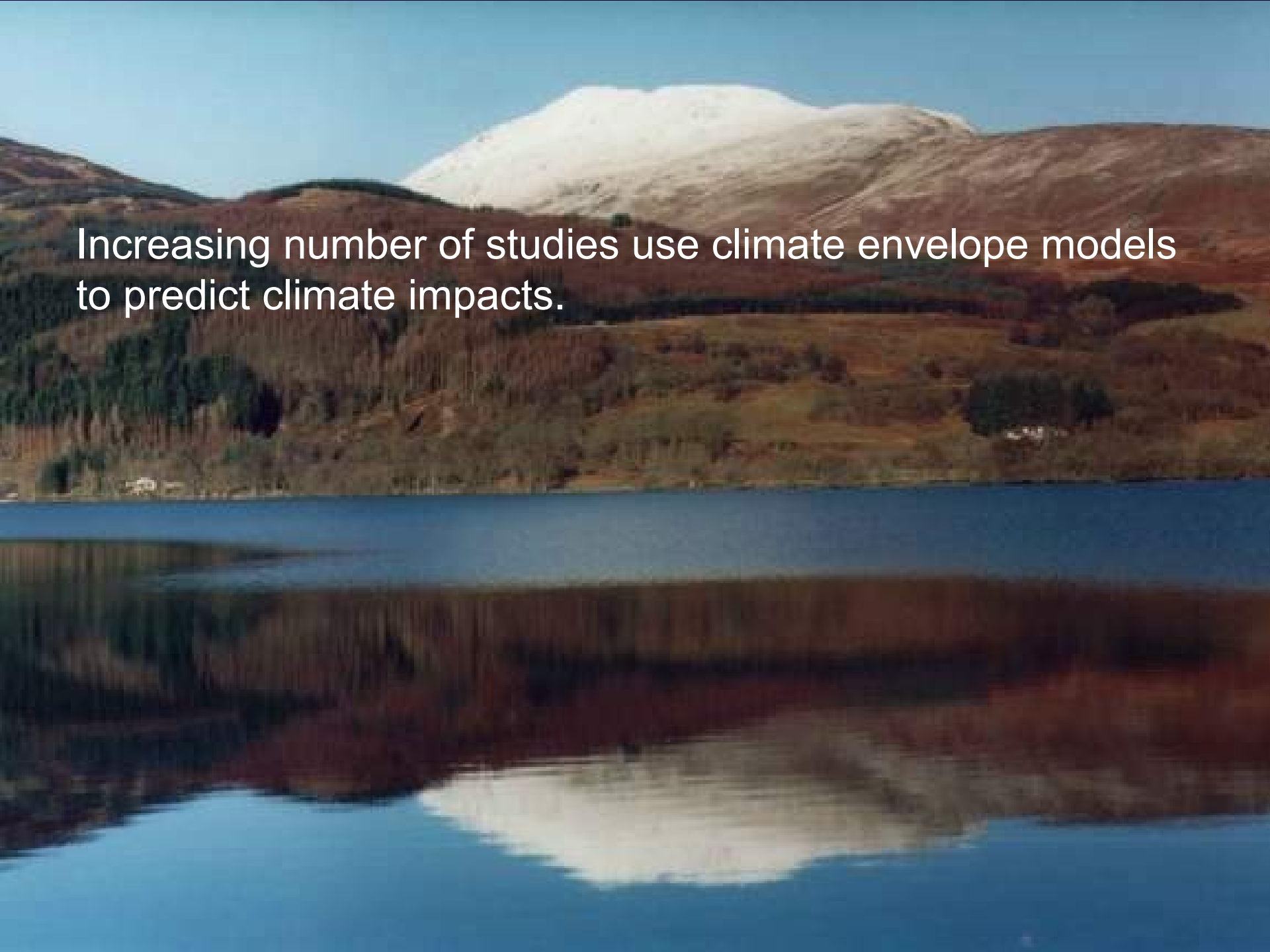


Impacts and Adaptation for Birds

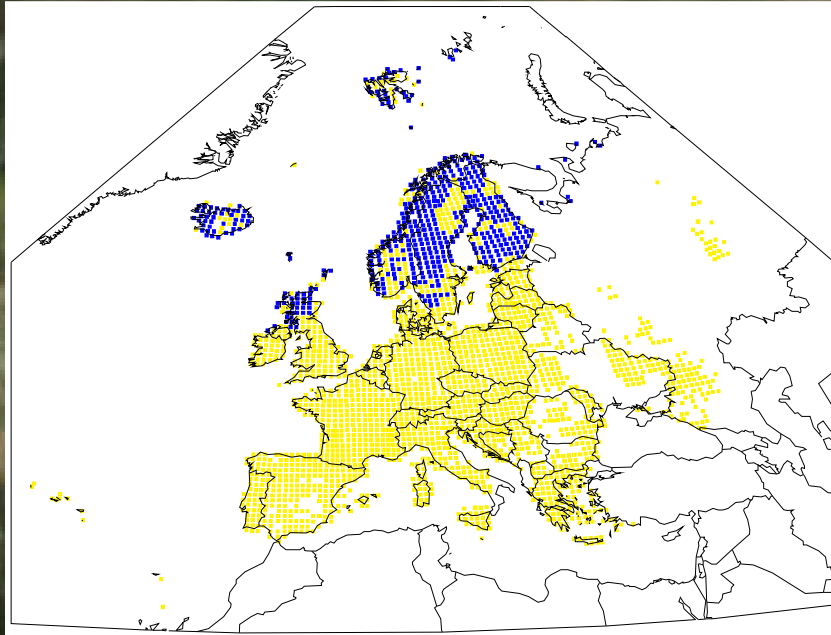
James Pearce-Higgins



