

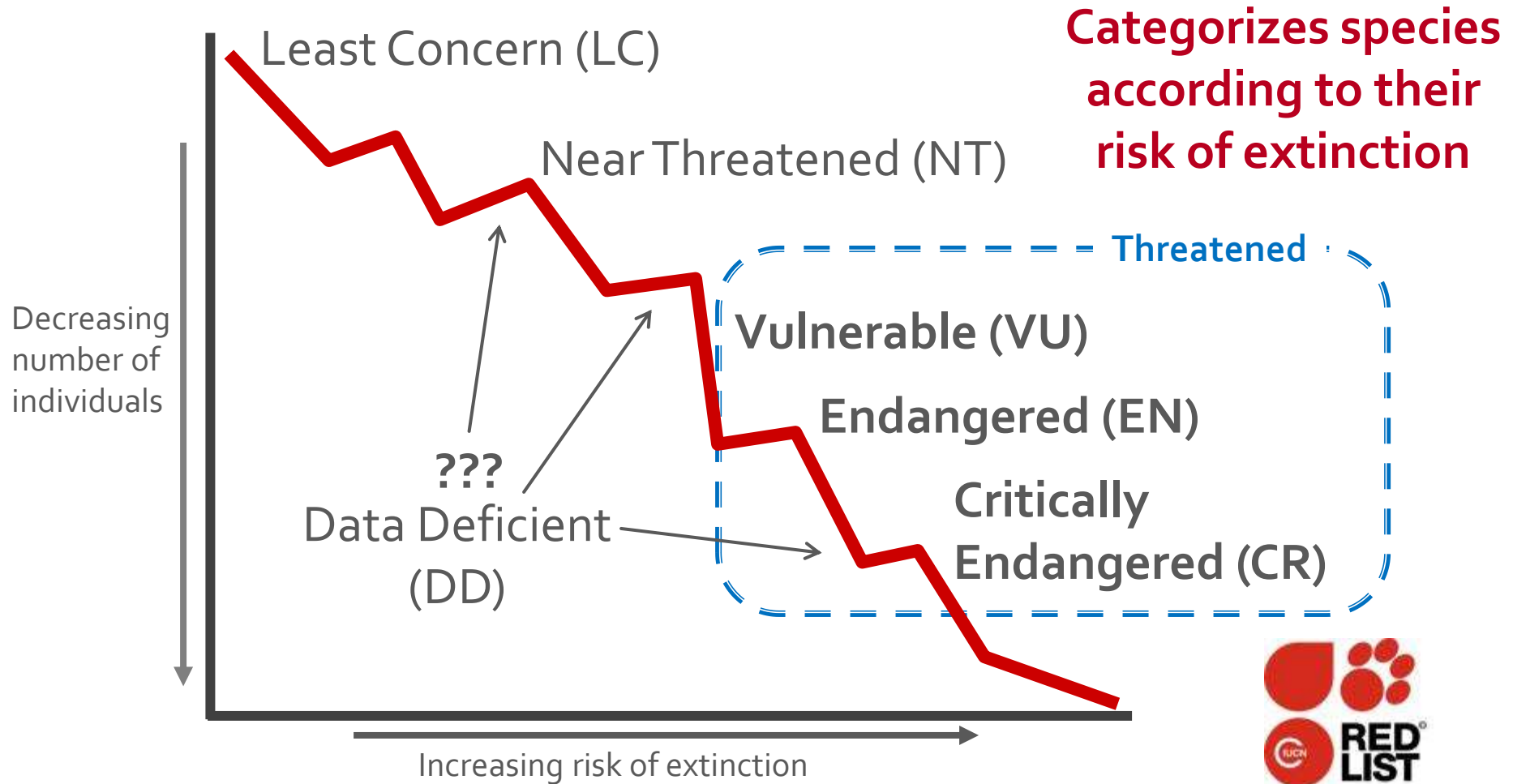
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National Red Listing and spatial data: an untapped frontier to estimate extinction risk



Introduction: What is the Red List?



Introduction:

What is the value of Red Lists?

- The best available scientific global (and regional/national) assessment tool for evaluating species' risk of extinction
- Focus attention on species in need of conservation action
- Data underpinning Red List assessments are used in conservation initiatives (e.g. conservation planning or protected area expansion)
- The Red List Index - a global indicator of the decline of biodiversity
 - CBD targets

Nature of the Criteria

CRITERIA

A

Population
reduction

B

Restricted
geographic range

C

Small population
size & decline

D

Very small or
restricted
population

E

Quantitative
analysis

Quantitative
thresholds





THREATENED CATEGORIES

Critically Endangered (CR)

