



# Species Targets Literature Review

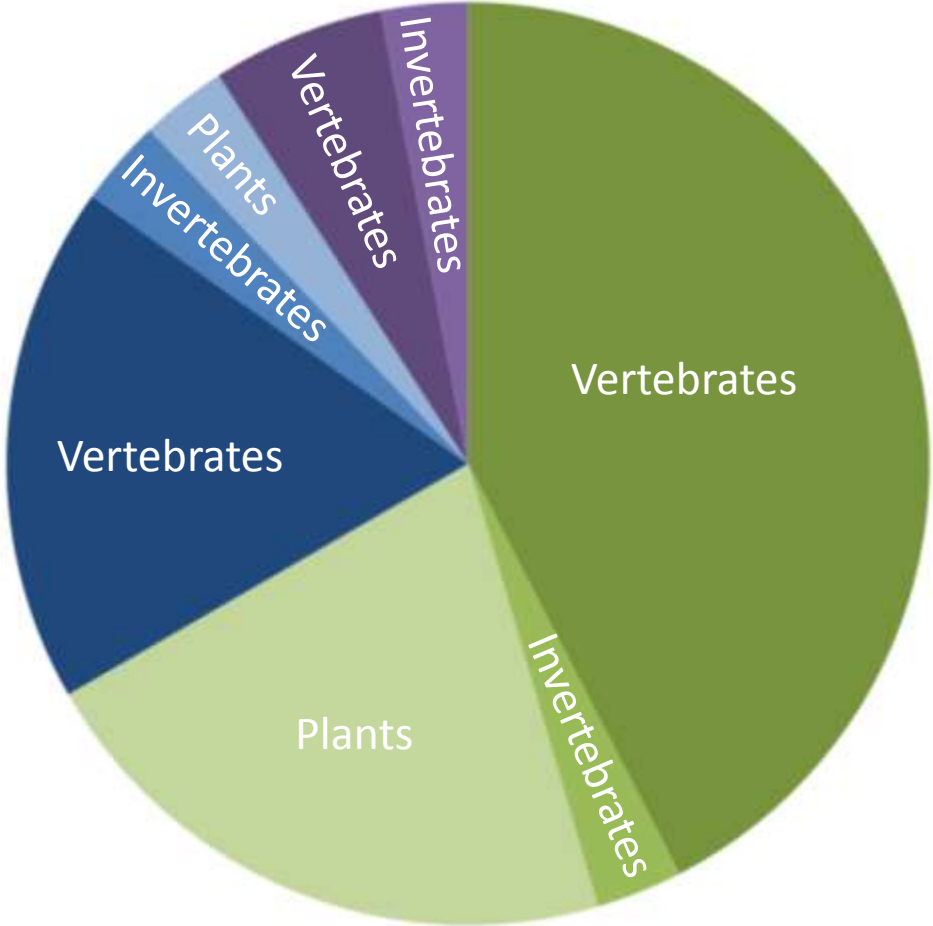
Lize von Staden

Theresa Sethusa

Dewidine van der Colff

SANBI Threatened Species Programme