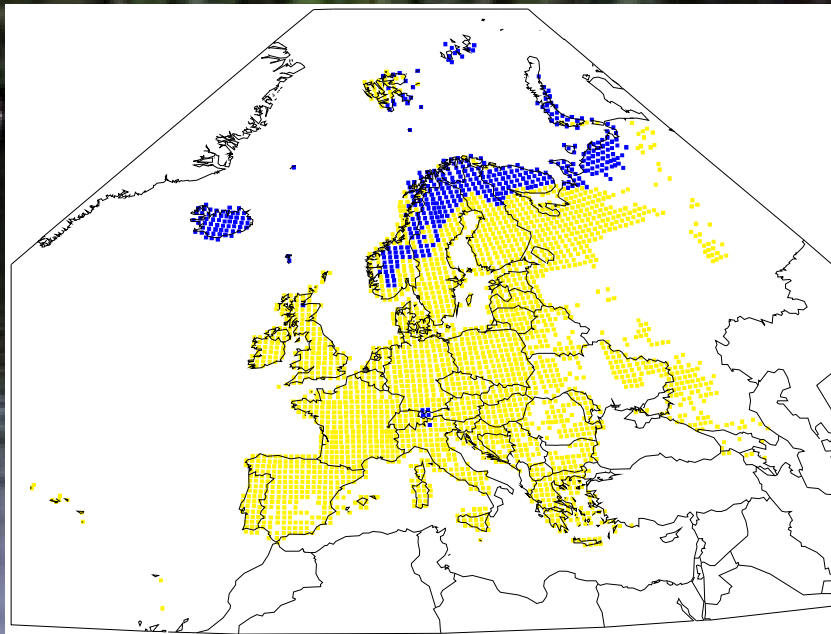
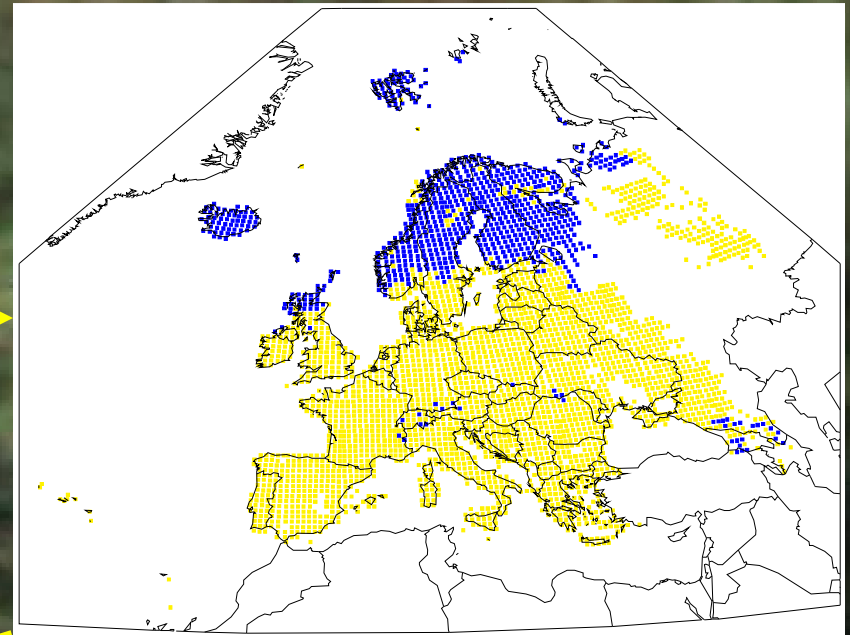
Increasing number of studies use climate envelope models to predict climate impacts.



