When are species at favourable conservation status?

Developing improved favourable reference values for species distributions

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Background

- EU legislation requires countries to maintain wild species at ***favourable conservation status***
- This is evaluated by comparing species' populations and distributions to historic baselines known as ***favourable reference values (FRVs)***
- However, this can be inaccurate if historic baselines were unnaturally low or high, resulting in inappropriate allocation of conservation resources
- Here, we develop systematic FRVs for species distributions by estimating where species would be in the absence of human land-use change

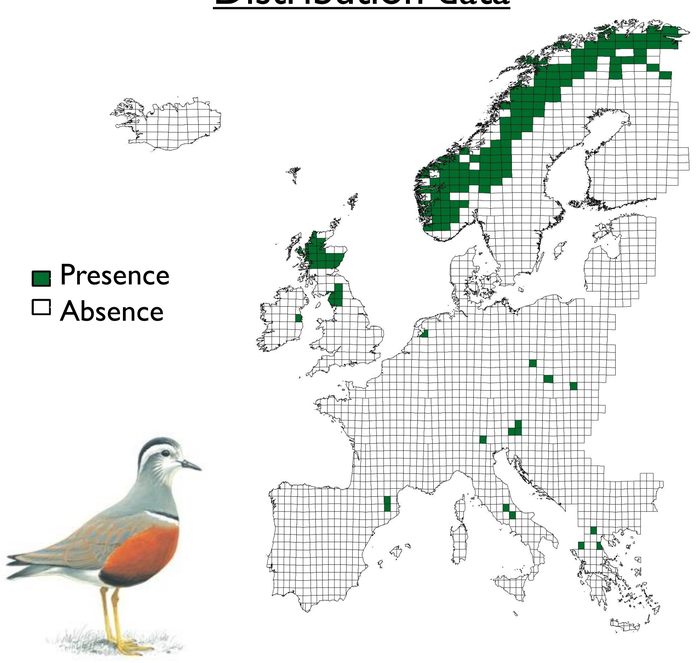
Case study
Spatial distributions of GB breeding birds

Approach

Step 1. Fit species distribution models

- Represent relationships between environment + distributions of 231 spp.
- Various climate + land-use explanatory variables

Distribution data

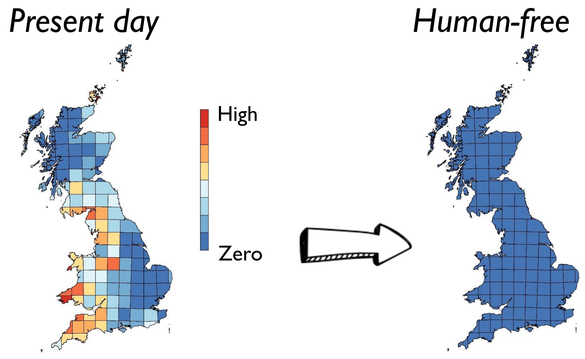


e.g., Dotterel (*Charadrius morinellus*)

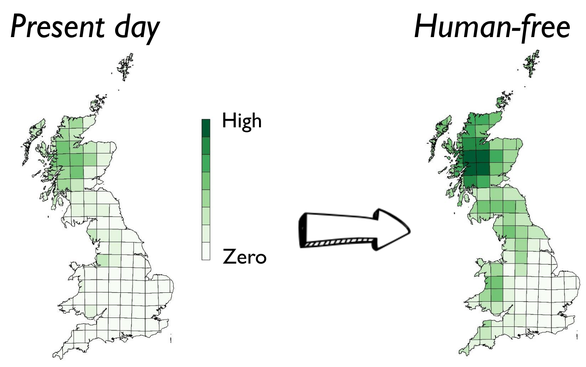
Step 2. Simulate distributions in human-free scenario

- Human-free landscape for GB developed using dynamic vegetation models
  - what would exist now in absence of humans?
- Probability of species occurrence (P_{Occ}) simulated across this landscape using models from step 1

Environmental data e.g., pasture



Simulated P_{Occ}

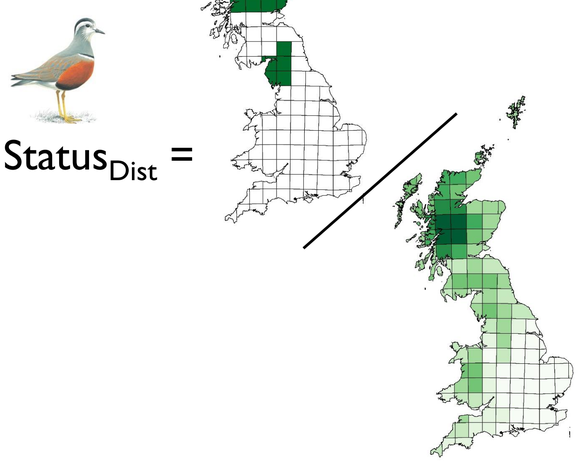


Step 3. Calculate status

- Human-free P_{Occ} summed across GB to produce measure of FRV
- Status of distribution calculated as follows:

