THE SILENT EFFECT OF CHANGES:

Towards Genomics-informed Assessments Of Extinction Risks

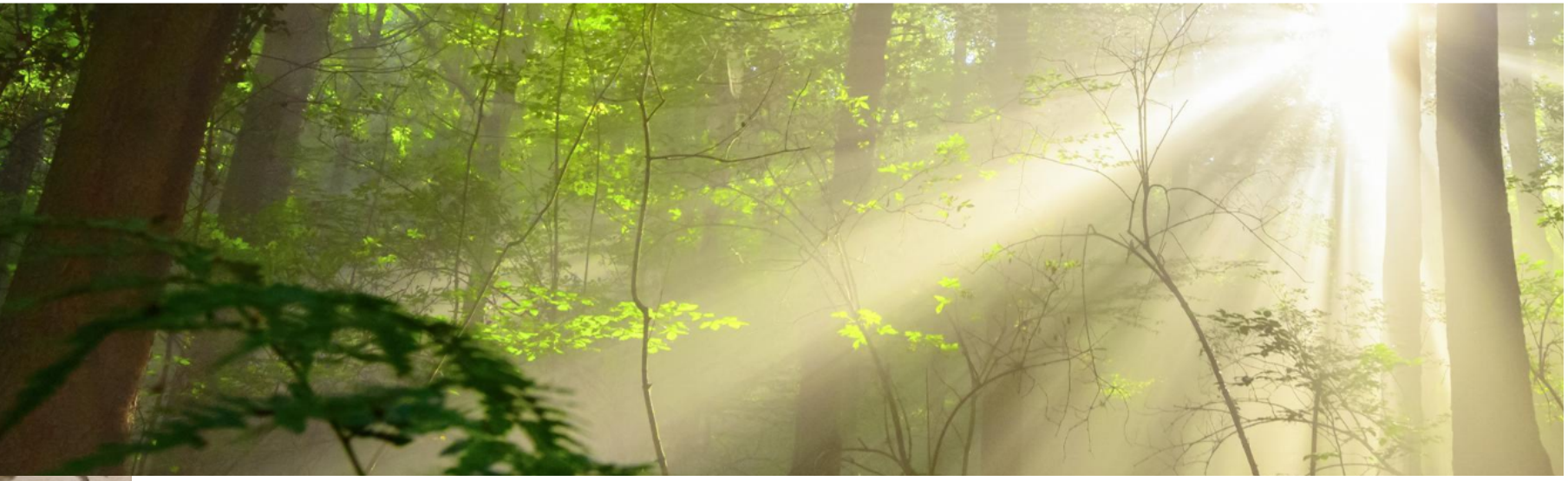
Isabel Marques & David Draper

U LISBOA | UNIVERSIDADE DE LISBOA
INSTITUTO SUPERIOR DE AGRONOMIA Universidade de Lisboa
TERRA
cE3c centre for ecology, evolution and environmental changes
CHANGE Global Change and Sustainability Institute
fct Fundação para a Ciência e a Tecnologia

Royal Botanic Gardens Kew

KEW GARDENS | WAKEHURST | KEW SCIENCE | READ & WATCH | LEARNING | MEMBERSHIP | SHOP | DONATE

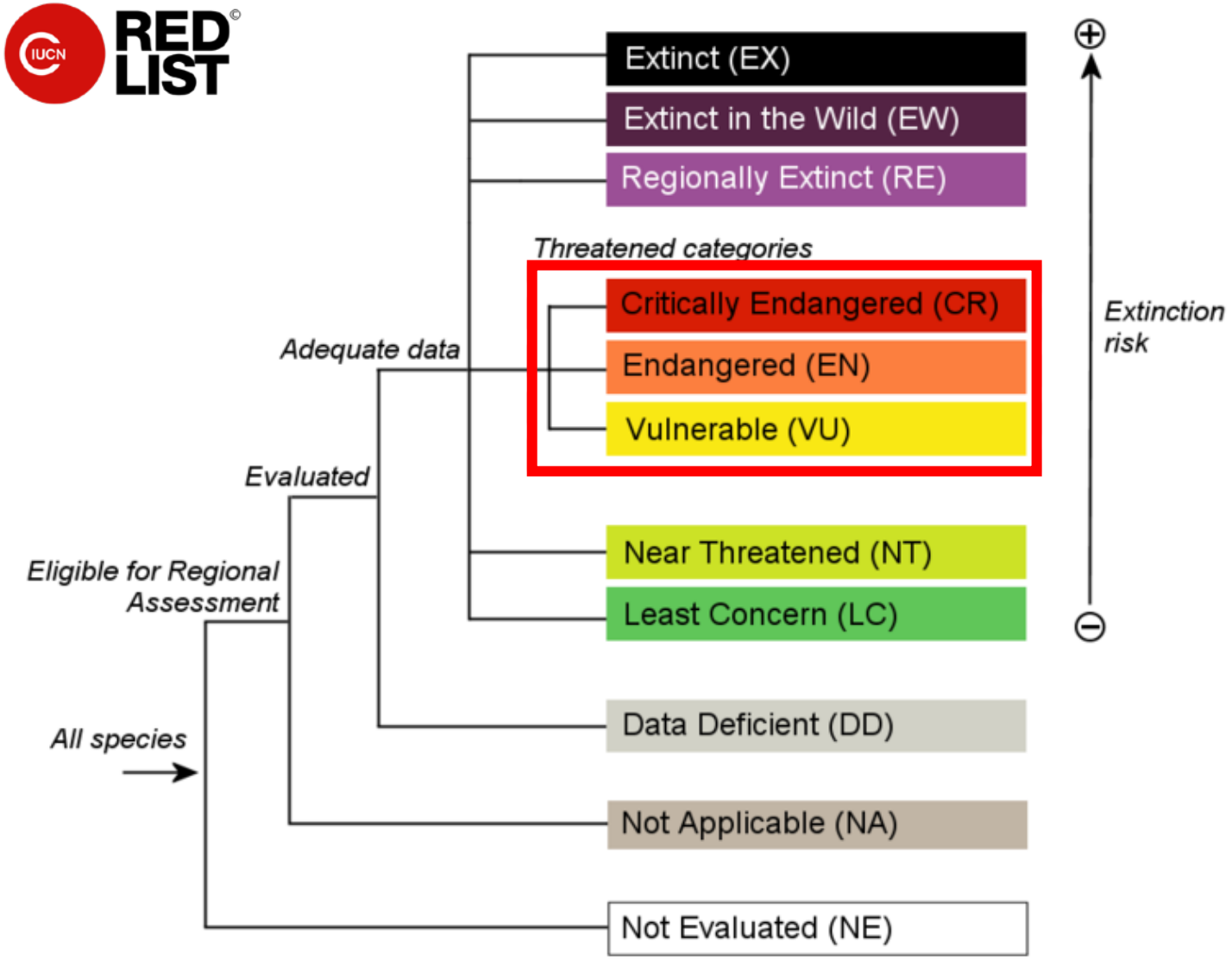
State of the World's Plants and Fungi



45% of known flowering plants estimated to be threatened with extinction

https://www.kew.org/science/state-of-the-worlds-plants-and-fungi

IUCN Red List Categories and Criteria



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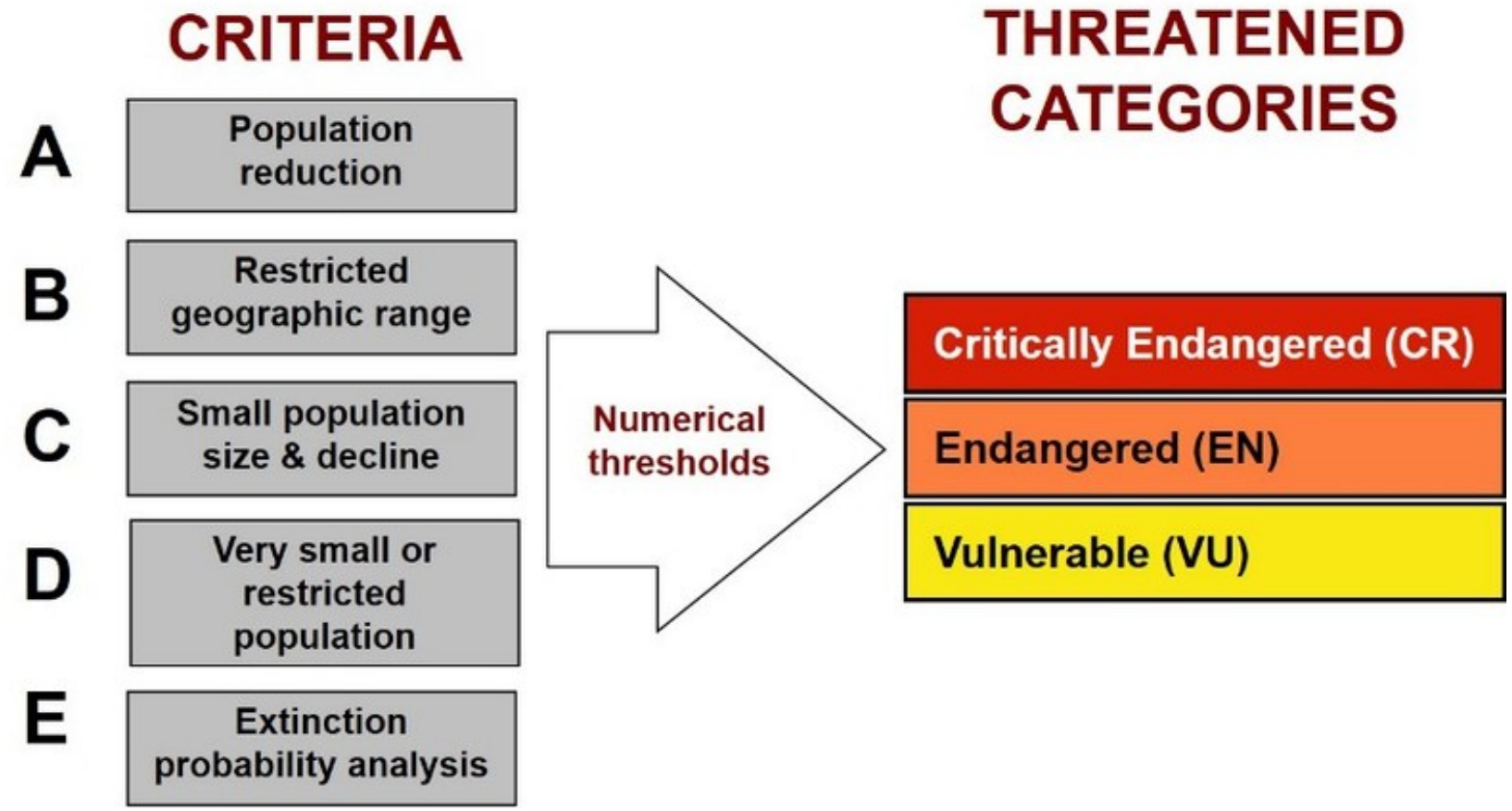