Current distribution

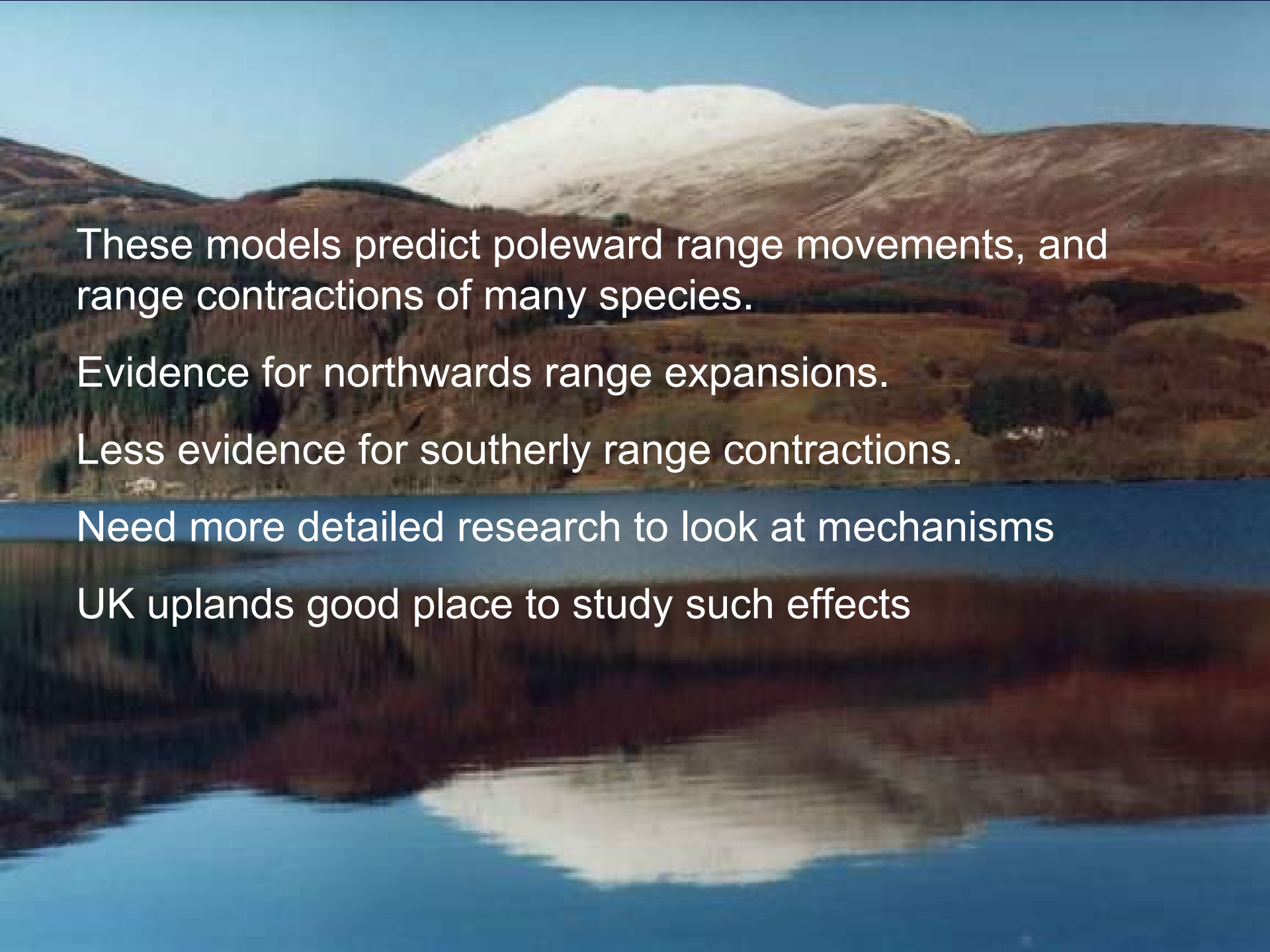


Modelled distribution



Future predicted distribution - high emission distribution





These models predict poleward range movements, and range contractions of many species.

