



# Evaluating Habitat Protection Coverage for Endangered Mammal Species in Portugal

Maxwell Snodgrass





# Research Questions

- Among the endangered mammal species in Portugal, which species live in habitats that are most and least protected by designated conservation areas?
- On average, which order of species are the most protected?
- Overall, how well protected are endangered mammal species in Portugal?

# Data Sources

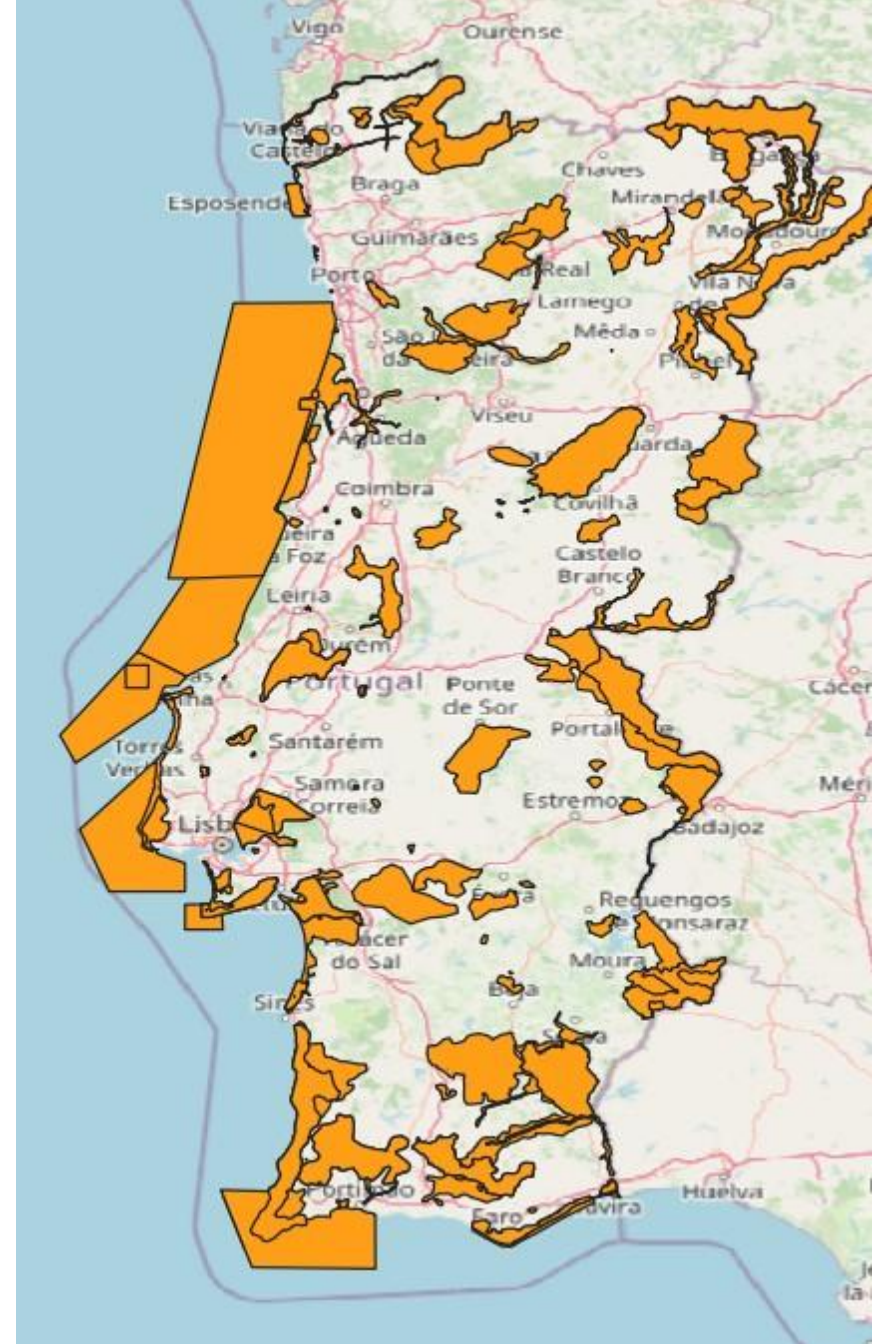
- Protected Areas
  - Source: Protected Planet
    - “Protected Planet is the most up to date and complete source of data on protected areas and other effective area-based conservation measures (OECMs), updated monthly with submissions from governments, non-governmental organizations, landowners and communities.”
- Endangered Species
  - Source: IUCN Redlist
    - Global dataset containing every endangered species in the world
    - Downloaded only mammal dataset





