

Projecting the effects of climate change on prey selection and dietary competition between reed bed warbler species across Europe

Supervisors

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Project description

Predicting the effects of future climate change on species and ecosystems is an urgent yet challenging research priority. For less mobile biota (invertebrates, plants) climate can be manipulated within laboratory mesocosms, but this is not practical for large, long-lived or highly mobile species, such as birds. Birds, especially migratory species, operate over multiple scales, habitats and sub-habitats, each of which may be affected by climate change in different ways.

Here we propose to use a network of field sites that represent analogues of future UK climate to study the effects of climate change on birds. Our hypothesis is that dietary changes, and competition for food by closely related species, can be predicted by studying diets along a north-south gradient through the UK and continental Europe. Thus birds currently breeding in northerly areas can expect change towards conditions currently found further south. The advantage to this approach is that nothing in our climate change analogue habitats has to be artificially manipulated. All elements of the ecosystems, from plant growth rates to invertebrate identity, richness and abundance, can be predicted to encompass the range of environmental changes expected by global warming under predicted scenarios. Current 30 year July average mean maxima/minima for Glasgow are 22/13C., for example, while those for Rome are 32/17C. By contrast predicted summer warming (2080s) ranges from rises of 1.4-8.1C. (SE England) (<http://ukclimateprojections.metoffice.gov.uk/>).

The project would build upon previous work at Cardiff on the responses of birds and invertebrates in reed beds to warming. It would concentrate upon the most common warbler species within reed beds, the reed, sedge and Cetti's warblers, along with the great reed warbler in the southerly continental range. Sites will be chosen where at least two of these species live sympatrically. Available prey would be monitored using yellow sticky traps. The diets of the warblers would be analysed using Next Generation Sequencing (NGS) of DNA in faeces of adults and chicks. We have extensive expertise using this technology to analyse diets. Prey choice would be analysed by comparing what is eaten with what is available using Monte Carlo simulation models we have developed. Comparisons would be made between warbler species along the gradient to measure how latitude affects competition (pilot work suggests significant partitioning of resources with some overlaps²).

This interdisciplinary project provides excellent training opportunities in field ecology, dietary analyses using

NGS, bioinformatics and statistics.

References

¹Davey JS, Vaughan IP, King RA, Bell JR, Bohan DA, Bruford MW, Holland JM, Symondson WOC (2013) Intraguild predation in winter wheat: prey choice by a common epigeal carabid consuming spiders. *Journal of Applied Ecology* 50, 271-279.

²King RA, Symondson WOC, Thomas RA (2015) Molecular analysis of faecal samples from birds to identify potential crop pests and useful biocontrol agents in natural areas. *Bulletin of Entomological Research* 105, 261-272.