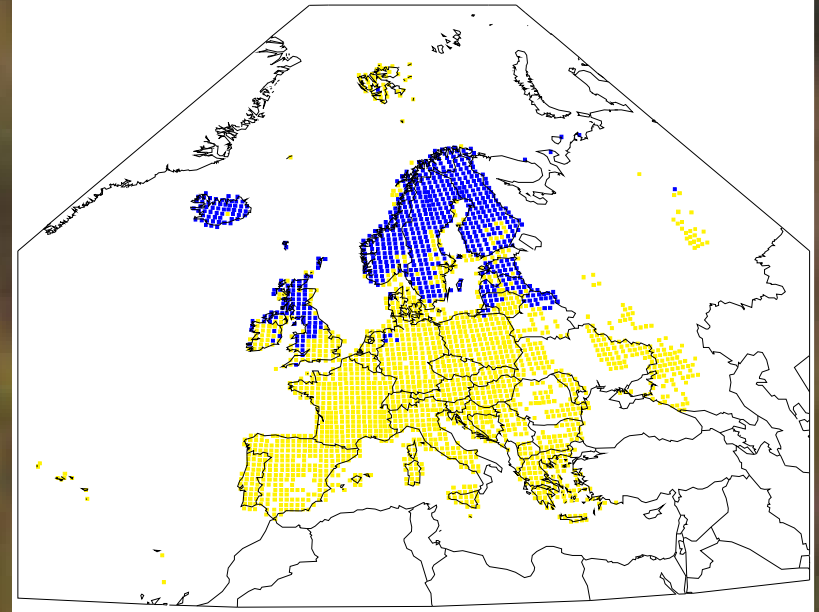
Evidence for northwards range expansions.

Less evidence for southerly range contractions.

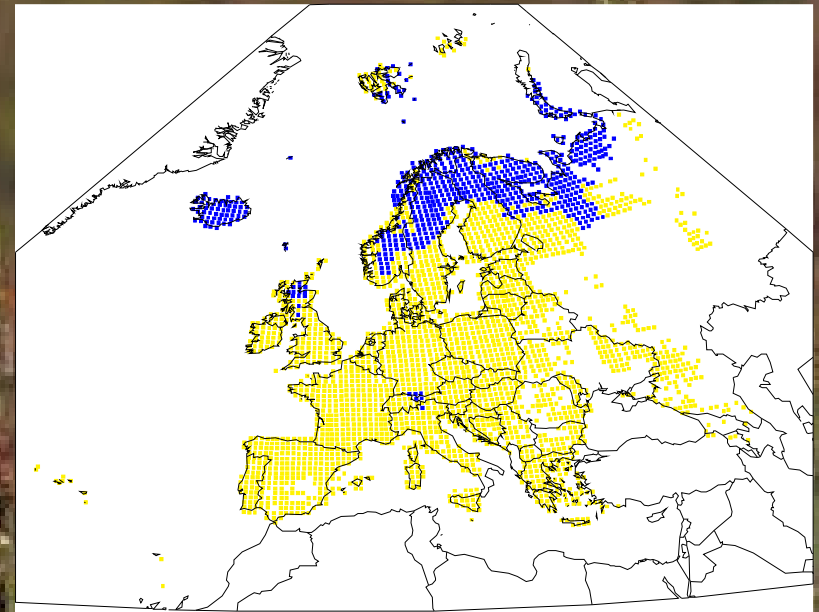
Need more detailed research to look at mechanisms