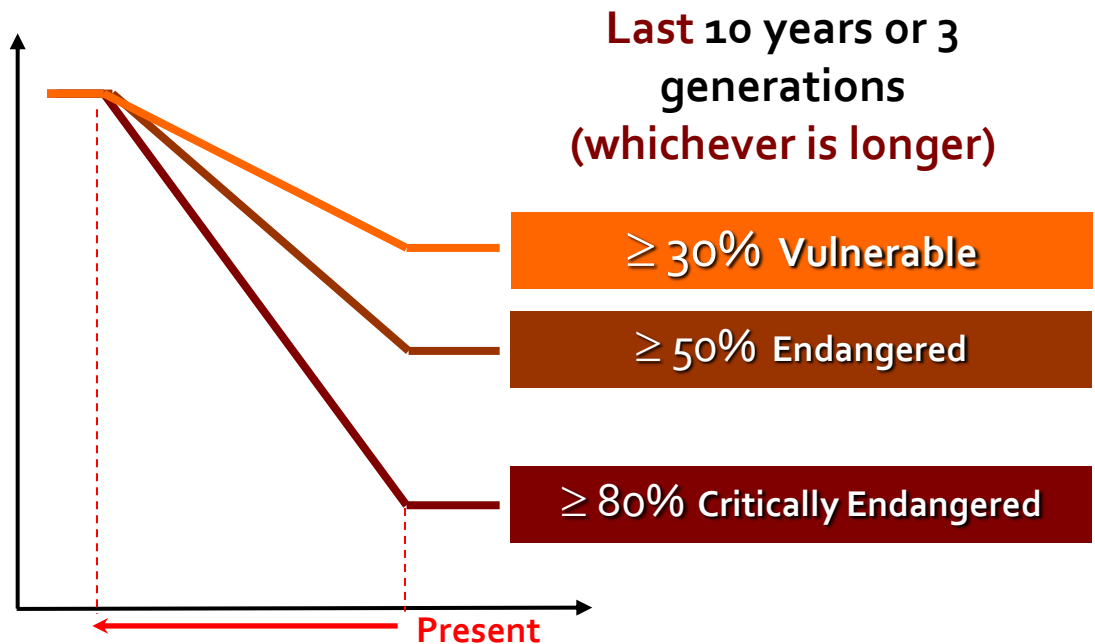
Endangered (EN)

Vulnerable (VU)

How is status measured?

-  Observed
-  Estimated
-  Inferred
-  Suspected

population size reduction of:



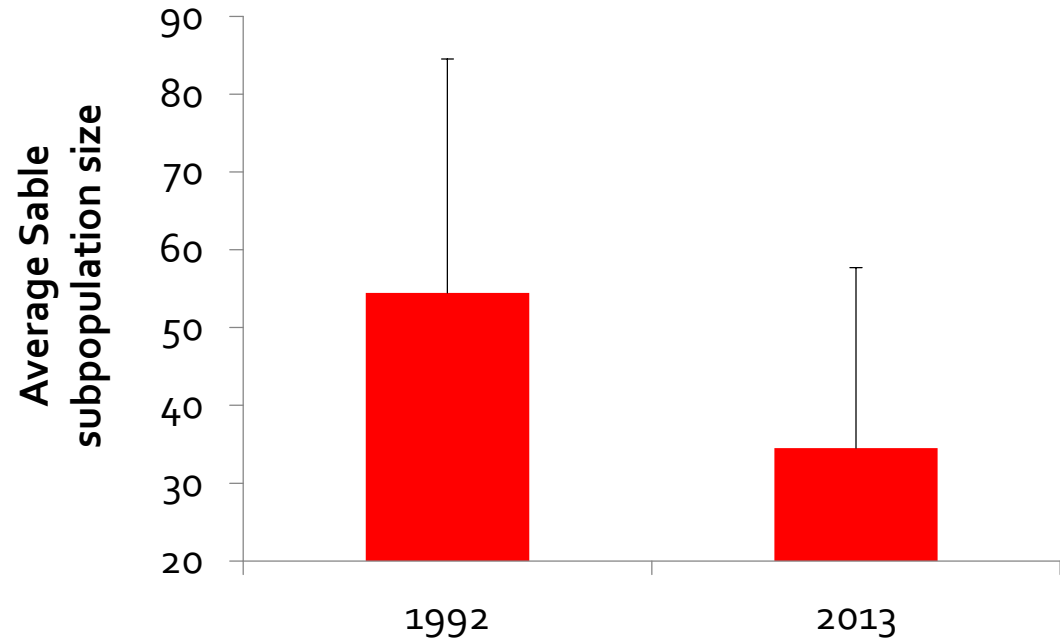
Criterion A

Criterion A

Decline based on **any** of:

- (a) Direct observation
- (b) An index of abundance appropriate to the taxon
- (c) A decline in:
 - area of occupancy;
 - extent of occurrence; and/or
 - quality of habitat.
- (d) Actual or potential levels of exploitation
- (e) The effects of:
 - introduced taxa
 - hybridization
 - pathogens
 - pollutants
 - competitors
 - parasites