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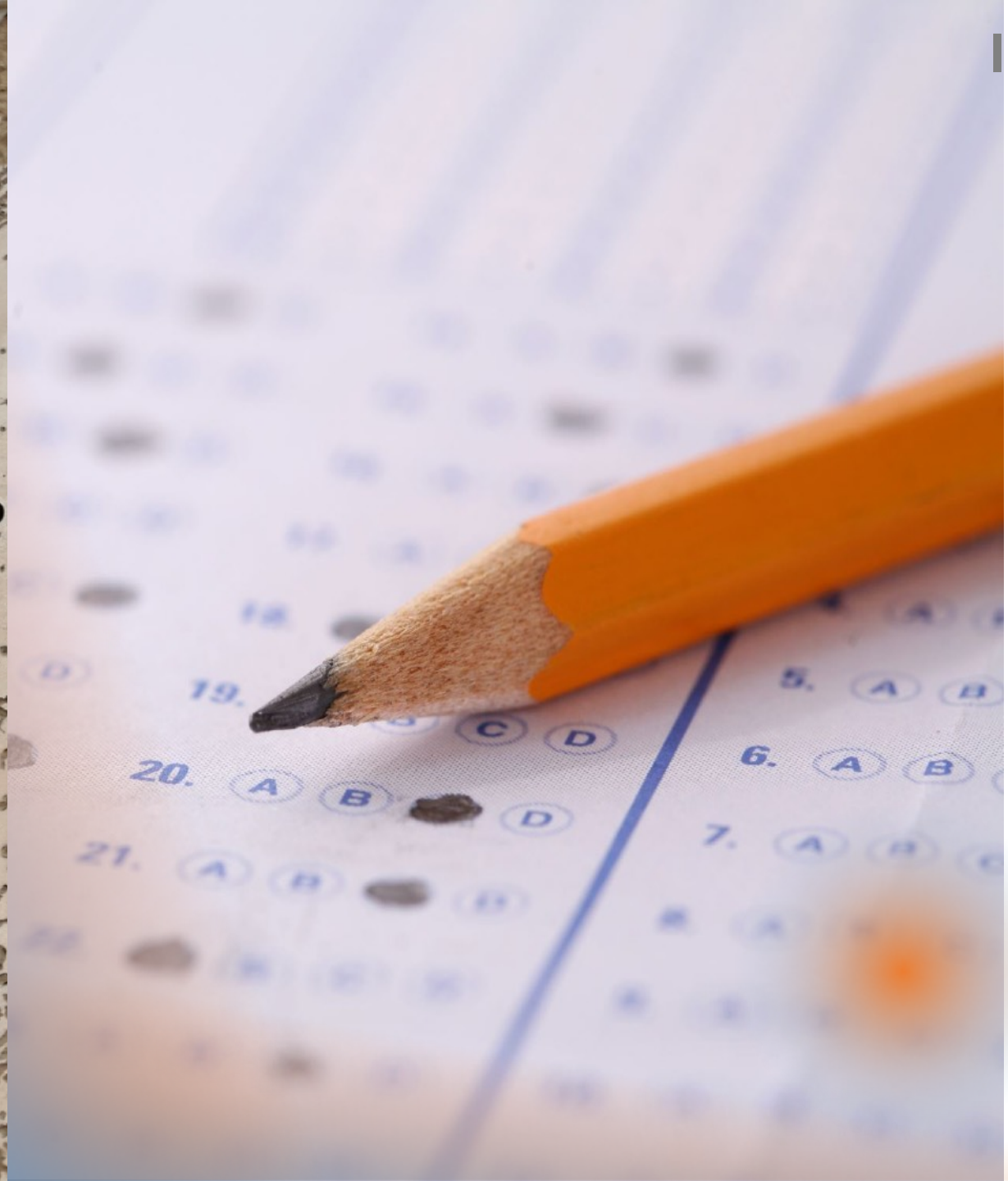

What are the main criteria for estimating the extinction risk of species?

- Spain as an example

IUCN Red List Categories and Criteria in Spain

CRITERIA

- **A** Population reduction
- **B** Restricted geographic range
- **C** Small population size & decline
- **D** Very small or restricted population
- **E** Extinction probability analysis

Numerical thresholds

THREATENED CATEGORIES

Critically Endangered (CR)	298
Endangered (EN)	420
Vulnerable (VU)	891

A fifth of Spanish vascular flora is threatened: 1609 taxa

Muñoz-Rodríguez, Draper Munt & Moreno Saiz (2016): Global strategy for plant conservation: inadequate in situ conservation of threatened flora in Spain, Israel Journal Plant Sciences. 10.1080/07929978.2016.1257105

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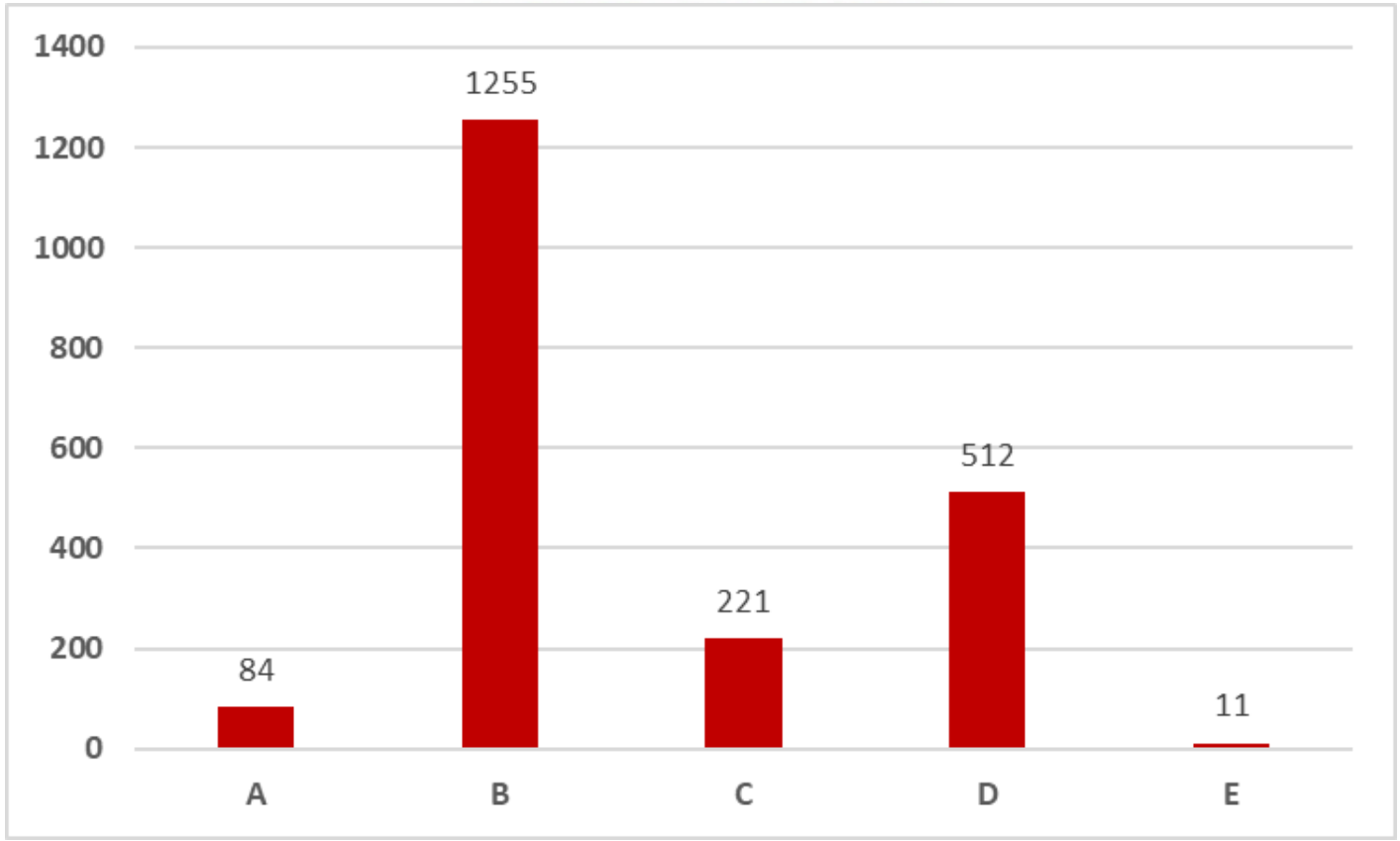

Draper Munt et al. Global trends of conservation in the threatened Mediterranean flora. In prep.