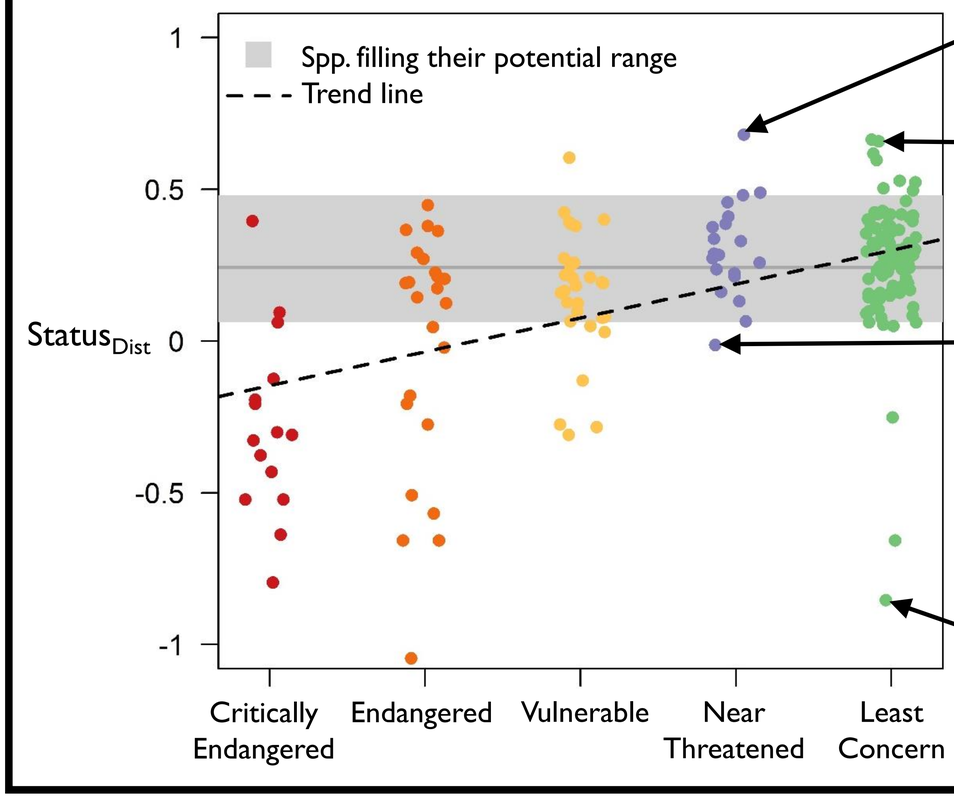
$$\text{Status}_{Dist} = \frac{\text{Current distribution}}{\text{FRV}}$$

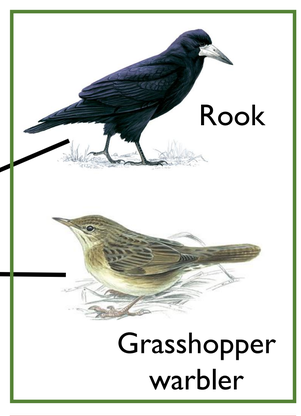
$$= \frac{\text{No. of grid cells occupied}}{\sum \text{Human-free } P_{Occ}}$$



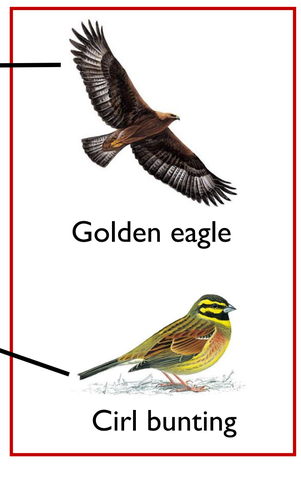
Is our approach useful?

Comparing Status_{Dist} and IUCN red-list





Spp. doing well
- High Status_{Dist}: more widely distributed with humans present



Candidate spp. for upgrading
- Low Status_{Dist}: less widely distributed with humans present
- But not threatened according to red-list

Results

- Status_{Dist} correlated with red-list
- However Status_{Dist} indicates that some spp. could be in more threatened red-list class

Conservation implications

- Systematic measure of FRV for spatial distributions
- Can identify spp. under-filling their potential range
- Could act as extra stage in red-listing procedure?

Wider socio-ecological context

- Understand where species *should* be