Marine

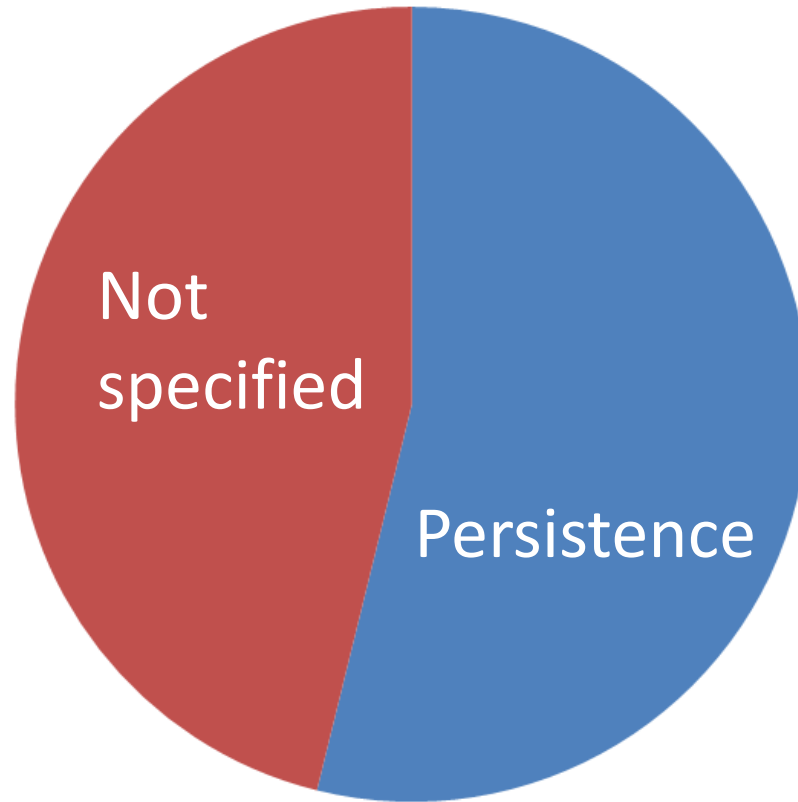


Freshwater

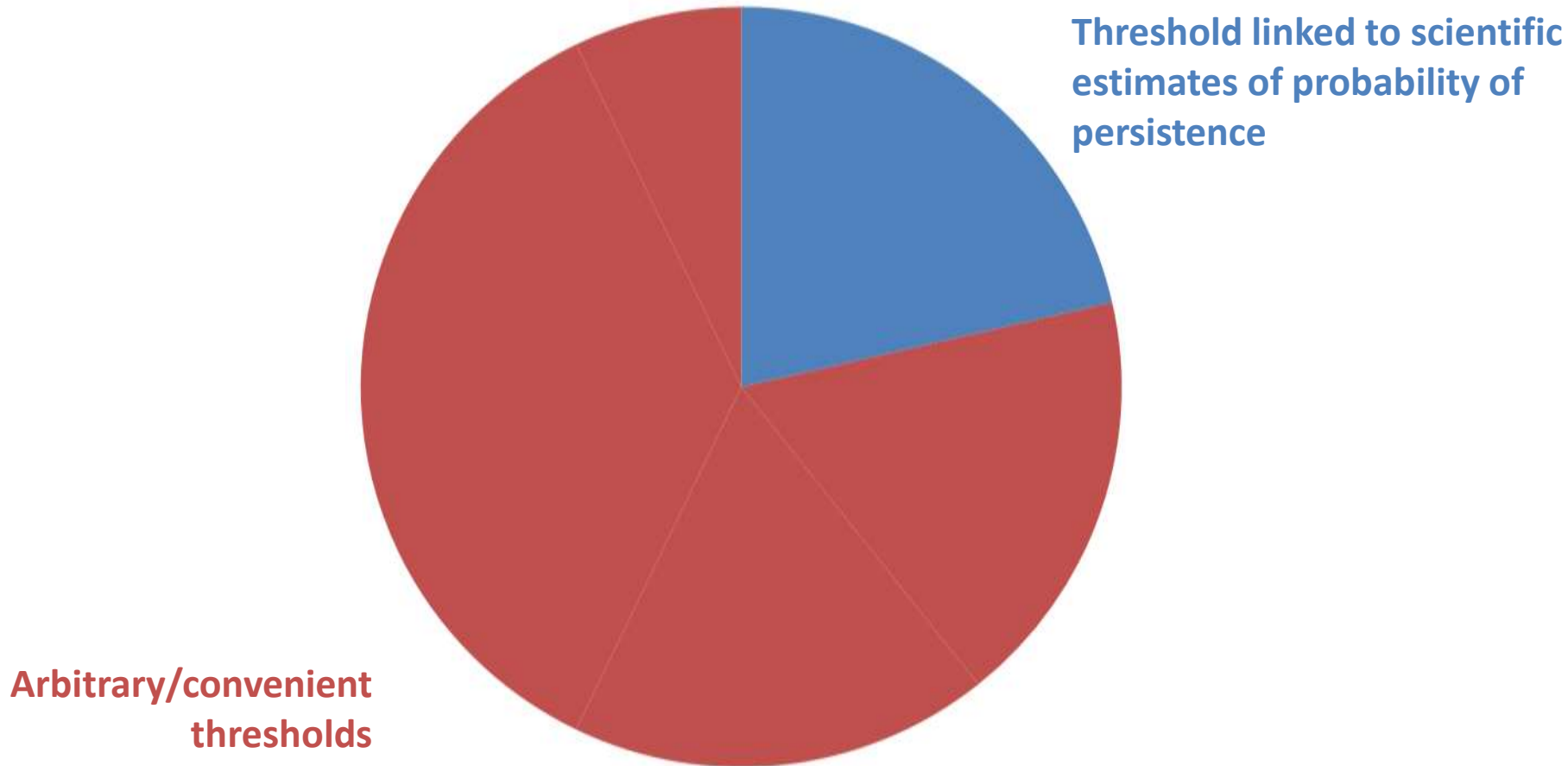
Terrestrial



# Representation or persistence?