IUCN Red List Categories and Criteria in Spain

Use any of the criteria A-E	Critically Endangered	Endangered	Vulnerable
B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy)			
B1. Either extent of occurrence	< 100 km^2	< 5,000 km^2	< 20,000 km^2
B2. or area of occupancy	< 10 km^2	< 500 km^2	< 2,000 km^2

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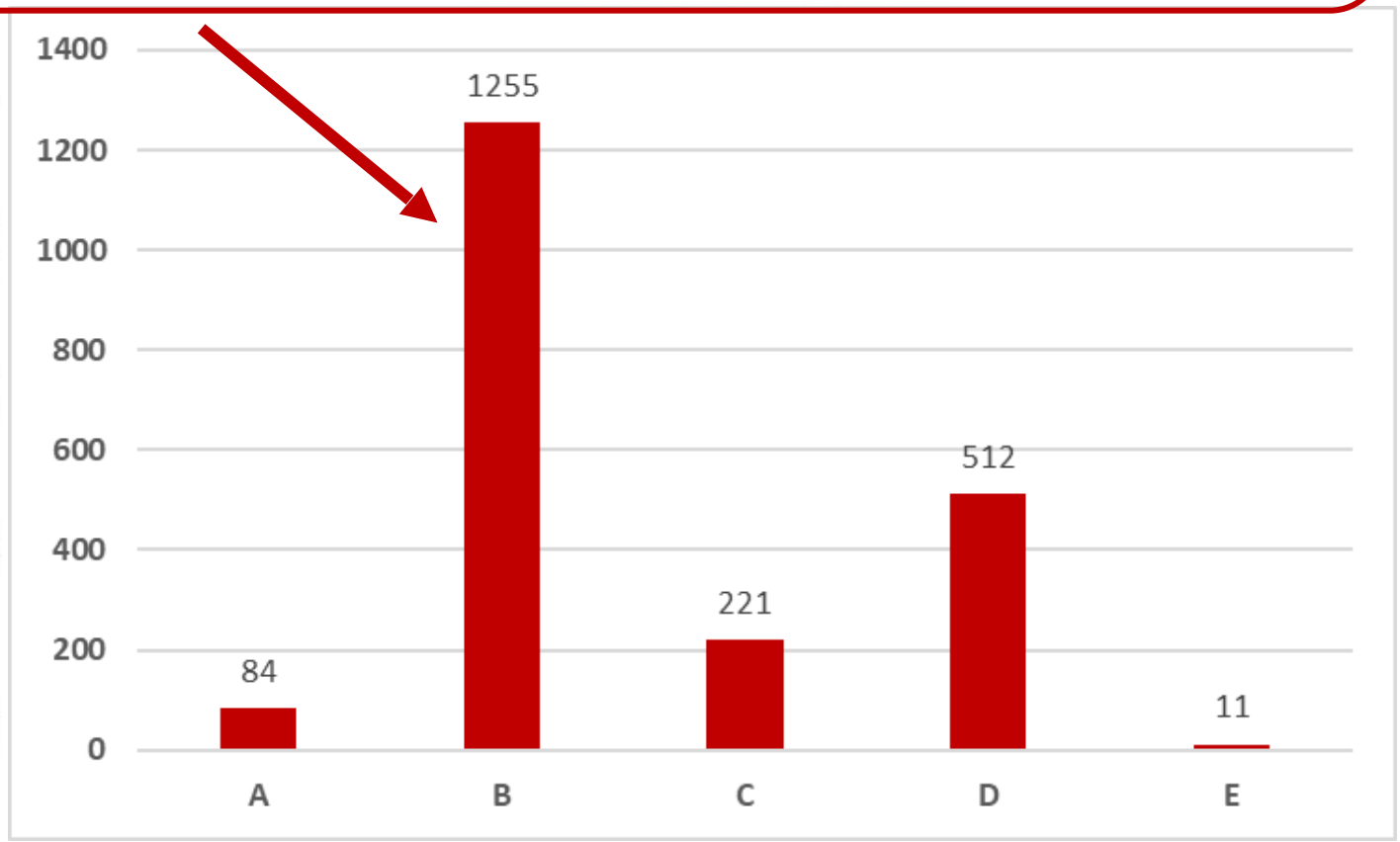

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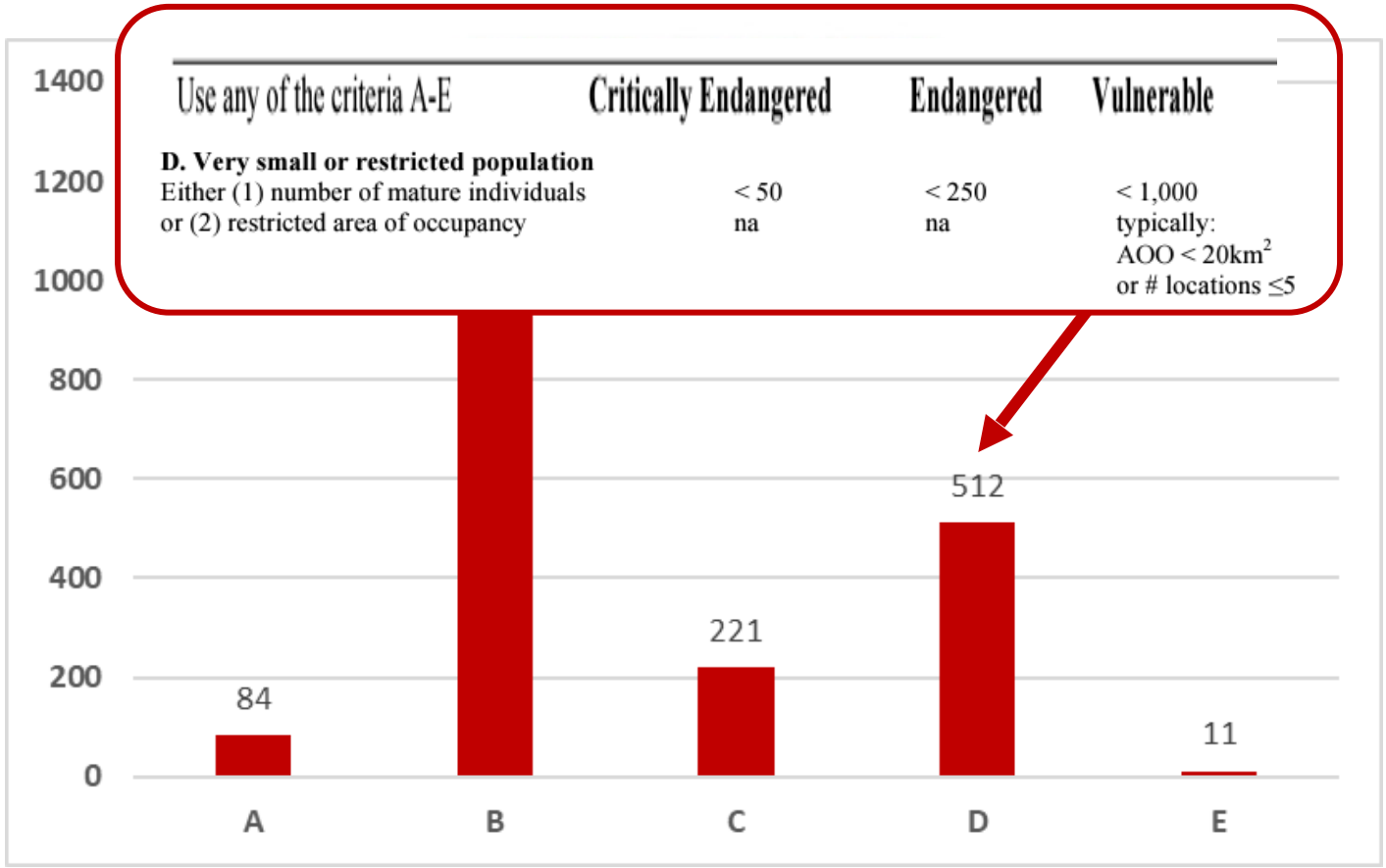

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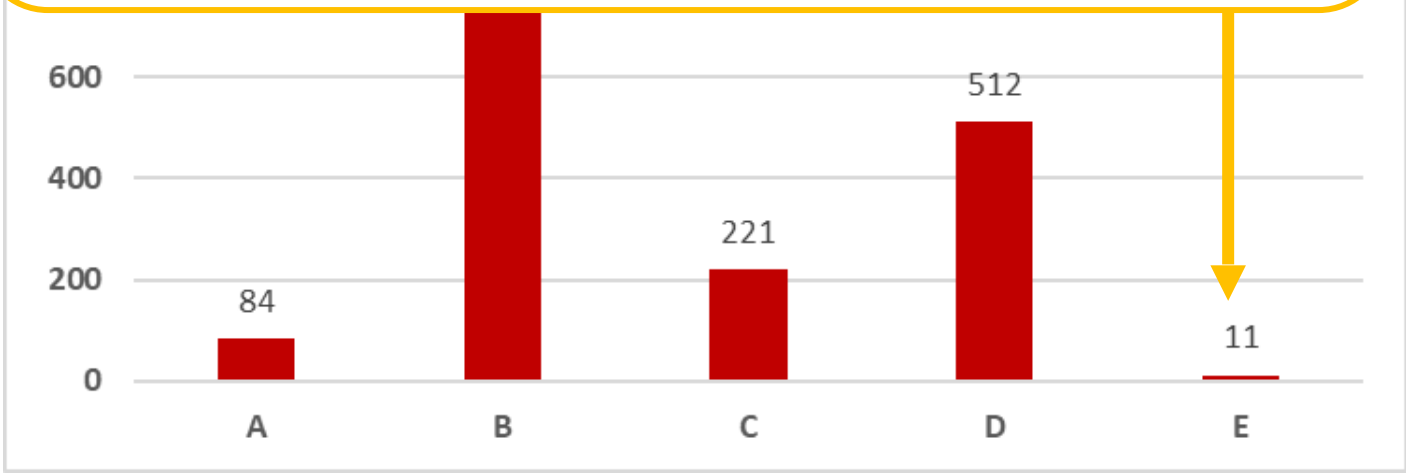
	Critically Endangered	Endangered	Vulnerable
E. Quantitative Analysis			
Indicating the probability of extinction in the wild to be at least	50% in 10 years or 3 generations (100 years max)	20% in 20 years or 5 generations (100 years max)	10% in 100 years