UK uplands good place to study such effects

Golden plover



Current distribution



Future high emission
distribution

Main prey

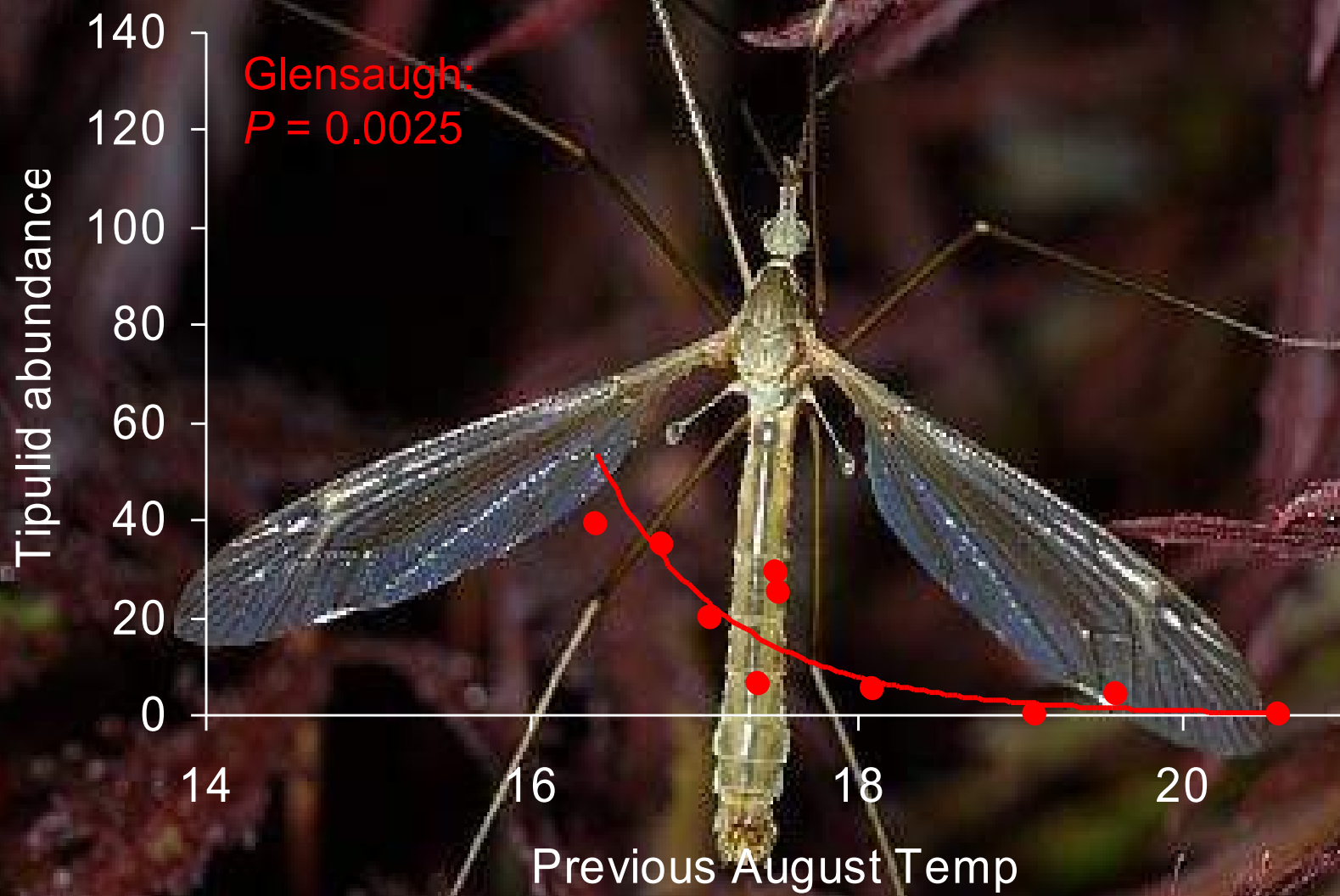
Key food resource in May/June on peatlands

