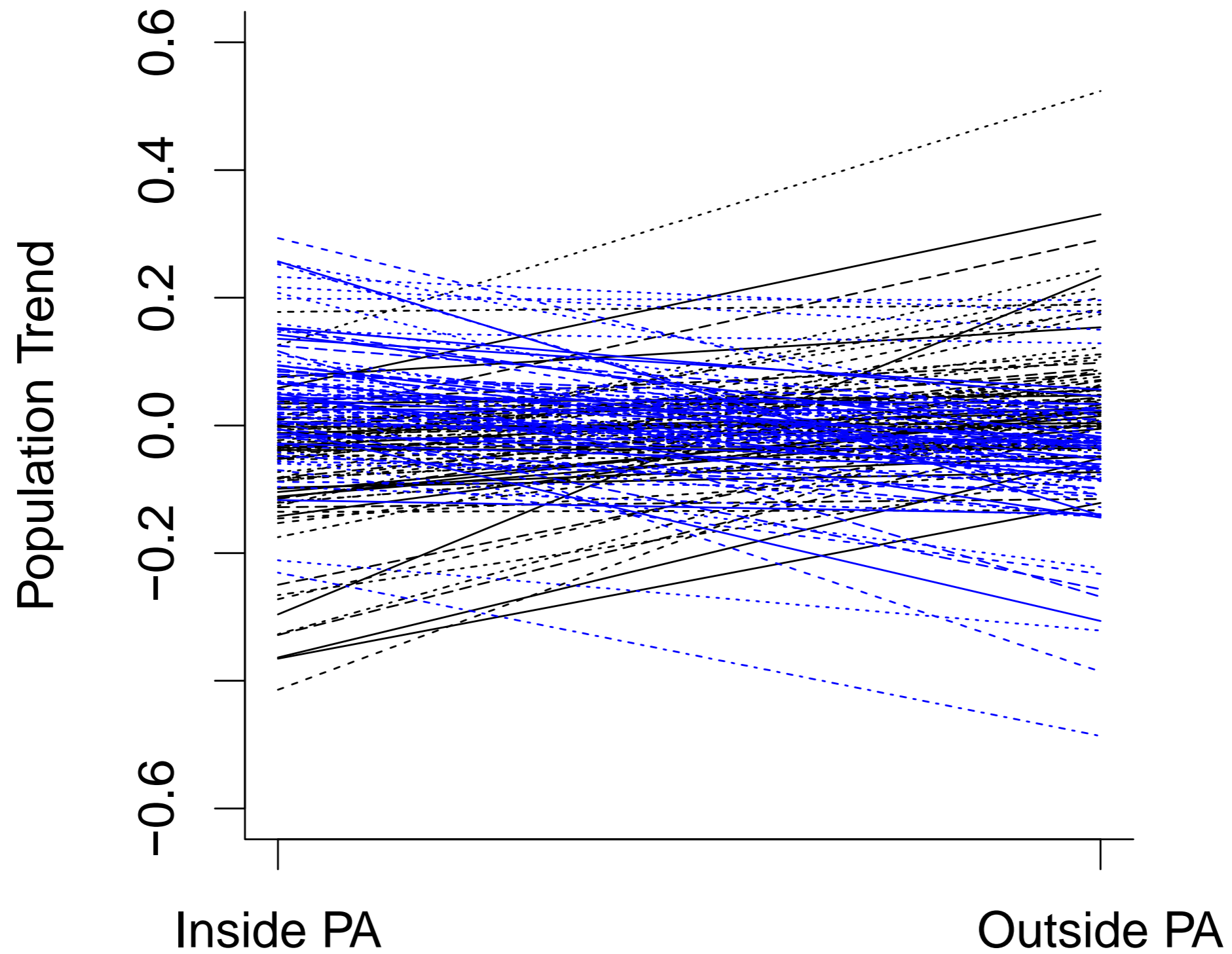
Paired abundance trends



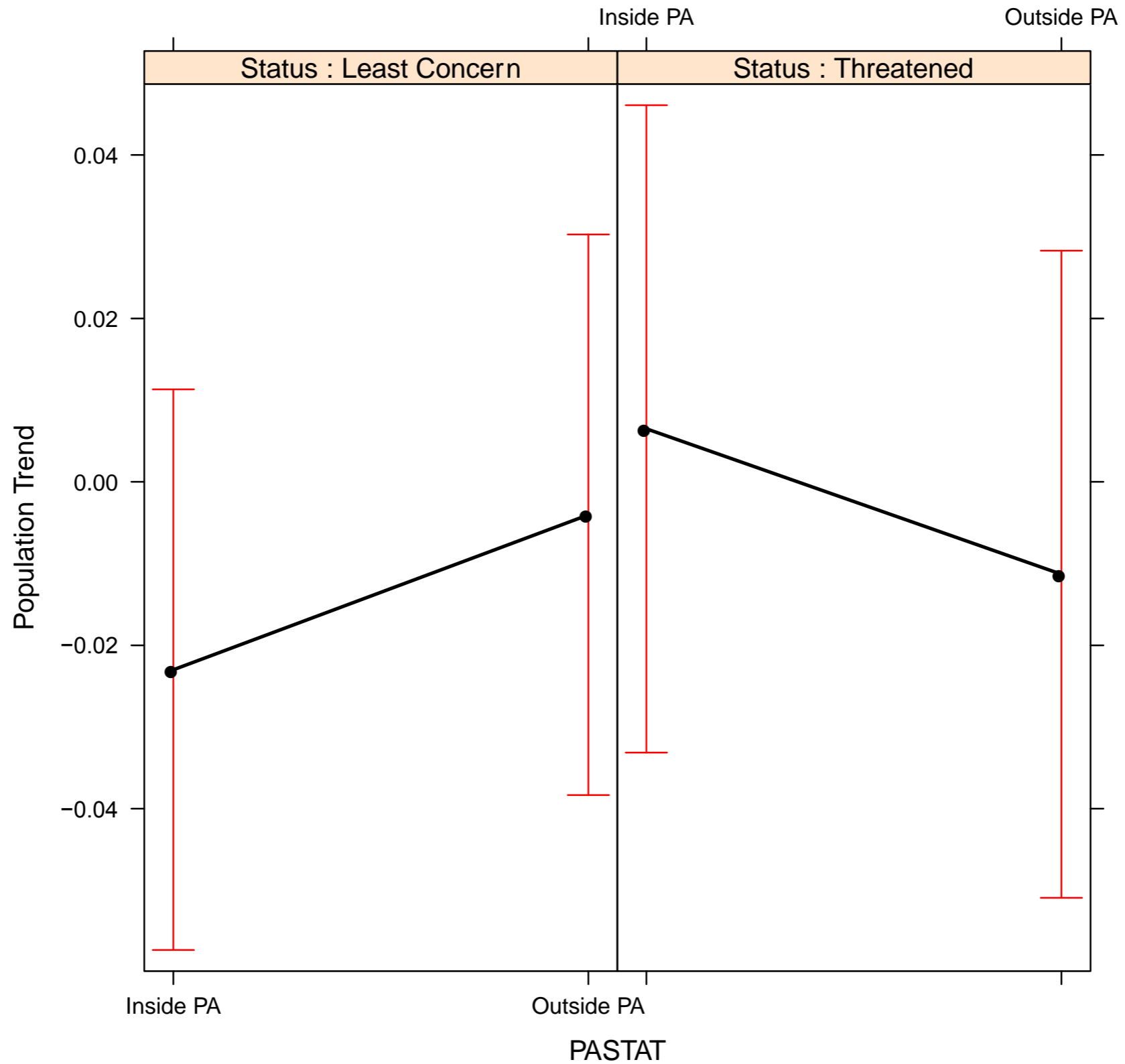
Paired abundance trends



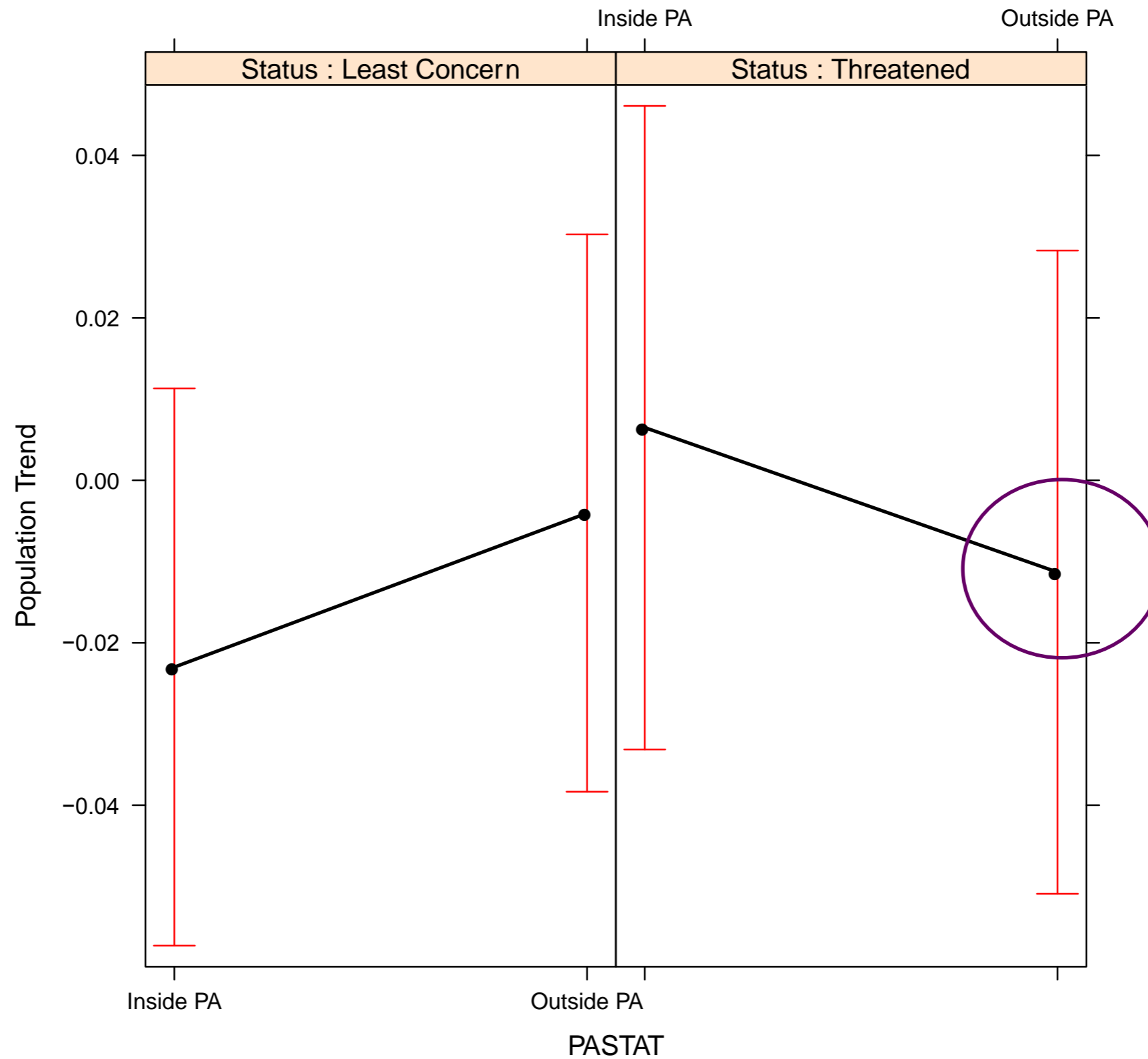