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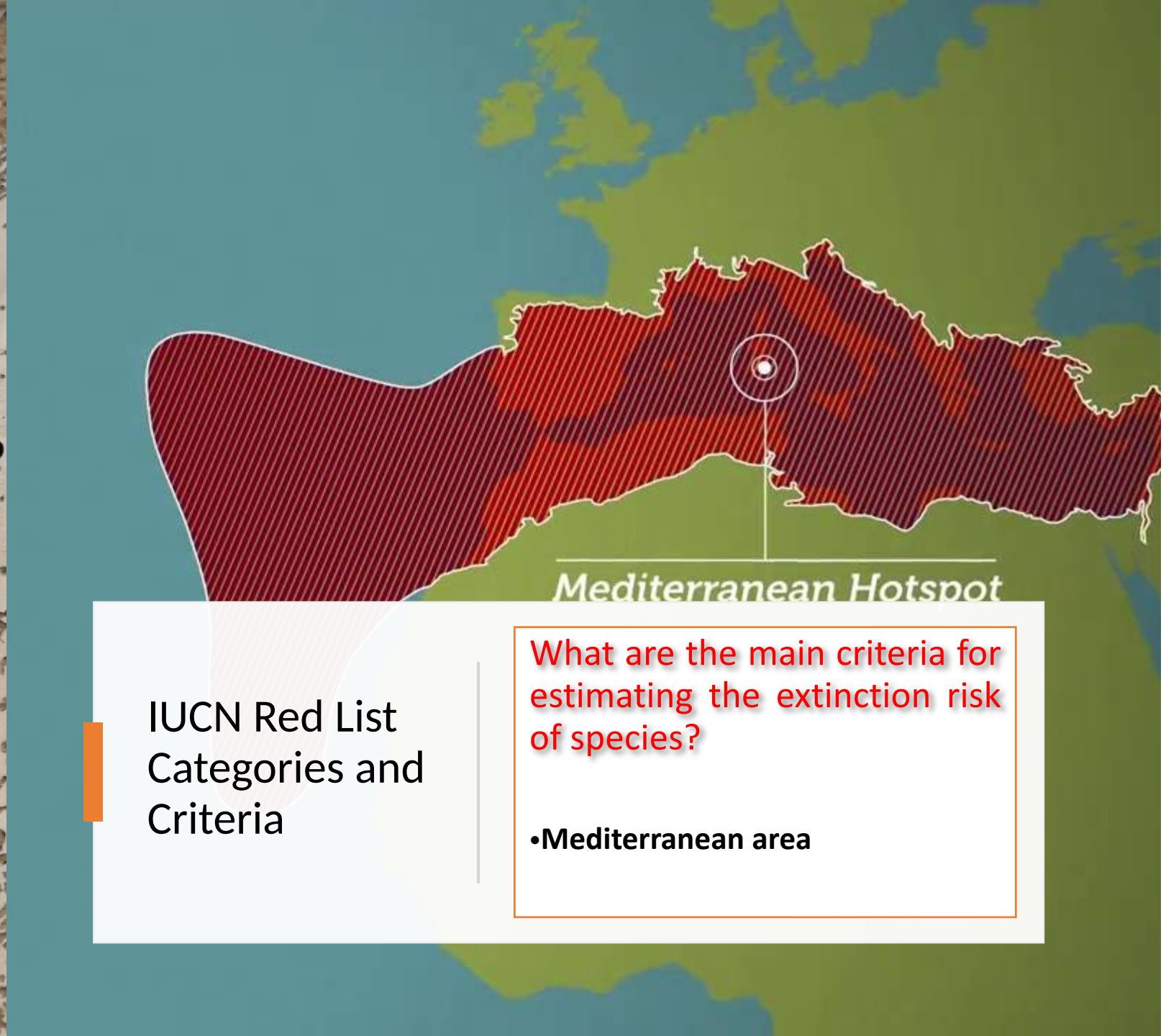
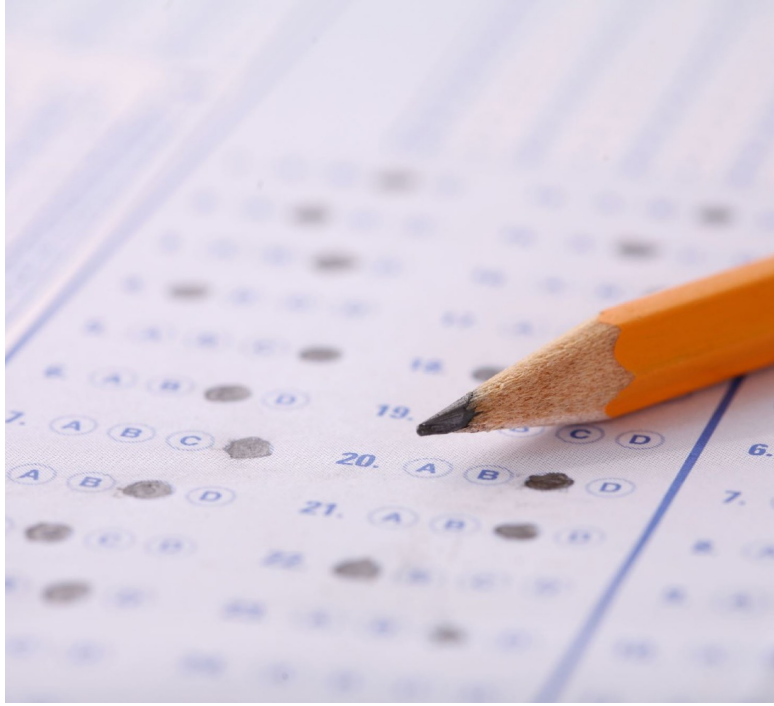
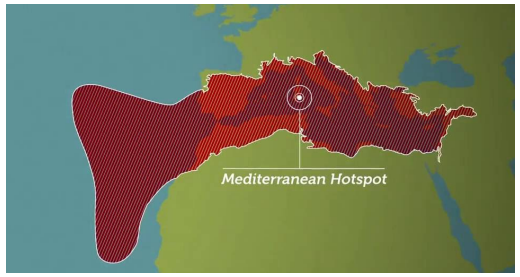




IUCN Red List Categories and Criteria

What are the main criteria for estimating the extinction risk of species?

- **Mediterranean area**



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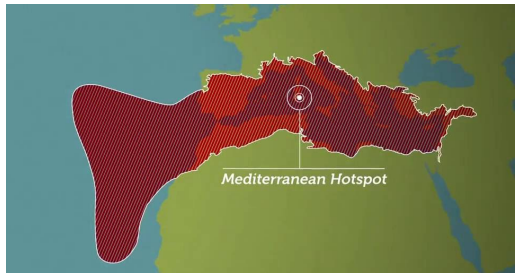
Numerical thresholds

THREATENED CATEGORIES

Critically Endangered (CR)	395
Endangered (EN)	562
Vulnerable (VU)	527

1484 plants are considered threatened in the Mediterranean area

Draper Munt et al. Global trends of conservation in the threatened Mediterranean flora. In prep.