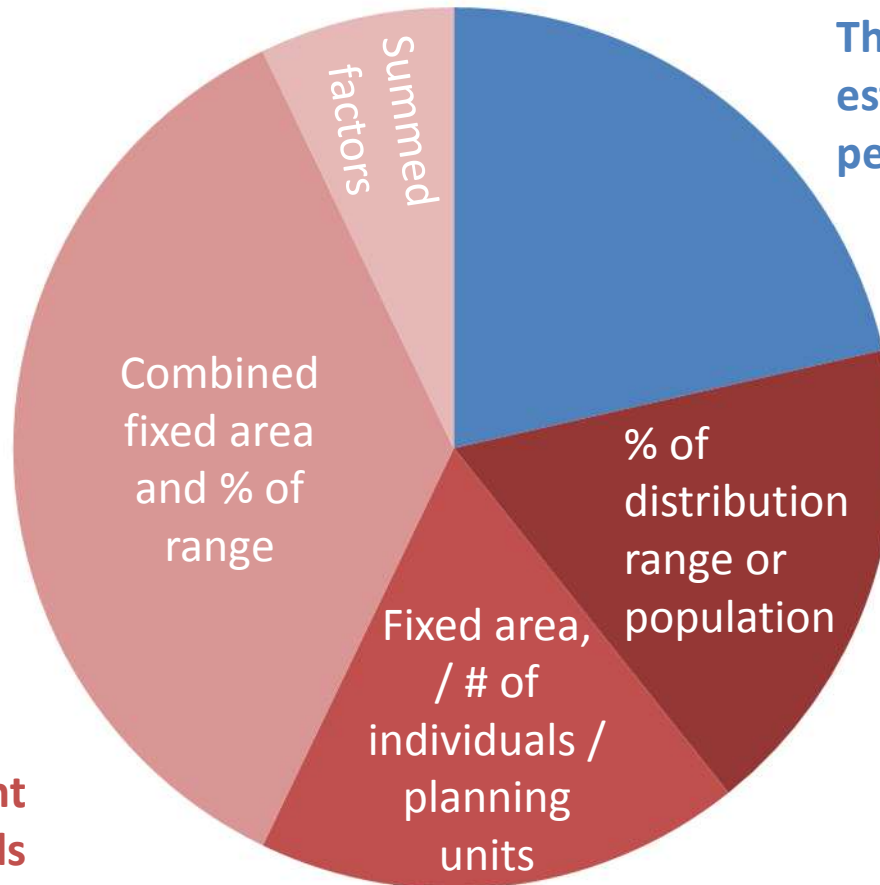


# Basis for target thresholds





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**Arbitrary/convenient thresholds**