Growth / survival of young chicks correlates with crane fly abundance

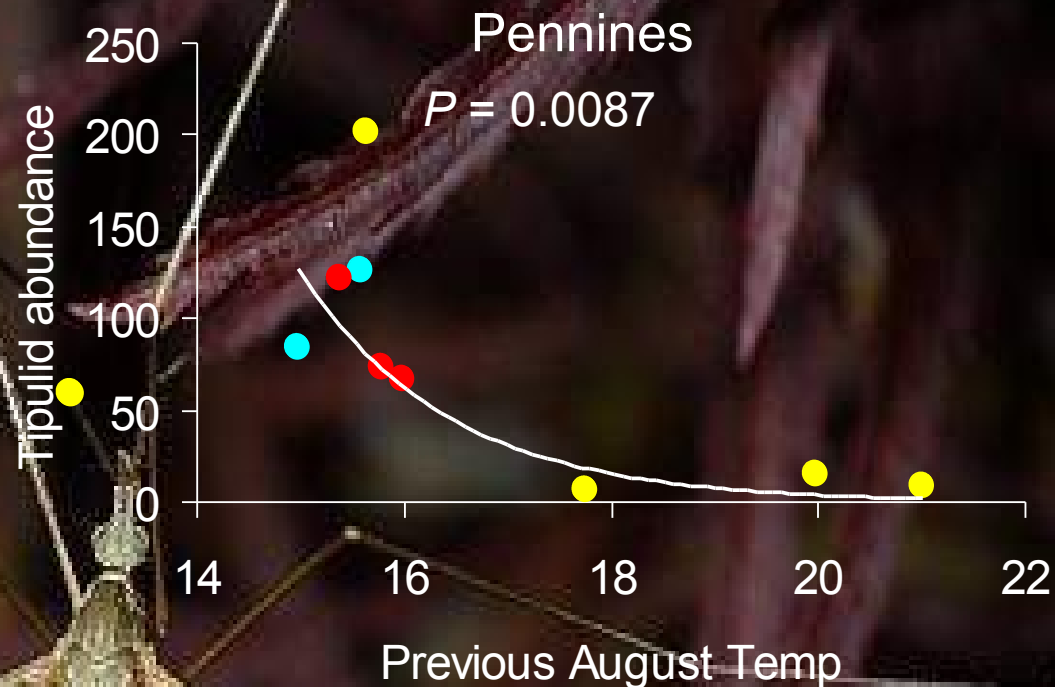
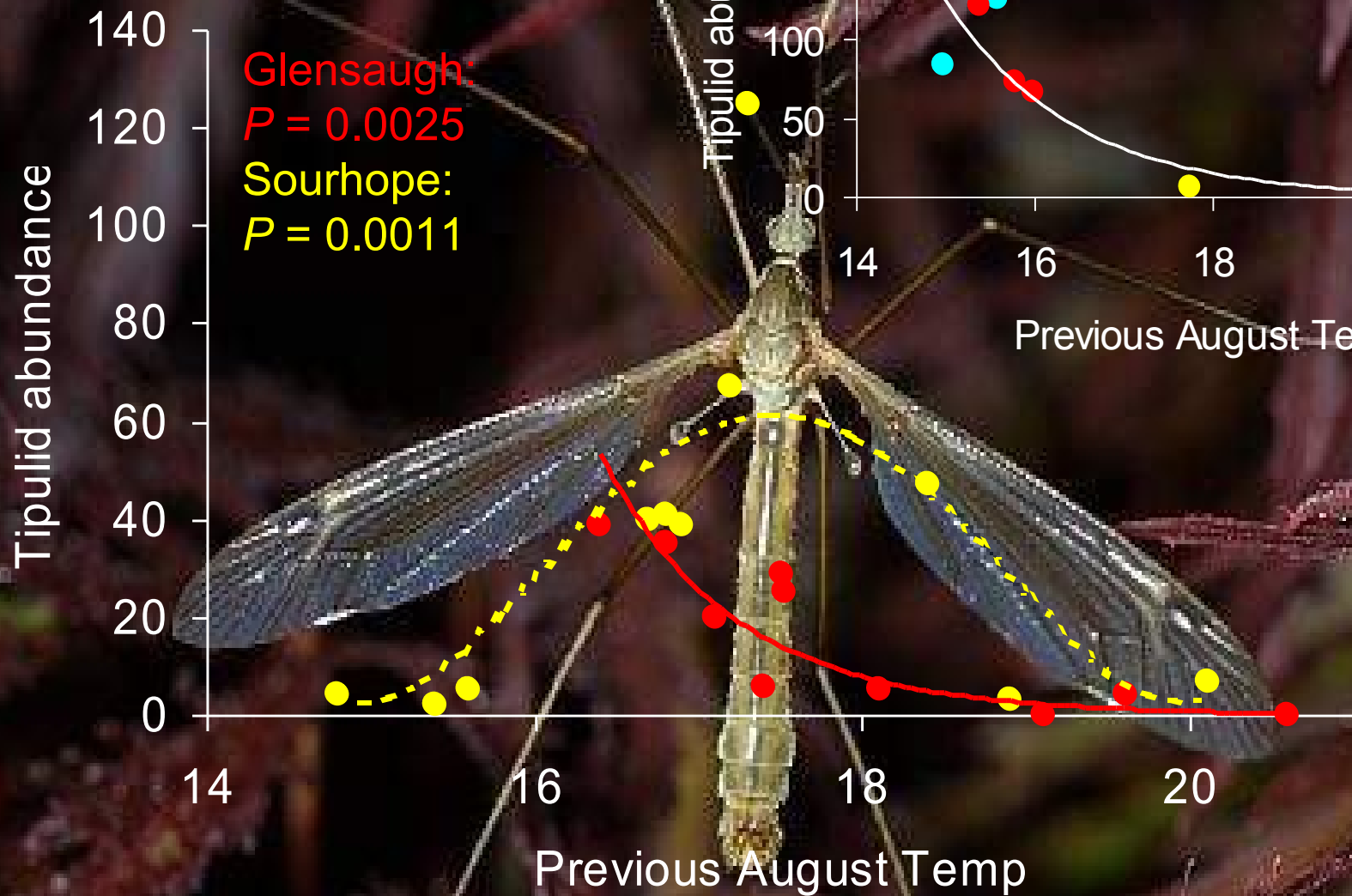
What are climatic drivers of crane fly populations?