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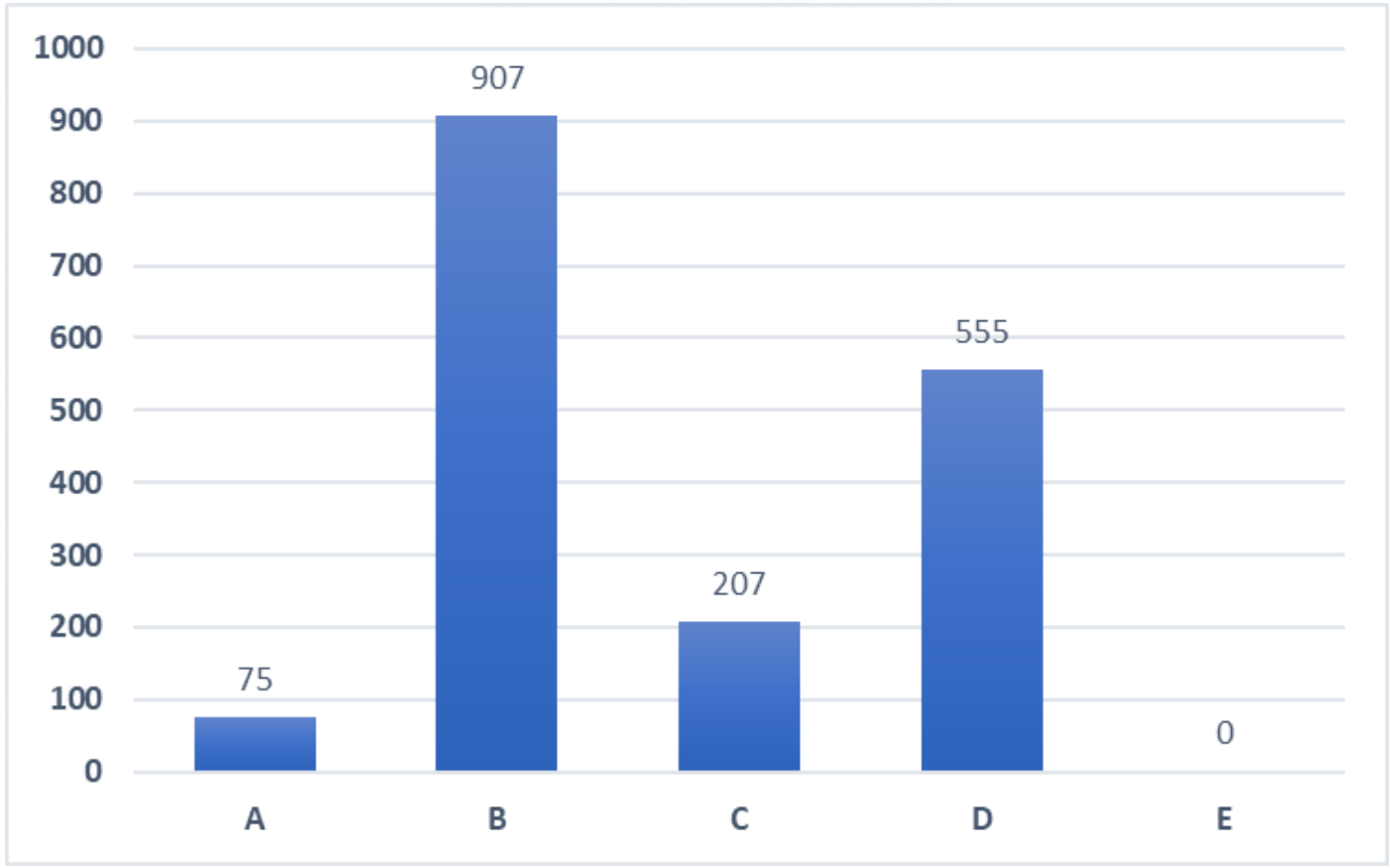

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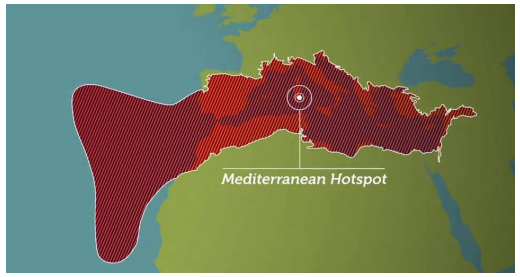

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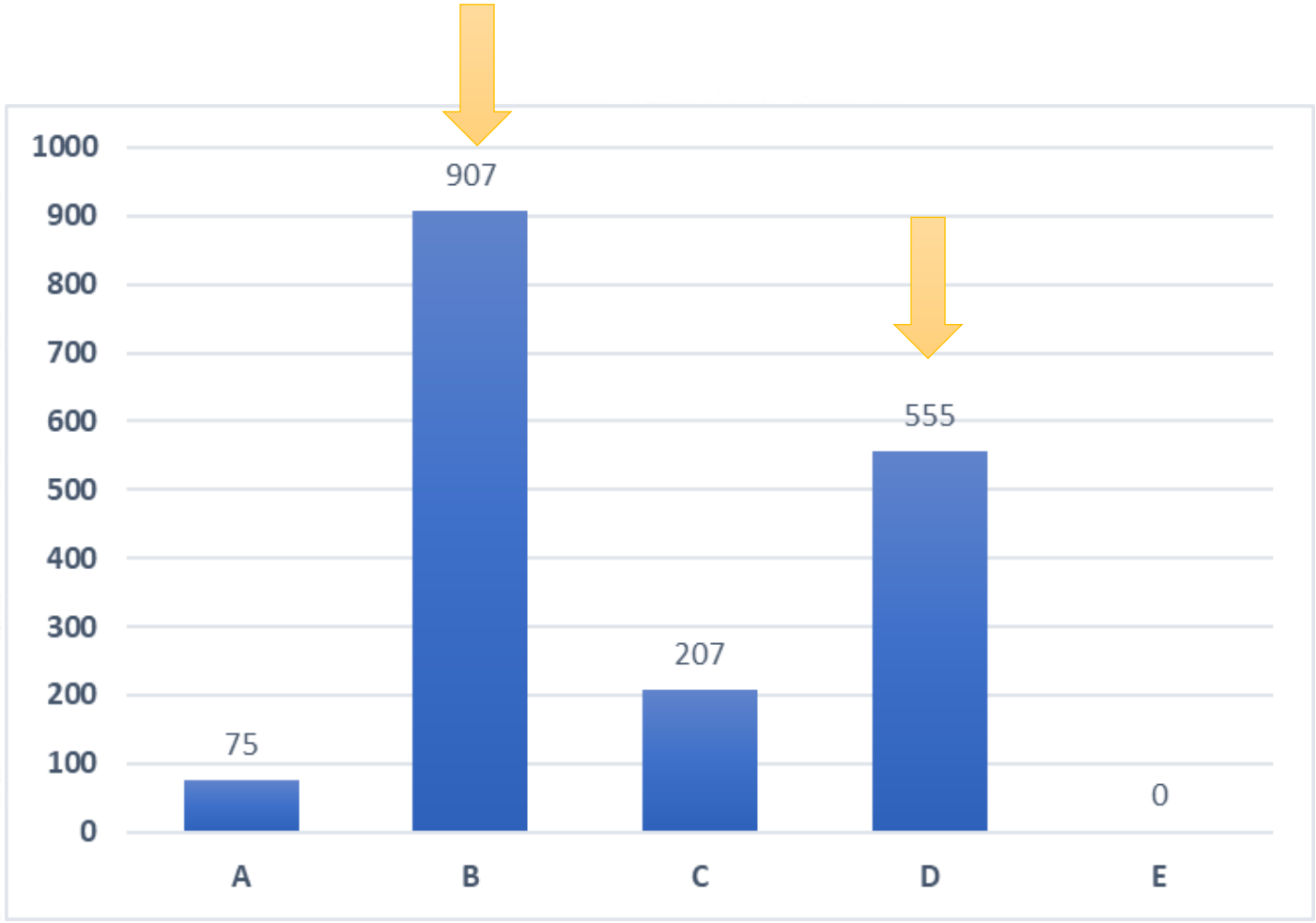

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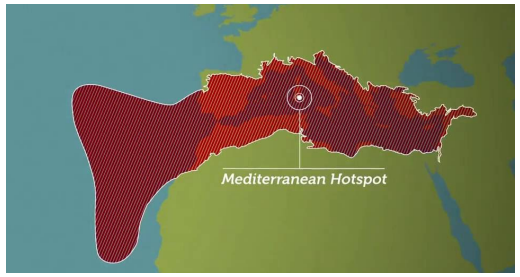

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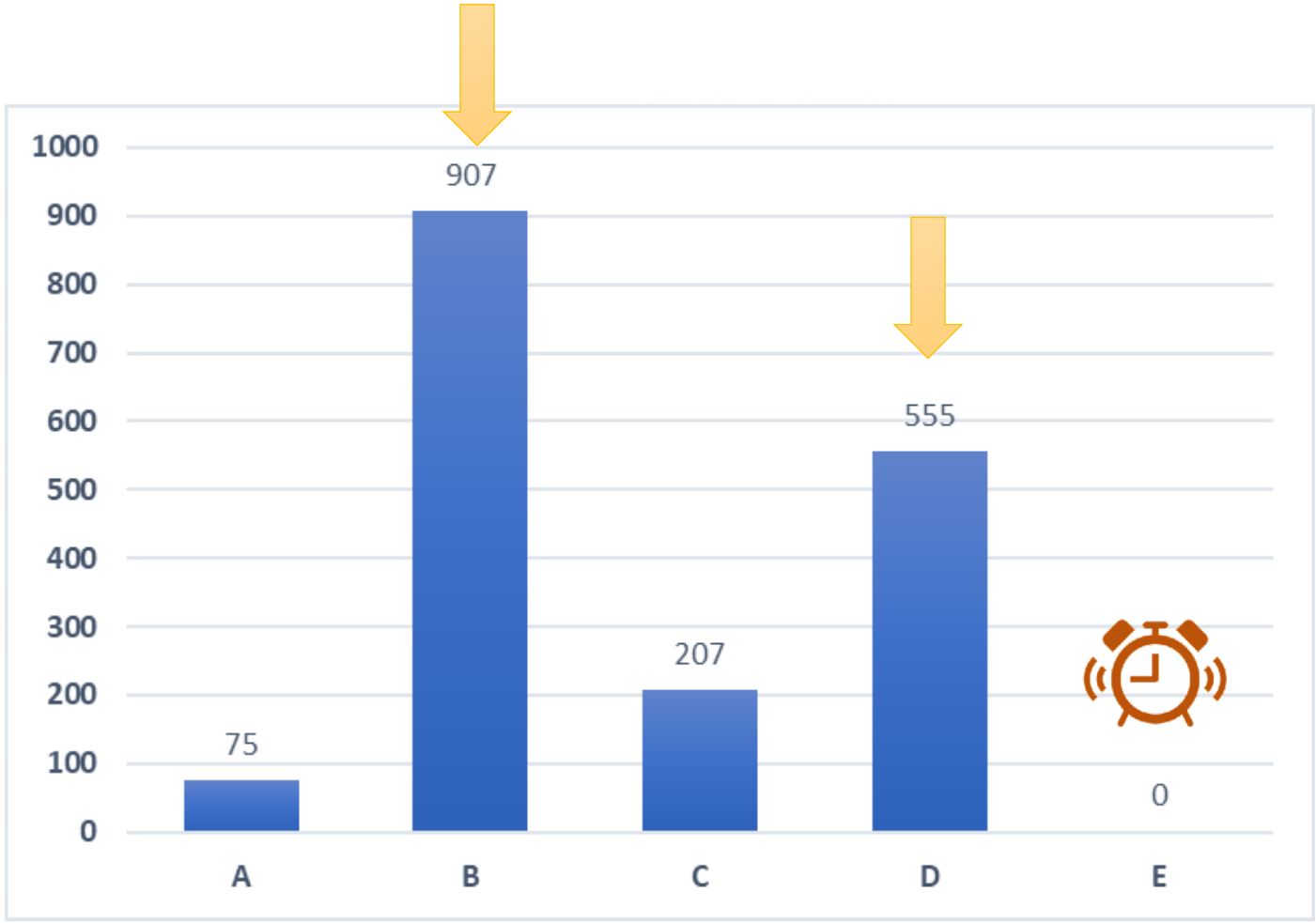