Criterion A: *Hippotragus niger niger*



2015 Status	Vulnerable A2a, C2a(i) and D1
2004 Status	Vulnerable C1 + 2a(i)
Total mature population size	516
Number of subpopulations	9
Population decline over 3 generations	37% (N=7 PAs)

Red Lists need spatial data

Spatial information is crucial in assessing extinction risk

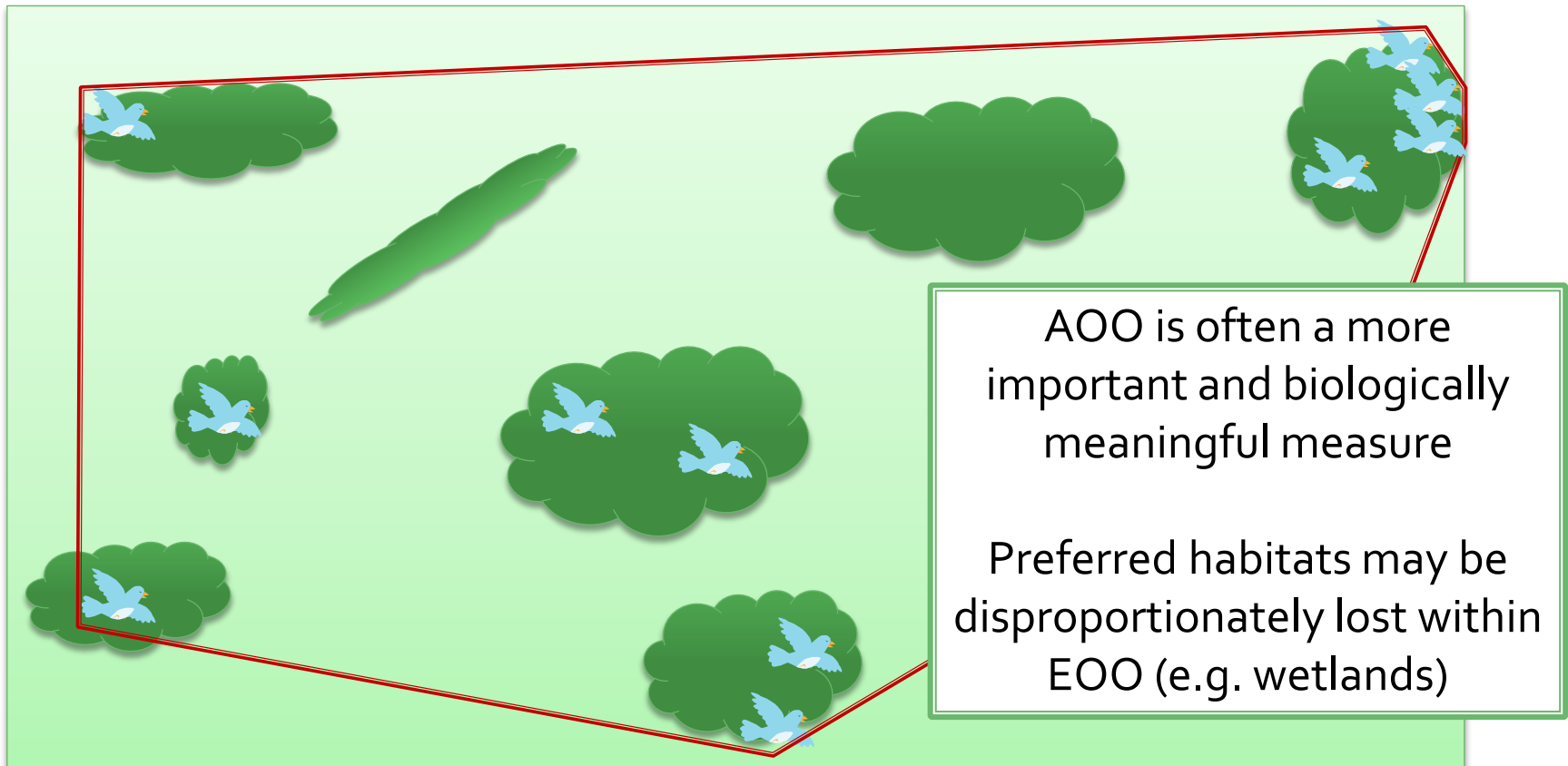
Examples from current revision of the Red List of mammals to demonstrate how spatial info can strengthen assessments