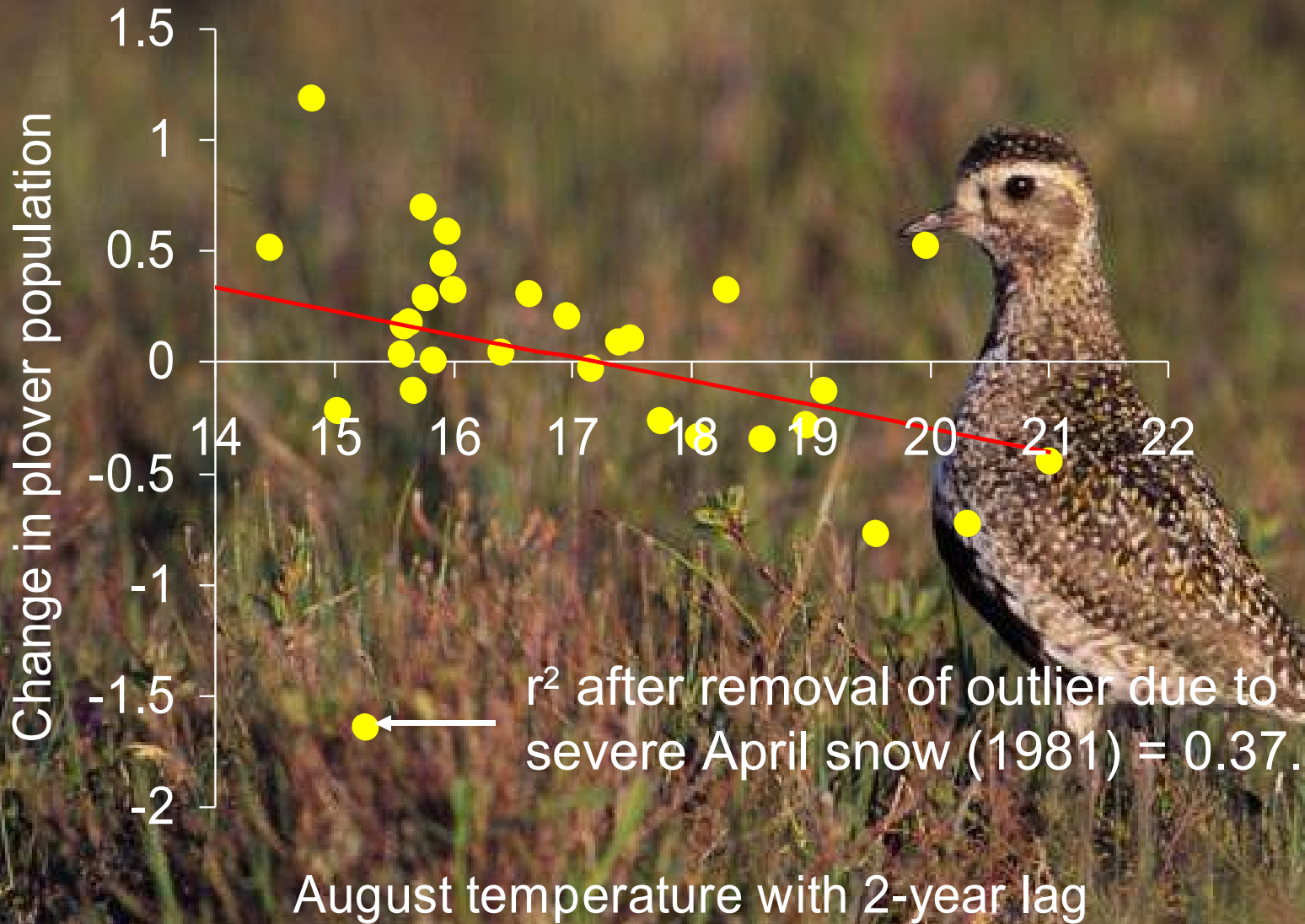
Main prey