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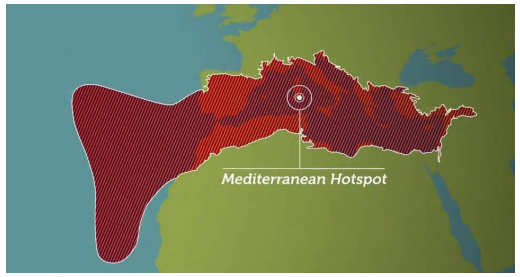
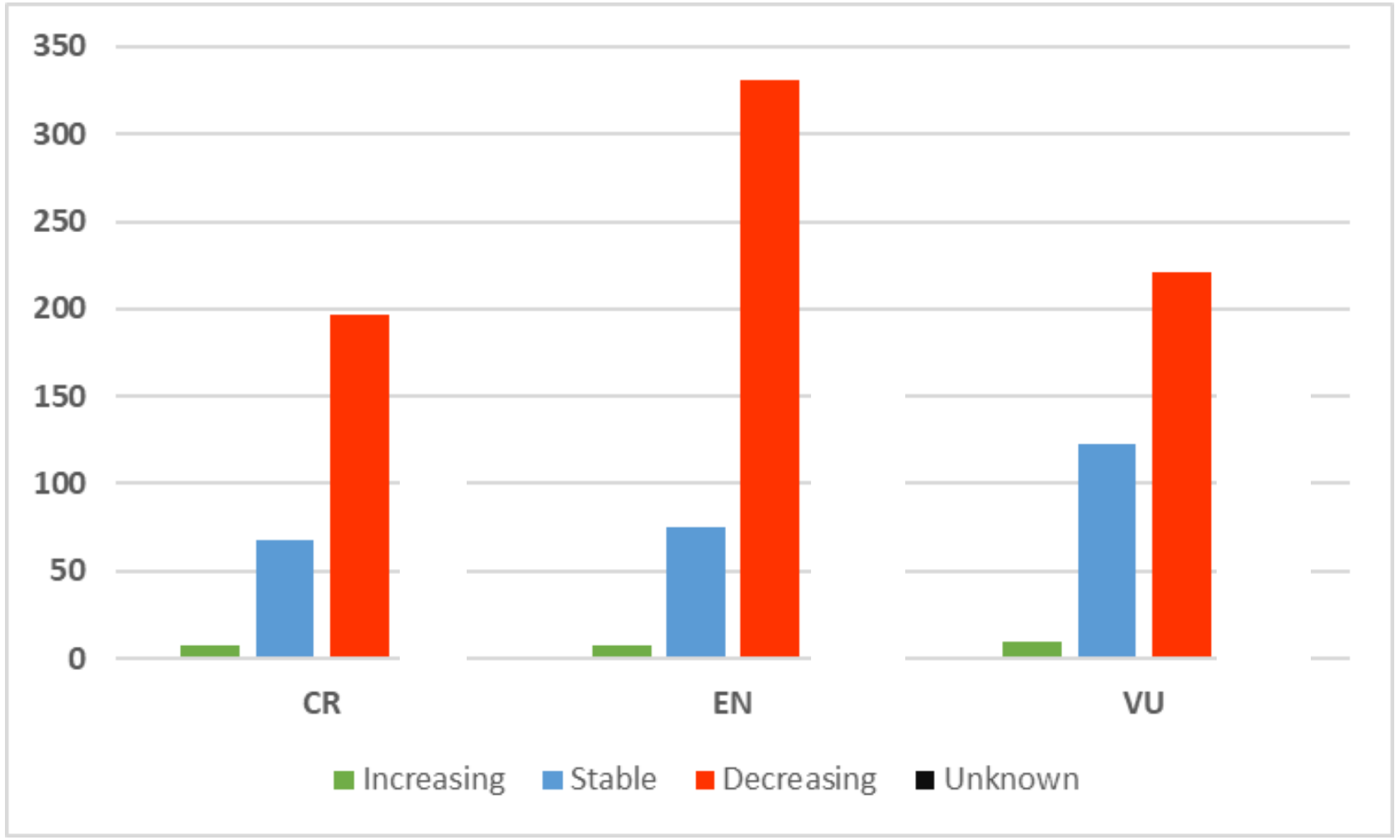


IUCN Red List Categories and Criteria in the Mediterranean: Population trends are needed!



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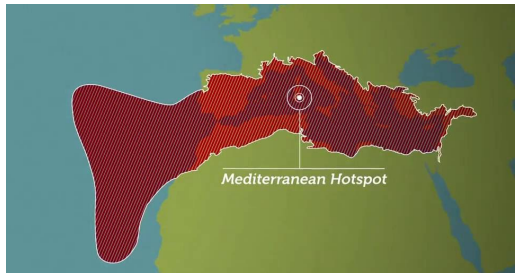

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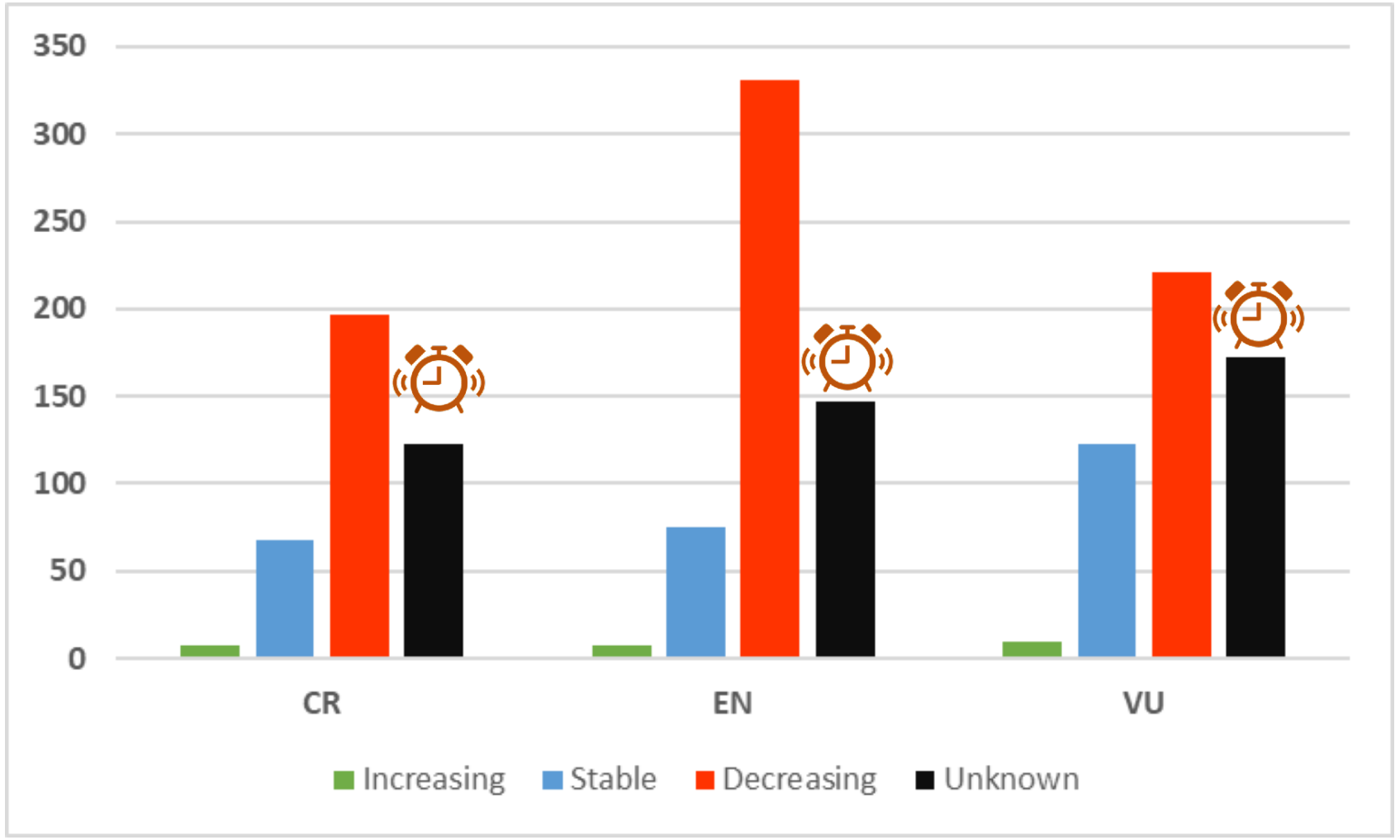