Ground Pangolin

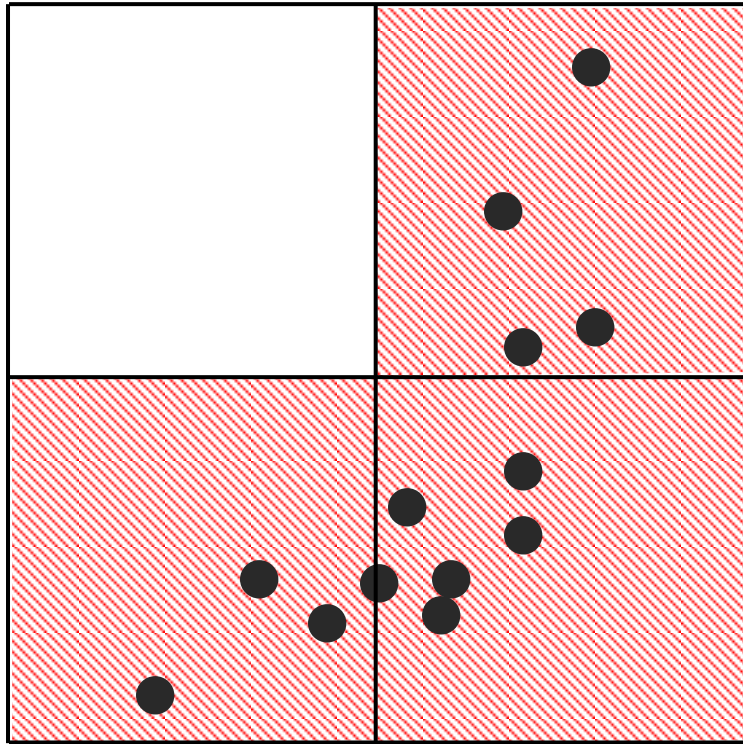
Definitions: EOO and AOO

Area of Occurrence is the **area of suitable habitat in km²** within a species' Extent of Occurrence which is physically occupied by the species.



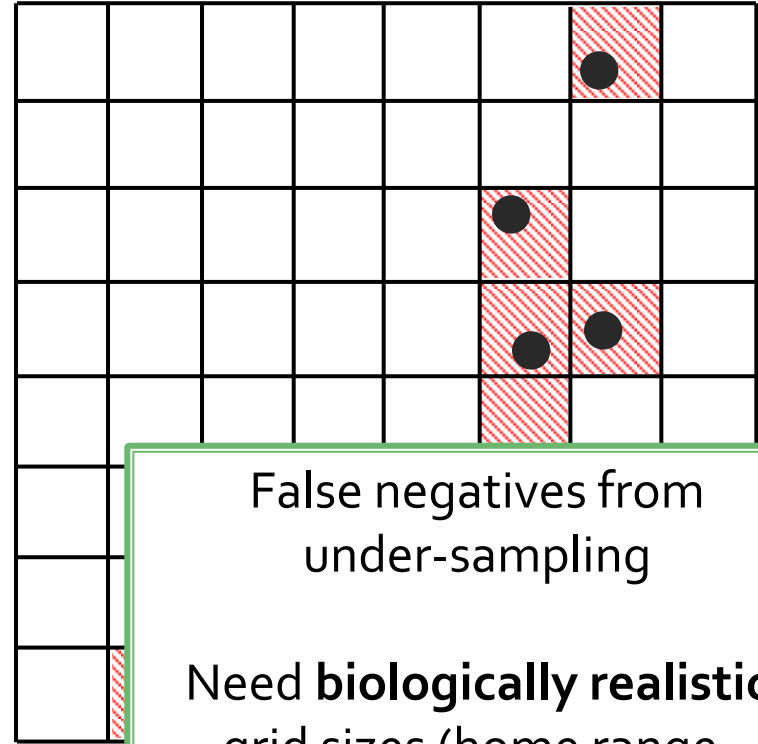
More on Area of Occupancy (AOO)