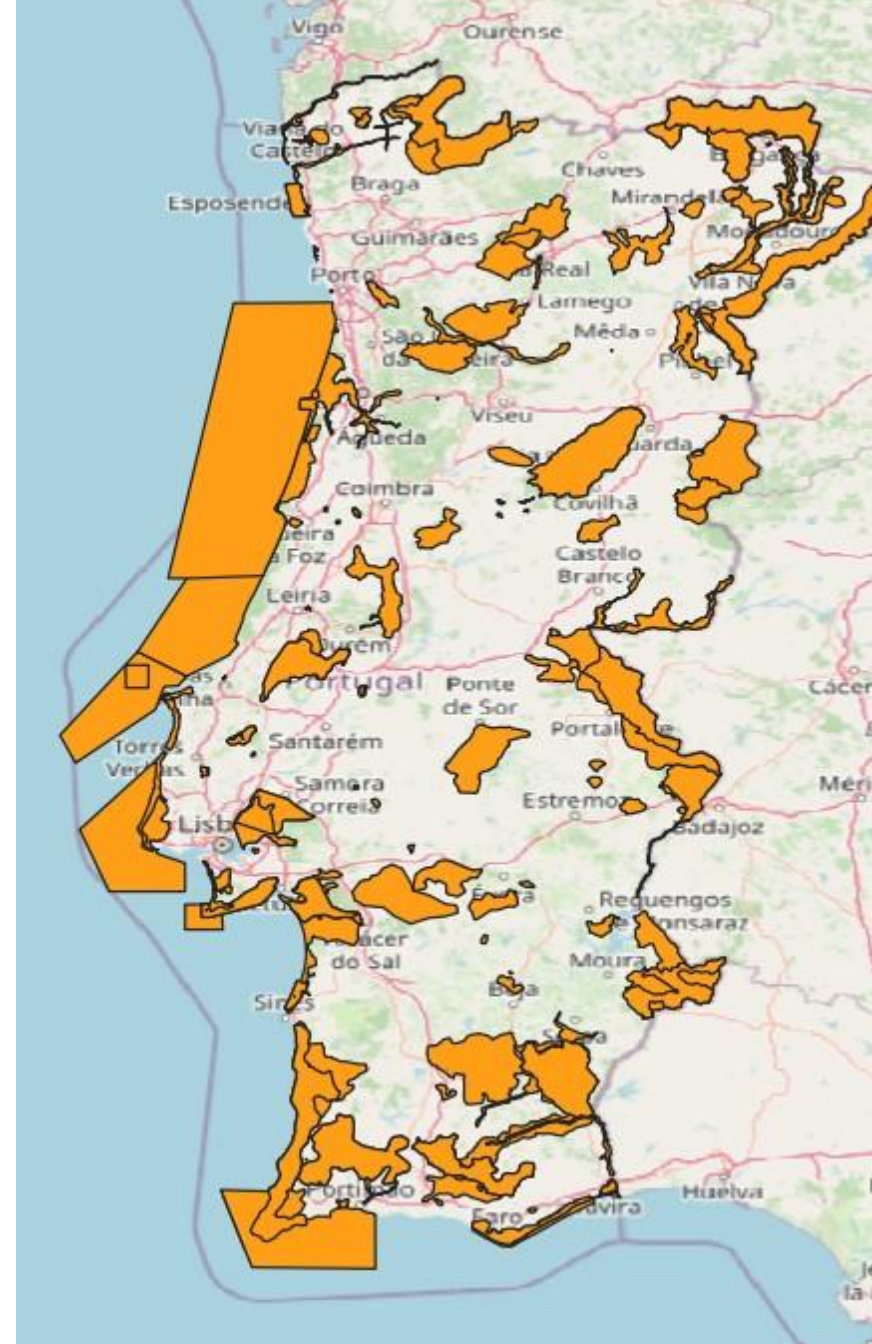
# Methodology - QGIS

1. Download a Portugal land polygon
  - Remove all endangered species data that falls outside
2. Reproject to EPSG:3763 (Portugal TM06)
  - Allows for calculation of area in hectares
3. Calculate area for each endangered species' habitat
4. Dissolve protected areas to one polygon
  - Some conservation areas overlap; avoids double counting
5. Intersect endangered species layer over protected area layer
6. Calculate area for each intersection layer
7. Save intersected dataset to CSV and export to Python
  - Due to QGIS software limitation and computing power