Calculating trends is…a challenge! …Lack of resources, monitoring studies, time…

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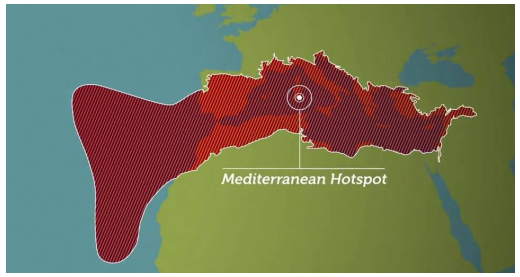

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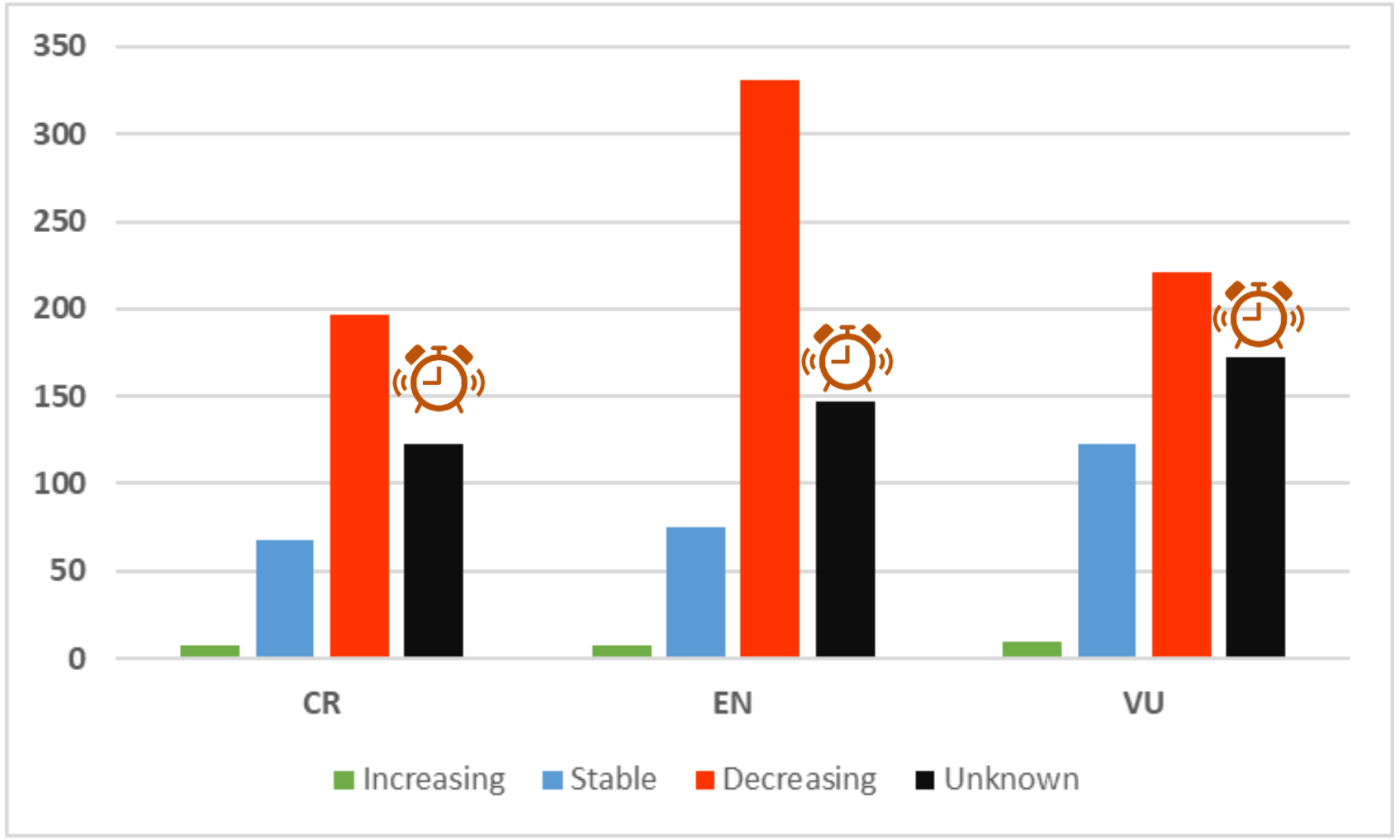

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Genetic assessments could help!

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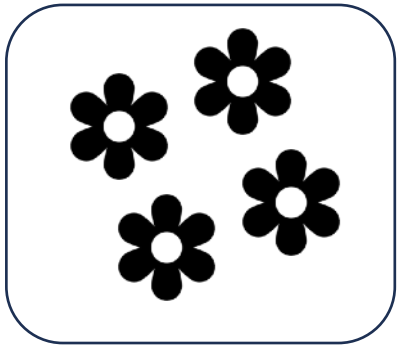
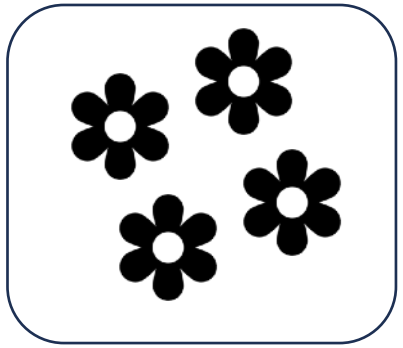
Census size vs. effective population size



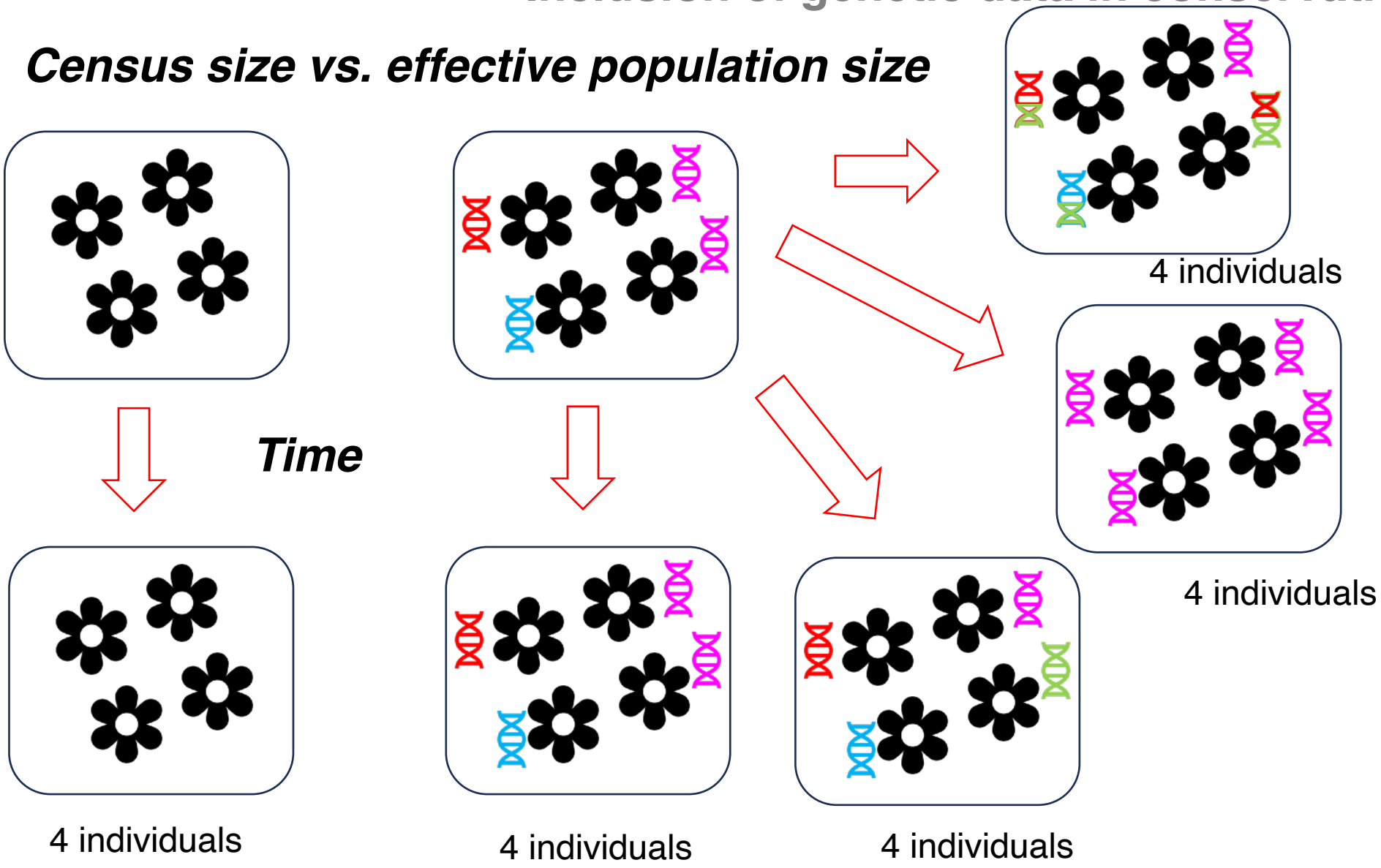
Time



4 individuals

Inclusion of genetic data in conservation decisions

Census size vs. effective population size



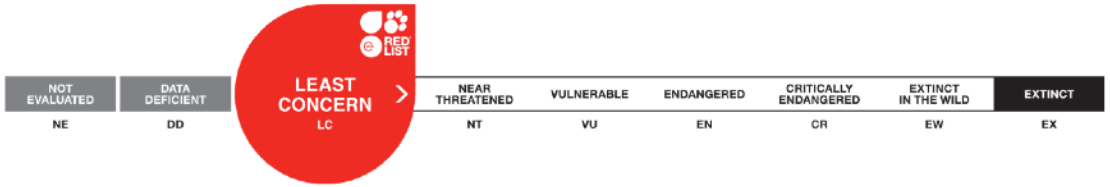
Inclusion of genetic data in conservation decisions

Narcissus serotinus

LC- Least Concern in the Mediterranean area

THE RED LIST ASSESSMENT

Juan Vicedo, J., Draper Munt, D., Marques, I. & Véla, E. 2018. *Narcissus serotinus*. *The IUCN Red List of Threatened Species* 2018: e.T13147080A18613955. https://dx.doi.org/10.2305/IUCN.UK.2018-1.RLTS.T13147080A18613955.en. Accessed on 18 October 2023.