Paired abundance trends



No effect of protection on population abundance

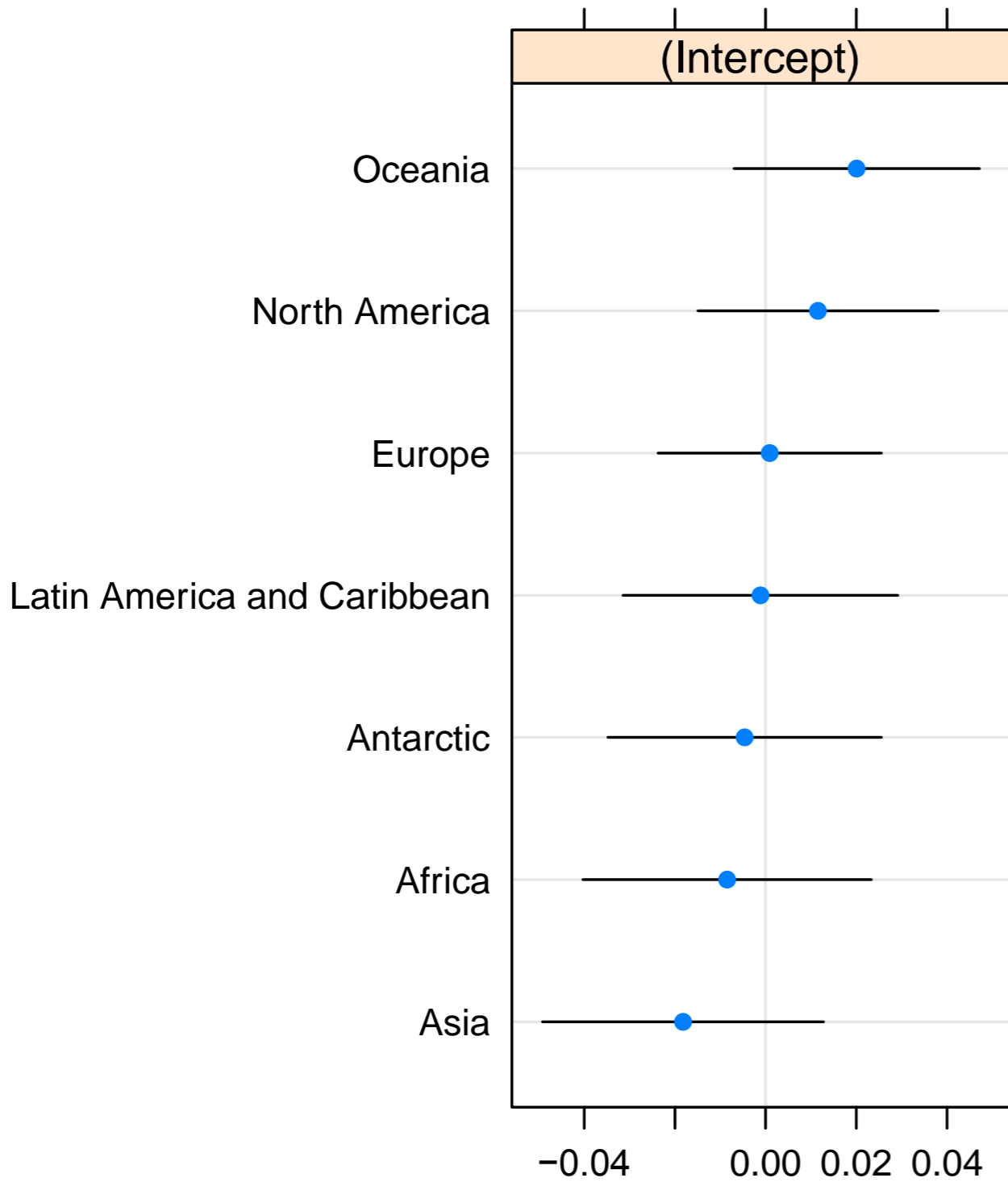