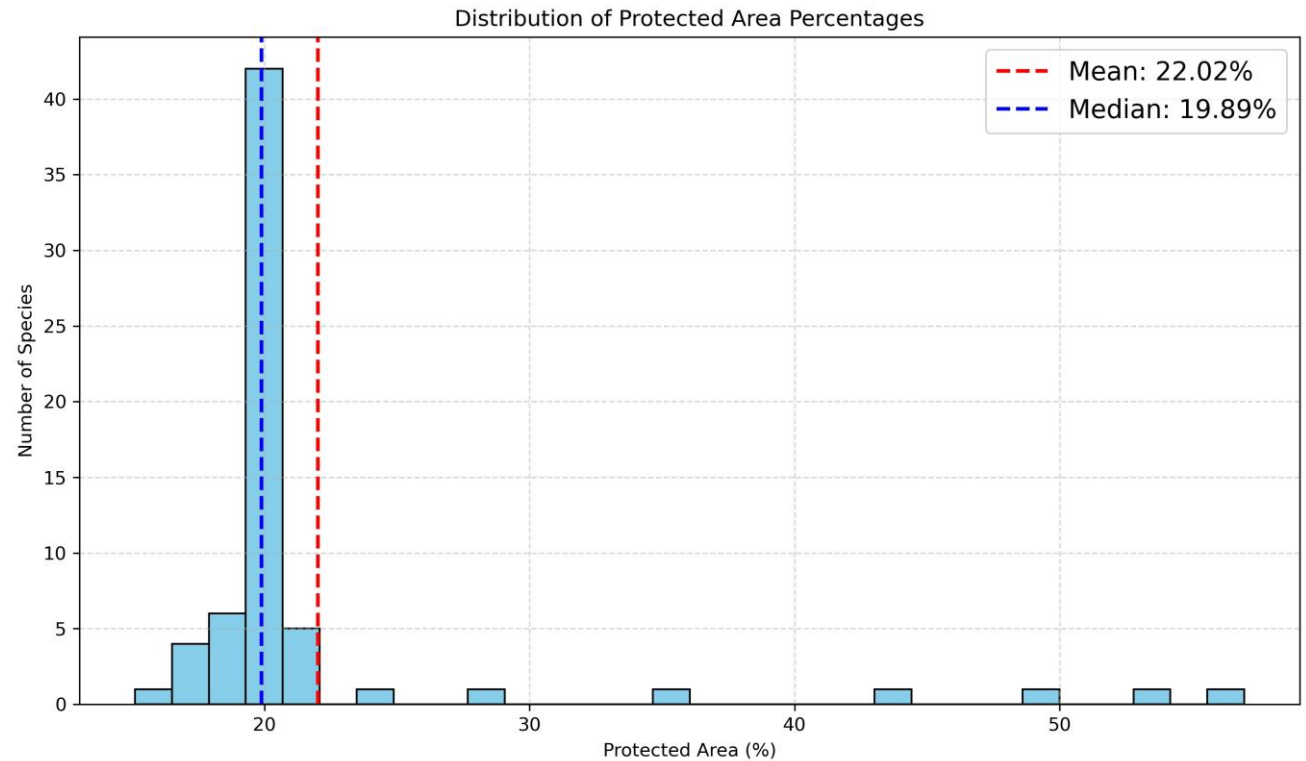
# Methodology - Python

1. Group by animal species and sum all values for total protected area and habitat area if applicable
  - Some animals had multiple polygons
2. Calculate percent coverage of each species
  - $(\text{Intersected Protected Area} / \text{Total Habitat Area}) * 100$
3. Analyze further with Python



# Distribution of Protected Area

- Mean: 22.02%
- Median 19.89%
- High concentration of animals around 20%
  - Due to many sharing the same habitat
- Various outliers with higher protection