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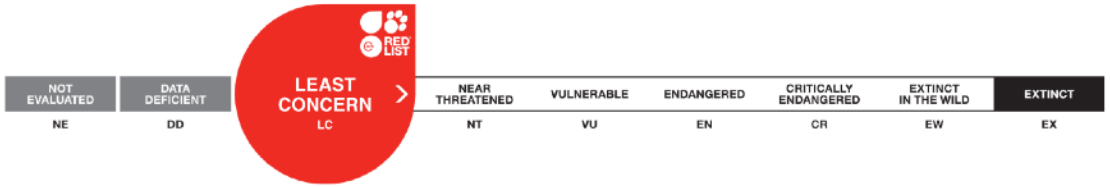
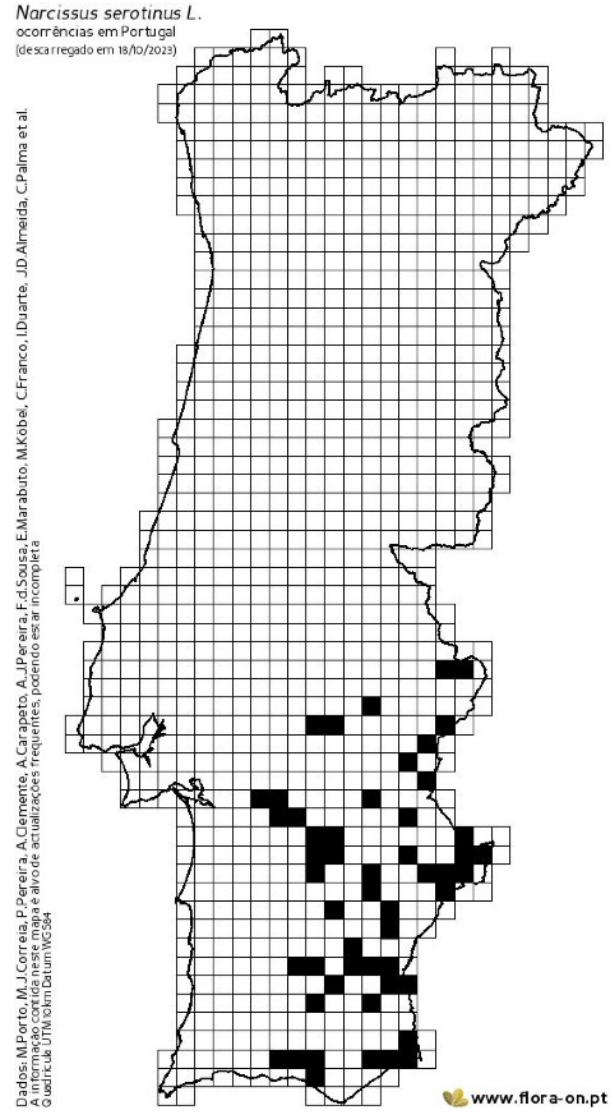


NT- Near Threatened in Portugal



M.Porto, et al. (2023). Narcissus serotinus L. - mapa de distribuição. Flora-On: Flora de Portugal Interactiva, Sociedade Portuguesa de Botânica. http://www.flora-on.pt/#wNarcissus+serotinus. Consulta realizada em 18/10/2023

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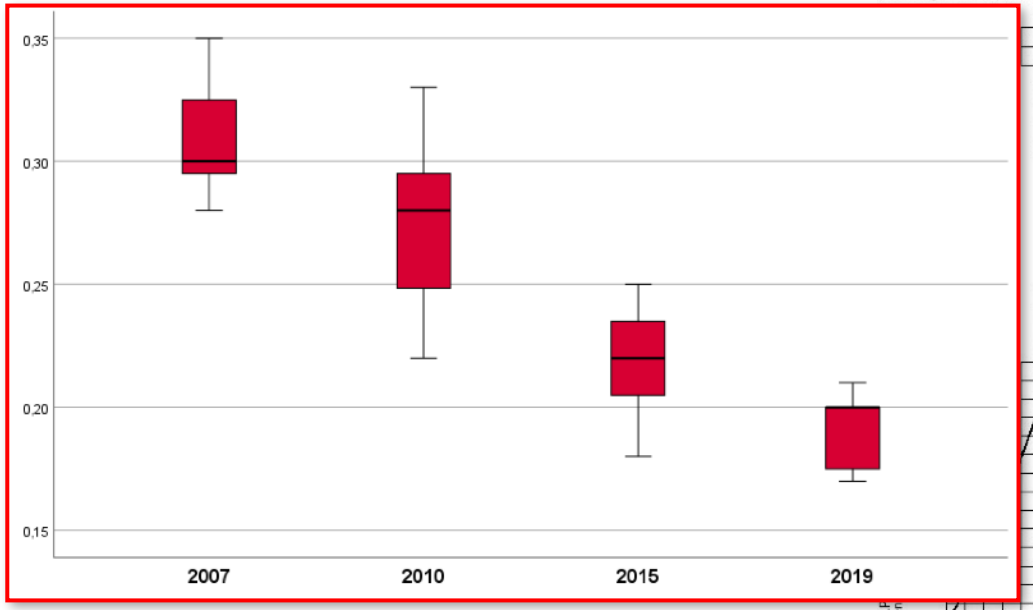

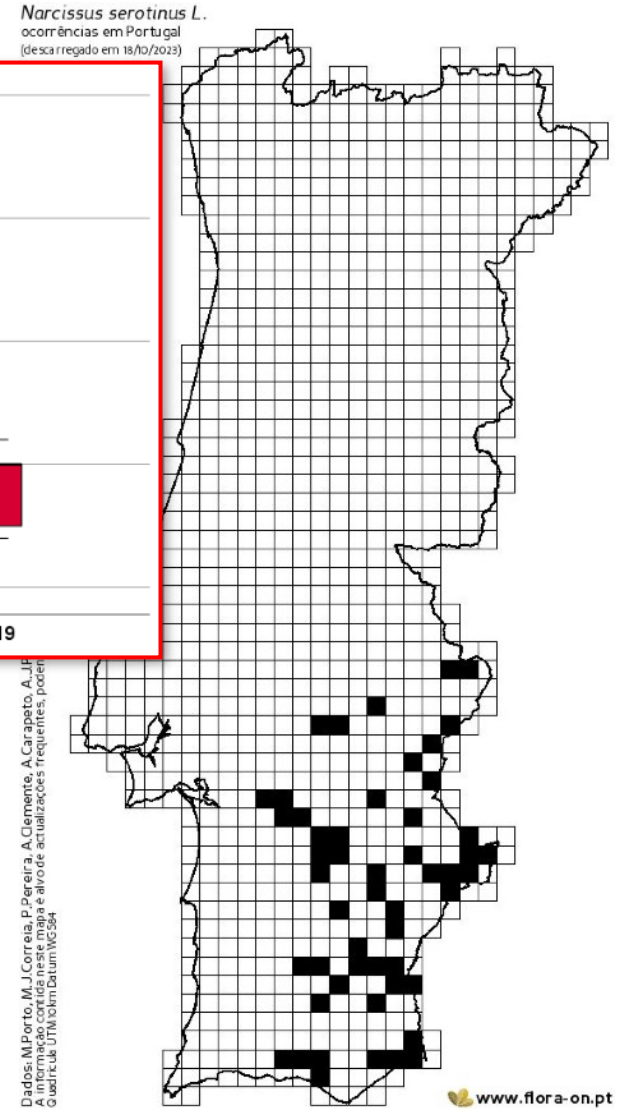

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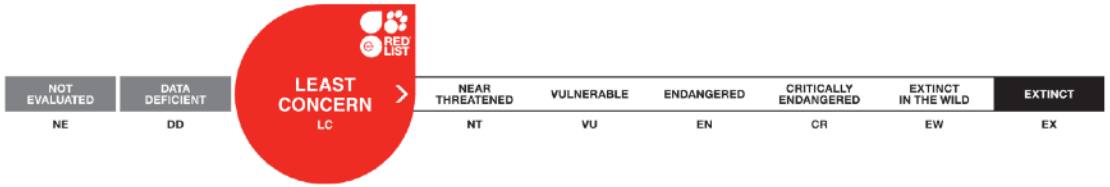

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The road to a genetic monitoring program

- *Defining sampling procedures and goals*
- *Tools to measure genetic diversity*
- *Selecting species and populations*

Defining sampling procedures and goals

- What is the scale of the study, i.e., specific areas, a region, a country?
- How do I accurately sample this spatial distribution?
- What is the generation length of the species?
- Where and how will I store the samples?
- Which meta-data should I also collect?
- What is the longevity of funding?

Which tools should I pick to measure genetic diversity?

- What data are already available, e.g., molecular datasets?
- Do I need to develop new markers, or can I use available ones?
- What is the genome size for the species?
- Is a reference genome available?
- How much funds to I have for this?
- Are there partners available for genetic studies, e.g., laboratory and data analysis?

Which species/populations should I select?

- Species with the most urgent conservation issues
- Red listed species
- Species of key ecological importance/ecosystem service delivery
- Representative species from main habitat types
- Endemic species
- Wild relatives
- Species already subjected to monitoring studies

"Alone, we can do so little; together, we can do so much."

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