Grid Cells 16 km²



$$\text{AOO} = 3 \times 16 = 48 \text{ km}^2$$

Grid Cell = 1 km²

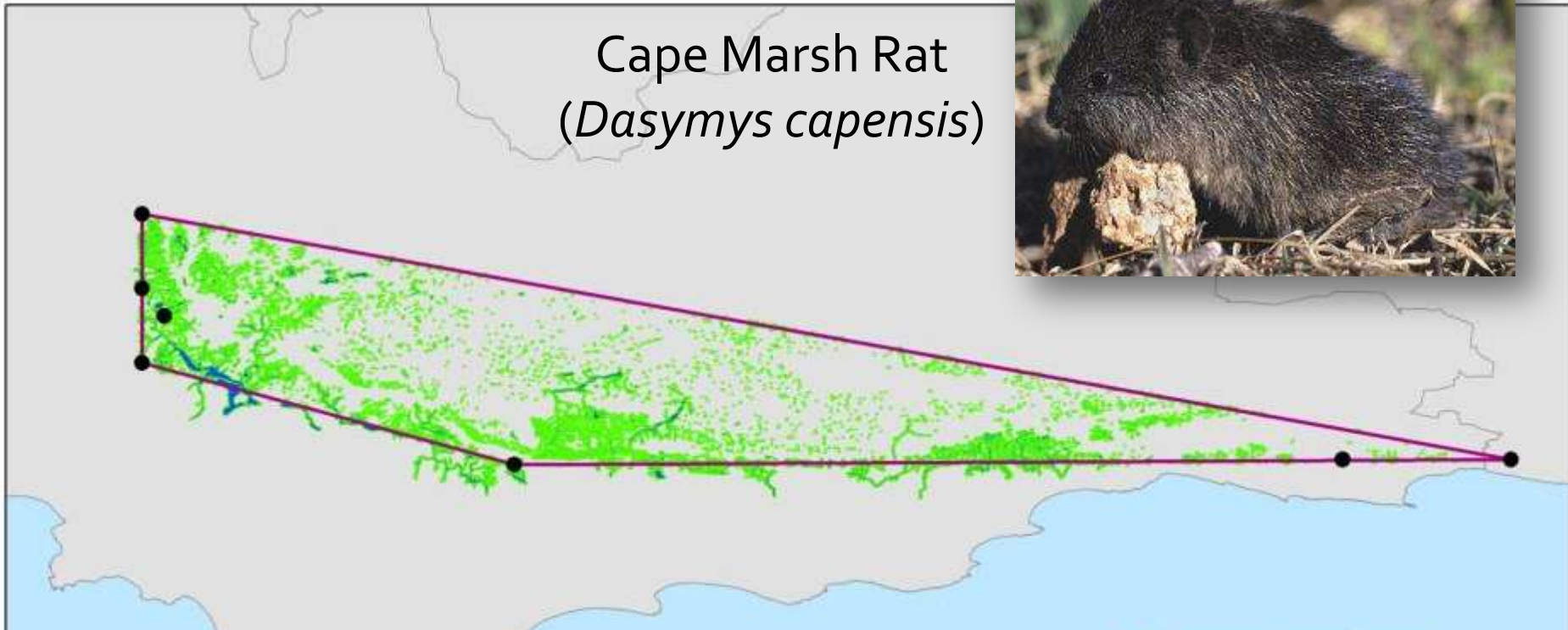


False negatives from
under-sampling

Need **biologically realistic**
grid sizes (home range,
dispersal distance)

Example: Estimating effective AOO small mammals

Cape Marsh Rat (*Dasymys capensis*)



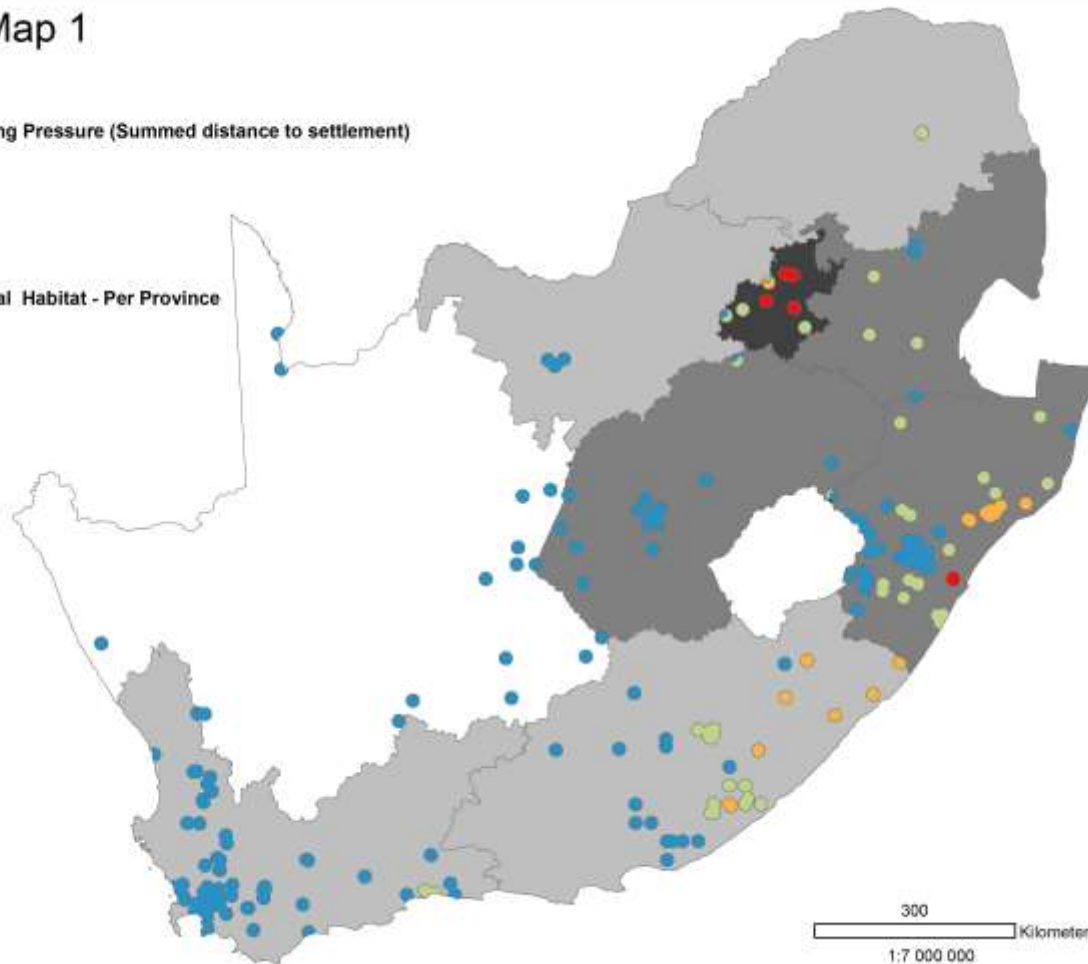
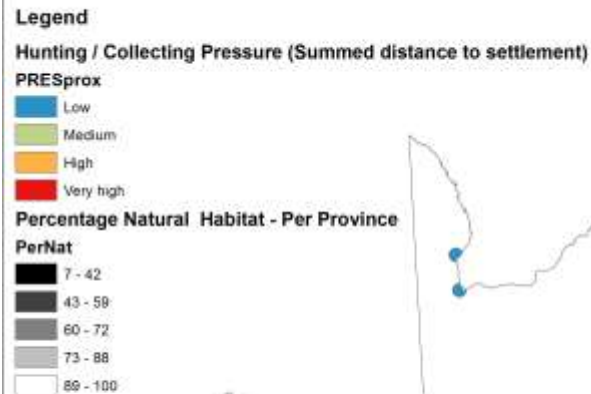
Key habitat type: all wetland patches in EOO, buffered by 32m (NEMA regs)
Subtracted transformed land, bare ground, open water bodies (GTI2014)