# Most Protected Endangered Animals

- Top three protected animals
  - *Lynx pardinus* (Iberian Lynx): 57.97%
  - *Arvicola scherman* (Montane Water Vole): 53.94%
  - *Capra pyrenaica* (Pyrenean Ibex): 49.64%



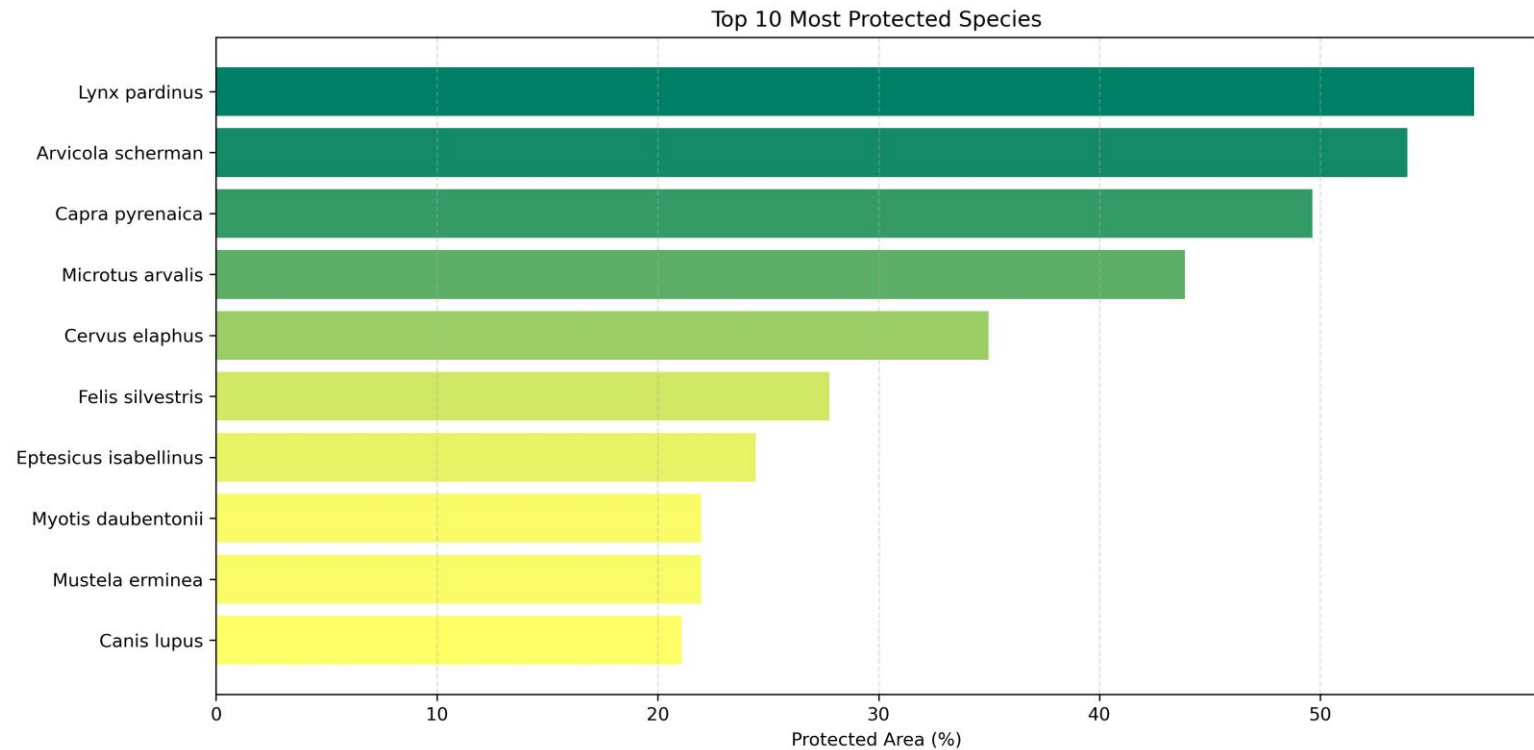
*Iberian Lynx*



*Montane  
Water Vole*



*Pyrenean Ibex*





# Least Protected Endangered Animals

- Bottom three protected animals
  - *Myotis bechsteinii* (Bechstein's Bat): 15.11%
  - *Sorex minutus* (Eurasian Pygmy Shrew): 17.04%
  - *Microtus lusitanicus* (Lusitanian Pine Vole): 17.17%