# Types of distribution data used

- Modelled distribution
- Point occurrence
- Occupied Range
- Combinations

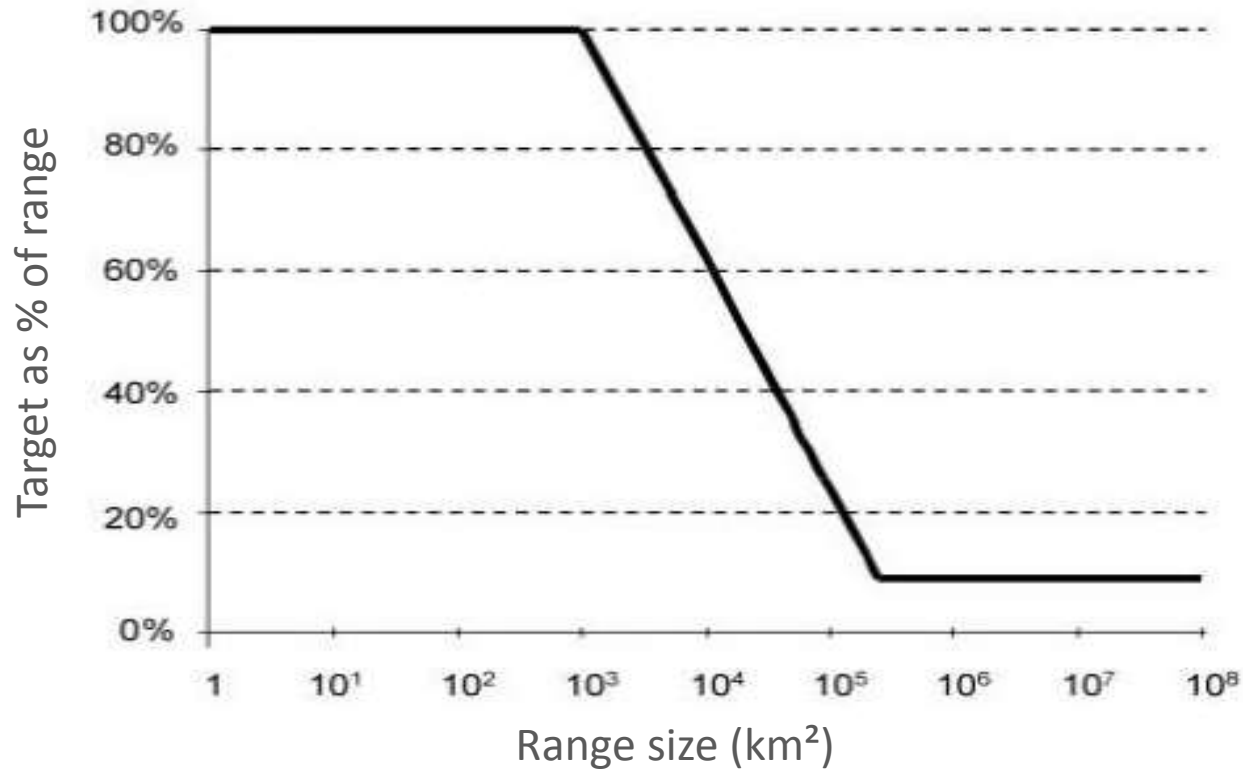


# Setting conservation targets

- Noted:
  - Constant targets are bias towards widespread species
  - Species with smaller ranges are Rare in range size + local abundance (Gaston *et al.* 1997)
  - Species with smaller ranges: vulnerable to adverse natural events (Gaston 2003)



# Conservation targets: Rodrigues et al. 2004



- **Restricted species (Range <1000 km<sup>2</sup>) = 100% target**
- **A wide spread species (Range >250 000 km<sup>2</sup>) = 10% target**



# Formulating conservation targets for a gap analysis of endemic lizards in a biodiversity hotspot by Silva *et al.* 2014

Applied to specific group of taxa: Lizards of Brazil

<b>Natural rarity (NR)</b>	1. Geographic range 2. Population size 3. Habitat specificity
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<b>Vulnerability (VL)</b>	1. Model future habitat loss threat 2. Estimate of threat: IUCN Red List Categories
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<b>Life history (LH)</b>	1. Body size: Larger species ~ Larger home range 1. 3 Body-size categories
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$$T_i = 0.065 + 0.1NR_i + 0.05VL_i + 0.05LH_i$$

- % Targets are applied to the SDM (species distribution model) by (% $T_i$  x SMD)
- **Influence on identification of gap areas for conservation:**
  - <50% = Major Gap
  - >50 % = Minor gap

# What the theorists say

**STEP 1:** Estimate Minimum Viable Population (MVP)\*

**STEP 2:** Estimate average density (D) - # of individuals per unit area

**STEP 3:** Estimate Minimum Area Required (MAR)

$$= \frac{MVP}{D} = \text{Target}$$

\*smallest # of individuals with long-term, high probability of persistence



# More about MVP

- Independent of total (original/historical) population size
- Cannot be reliably predicted by biological or life history traits (e.g. body size, trophic level)
  - Pe'er, G., Tsianou, M.A., Franz, K.W., Matsinos, Y.G., Mazaris, A.D., Storch, D., Kopsova, L., Verboom, J., Baguette, M. and Stevens, V.M. 2014. Toward better application of minimum area requirements in conservation planning. *Biological Conservation* 170:92-102.
- MVP is around **5000** individuals for most species
  - Traill, L.W., Bradshaw, C.J. and Brook, B.W. 2007. Minimum viable population size: a meta-analysis of 30 years of published estimates. *Biological Conservation* 139(1):159-166.