No effect of protection on population abundance

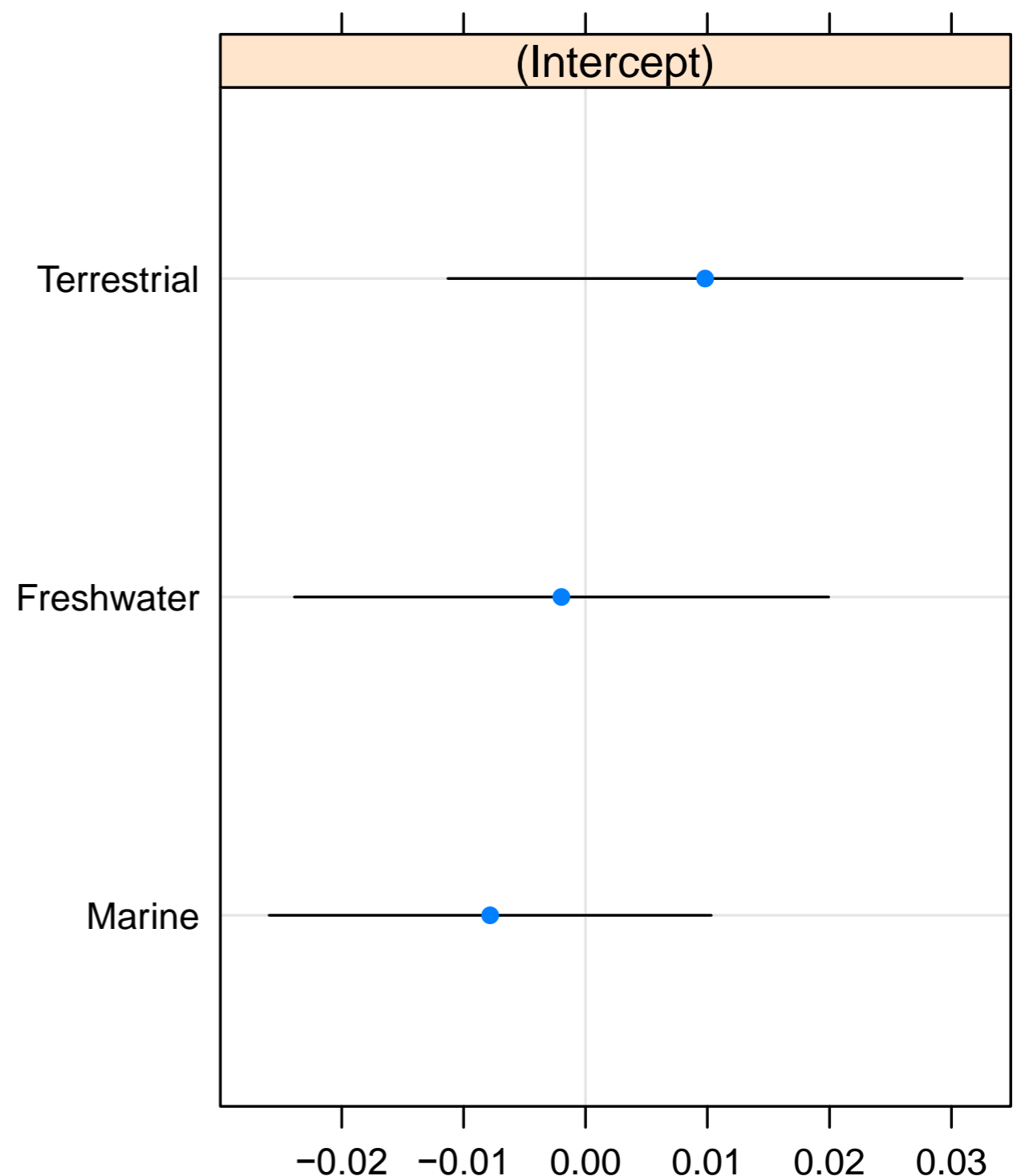


Variation across the data

Region



System



Conclusions

- Mixed evidence for the benefits of protection
- Clearly some populations improving in PAs but no pattern so far – threat status looks promising but need more data
- Can only analyse what is reported – many large terrestrial species of conservation concern do not occur outside PAs

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