Effective maximum AOO – 615 km² – VU B2ab(ii,iii)
[Endangered B2 (AOO <500 km²)]

- *Dasymys capensis* record
- EOO
- Wetlands in EOO
- 500 m buffer around EOO wetlands

Example: Estimating effective AOO utilised species

Weasel Map 1



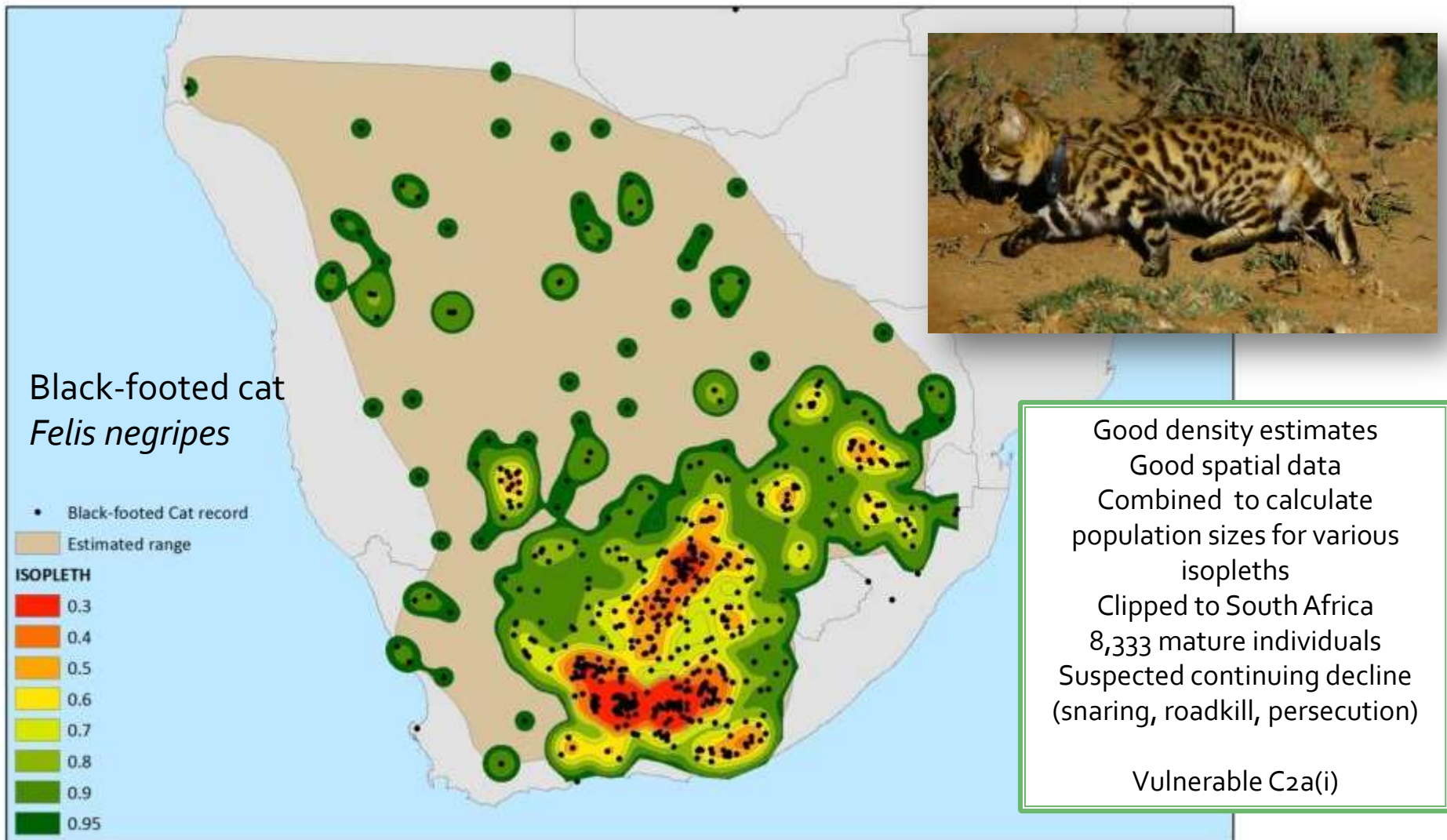
Buffered all known localities by 10km (sample AOO – 50,518 km²)
Subtracted transformed land (sample AOO – 36,506 km²)
Subtracted “harvest distance” – rural villages buffered by 10 km (sample AOO – 7,138 km²)
Continuing rate of rural expansion