# Other consistent population thresholds

Deleterious genetic effects so severe that population will decline to extinction in <5 generations

- Frankham et al. 2014

50 1000

0

'Genetic bottleneck' – reduced long term genetic fitness/ adaptive (evolutionary) potential

- Frankham et al. 2014

MVP when population is stable

- Traill et al. 2007

5000

10 000

MVP when population is declining (IUCN Criterion C threshold for VU)

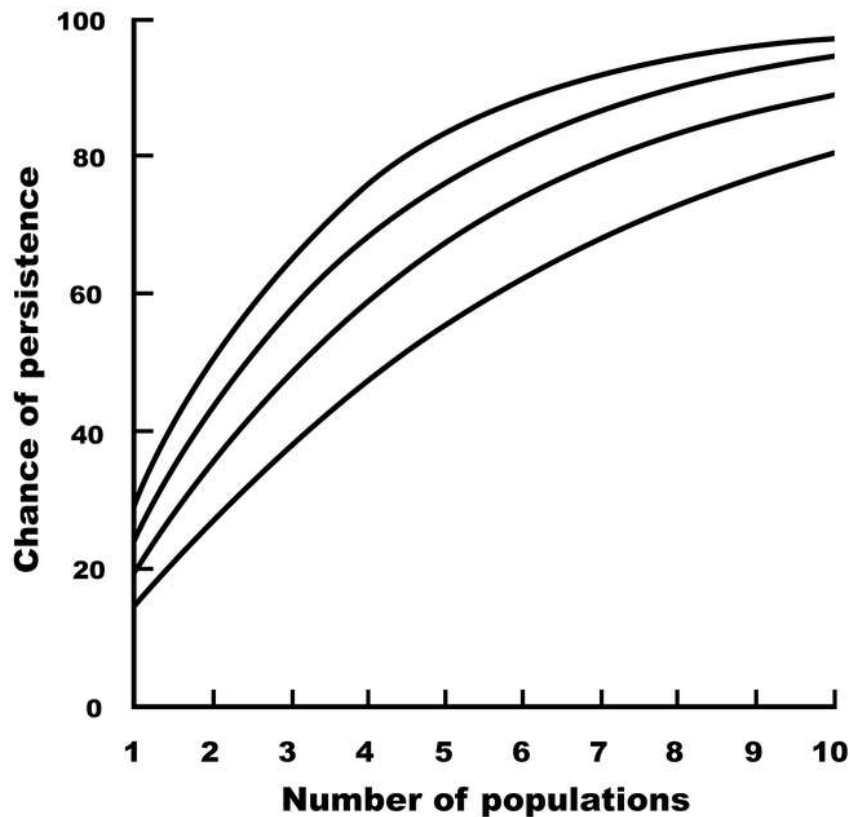
- Mace et al. 2008

Very large





# Meta-population analysis



- High probability of long-term overall persistence with 10 or more populations
  - Cox et al. 1994
- Local abundance (subpopulation size) best predictor of persistence at habitat patch level
  - Verboom et al. 2001



# Revisiting IUCN CR thresholds

Criterion	IUCN CR Thresholds	Equivalent target
A		
B		
C		
D		



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A	80% population reduction in 10 years/3 generations	20% of population
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C		
D		



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C	Population size <250 individuals No subpopulation >50 mature individuals	250 individuals [5 subpopulations of >50 individuals]
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D	Population <50 individuals	50 individuals



# Measuring protection levels against MAR and 10 populations target

Protection level	Threshold	
	MAR	Populations
Unprotected	<5%	0
Poorly protected	5-49%	1-4
Moderately protected	50-99%	5-9
Well protected	100% or more	10 or more



# Questions

1. Keep or discard # of populations target?
2. If answer to 1 = keep - how many populations?
3. Should there be a minimum threshold for (sub)population size?
4. When using MAR in absence of population viability analysis: MVP 5000 or 10 000?
5. How should we measure protection levels for naturally rare species known from <populations /<MVP target?