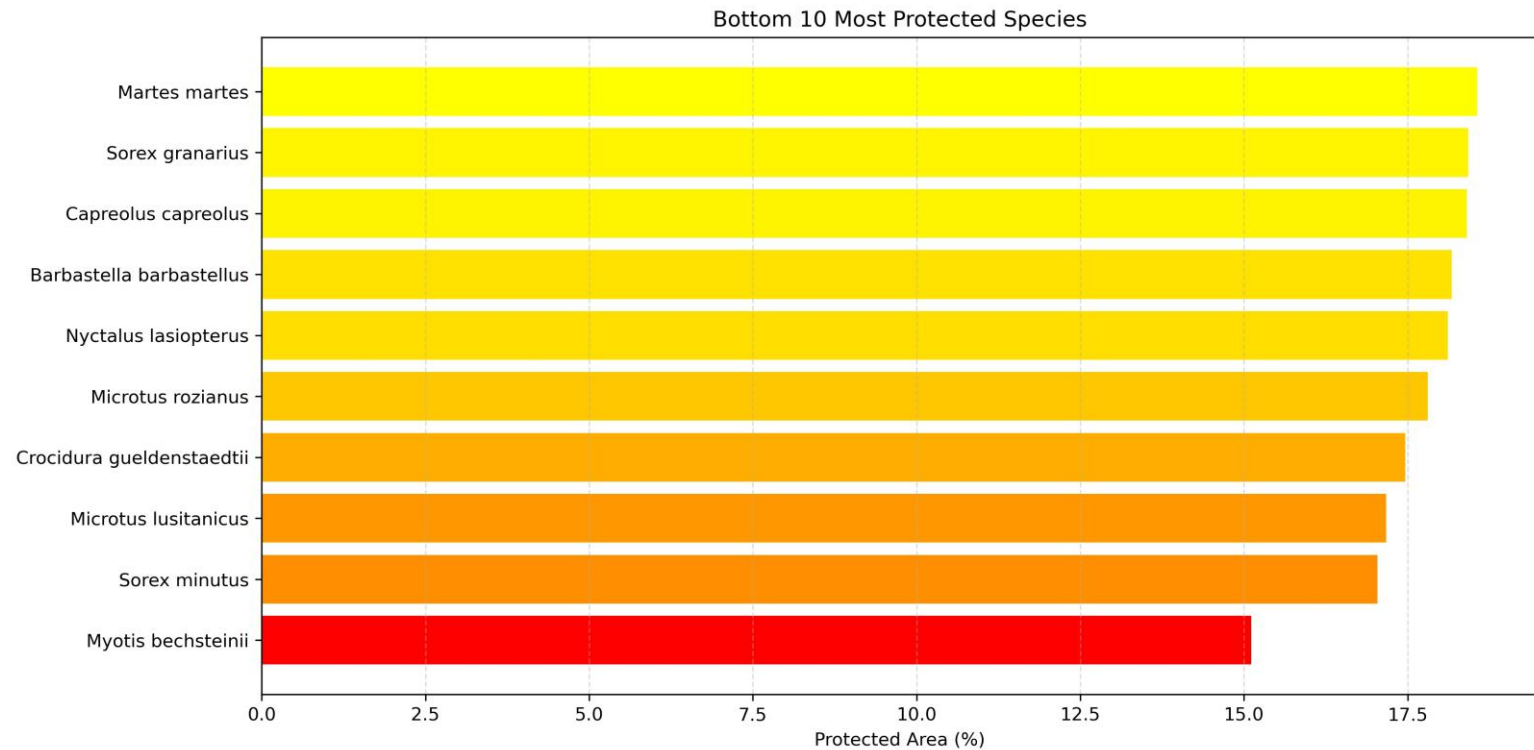
*Bechstein's  
Bat*



*Eurasian  
Pygmy Shrew*



*Lusitanian  
Pine Vole*





# Taxonomic Order Ranked

- Most protected order on average:  
**Artiodactyla: 28.56%**
  - Examples: Iberian Ibex, Red Deer
- Least protected order on average:  
**Eulipotyphla: 18.97%**
  - Examples: Eurasian Pygmy Shrew, Spanish Mole