Assumption <10,000 mature individuals (expert knowledge)
Near Threatened – C₁

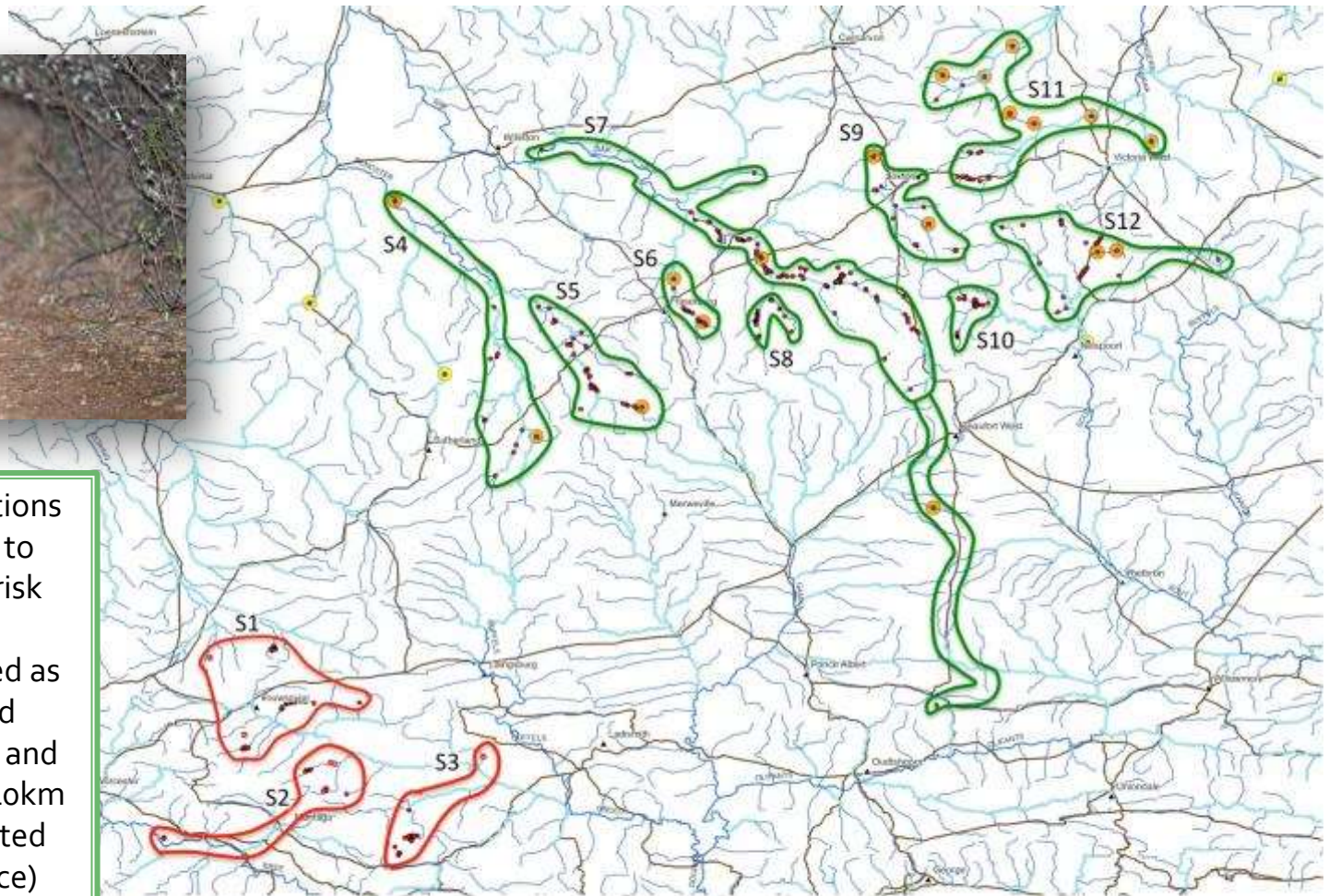
African Striped Weasel
(*Poecilogale albinucha*)



Example: Estimating population size from record clusters



Other uses of spatial information: Riverine Rabbit subpopulation identification



Subpopulations are defined as being made up of groups of at least 6 presence sightings in close proximity along 1st, 2nd and 3rd order rivers that are within a maximum of 10km of each other. If the presence sightings are more than 10km from each other they are not taken as being from the same subpopulation. A minimum of 6 sightings was taken to represent a subpopulation (potentially representing up to 3 breeding pairs). Where less than 6 sightings occurred in isolation from survey data, these were assumed to be part of the nearest subpopulation based on connectivity along the rivers. The Yellow circles represent museum specimens and were not included in subpopulation estimates.

Identifying subpopulations
(and isolation) is key to
assessing extinction risk

Subpopulations defined as
groups of confirmed
sightings along 1st, 2nd and
3rd order rivers within 10km
of each other (suspected
max dispersal distance)

Critically Endangered C2a(i)

Spatial data sources used in Red List so far

Layer name	Group	Reference	In use	Needed
NEPA wetlands layer	All wetland specialist species	Nel and Driver 2012	x	
NEPA rivers	Spotted-necked otter	Nel and Driver 2012	x	
Quaternary drainage regions	Spotted-necked otter	DWS 2010	x	
Vegetation types	All habitat specialists	Mucina & Rutherford 2006	x	
SPOT Building Count	Traded species	Eskom 2008	x	
2014 national land cover	All small mammals	GeoTerra Image	x	
National Biodiversity Assessment	All habitat specialists	Driver <i>et al.</i> 2012	x	
KZN land cover 2008	All small mammals	Jewitt 2012	x	
MPUM land cover 2012	All small mammals	MPTA 2014	x	
NW land cover 2009	All small mammals	NW DACERD 2009	x	
2000 national land cover	All small mammals	GeoTerra Image		x
Climate change layer	All small mammals			x
Wetland land cover change	Wetland specialists			x

Conclusions

Data summary



Total records in MM: **c. 561,328**

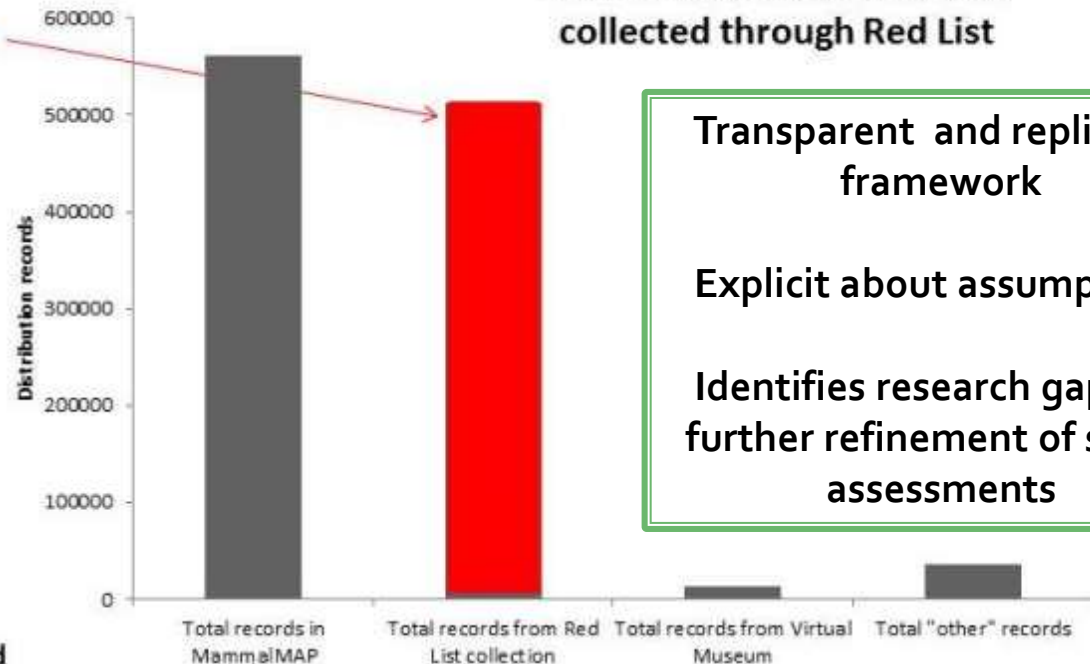
Total Red List records: 512,880

Total VM records: 12,436

Total "other" records: 36,012

Total useable: 531,372

Total useable refers to just those georeferenced, but not cleaned



91% of total records in MM collected through Red List

Transparent and replicable framework

Explicit about assumptions

Identifies research gaps for further refinement of status assessments