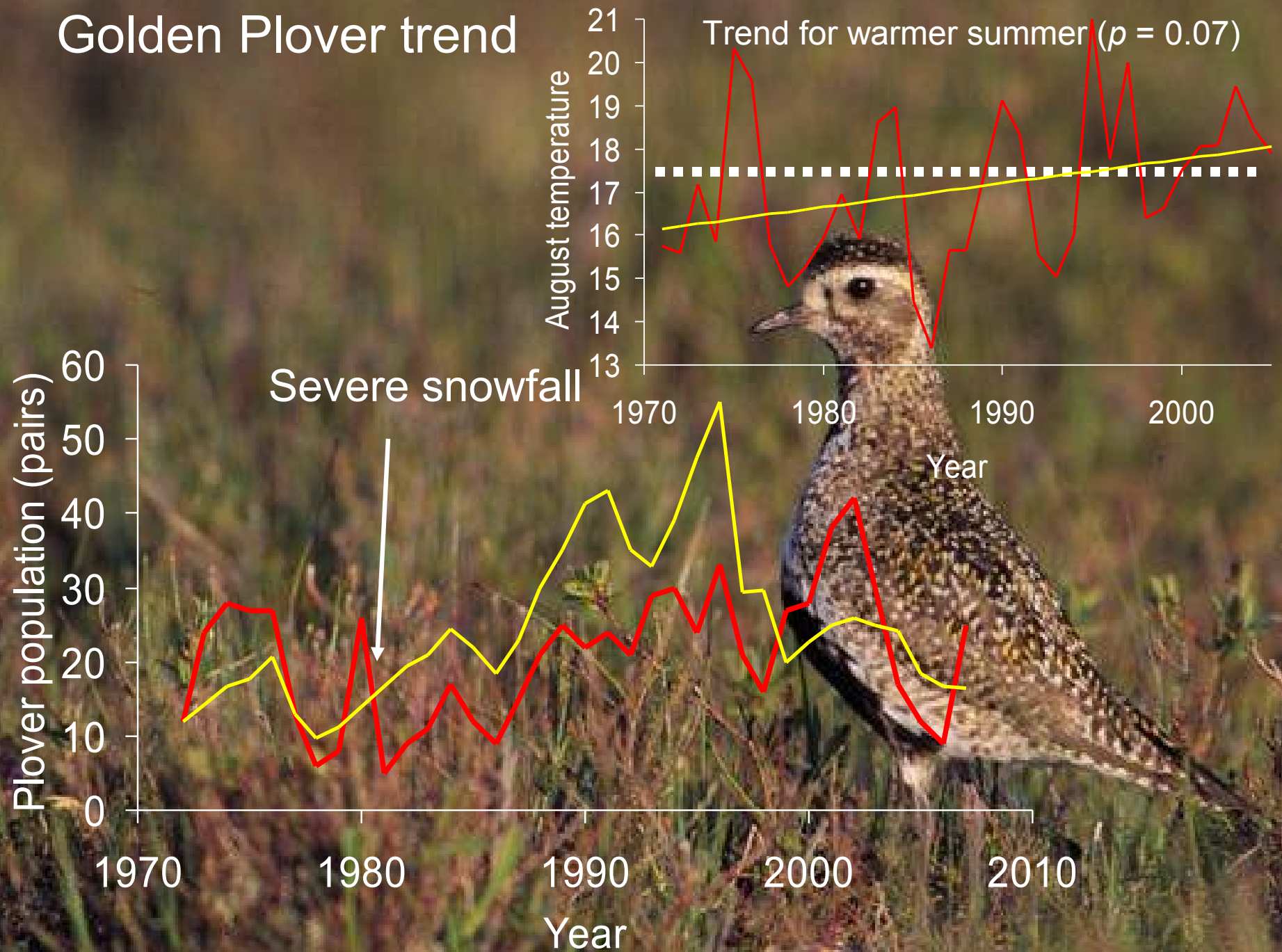
Main prey



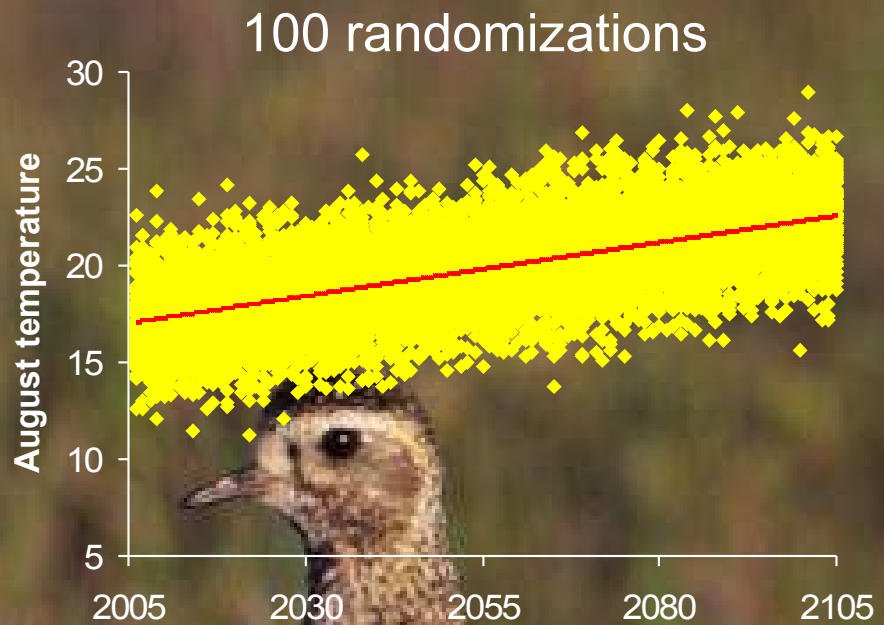
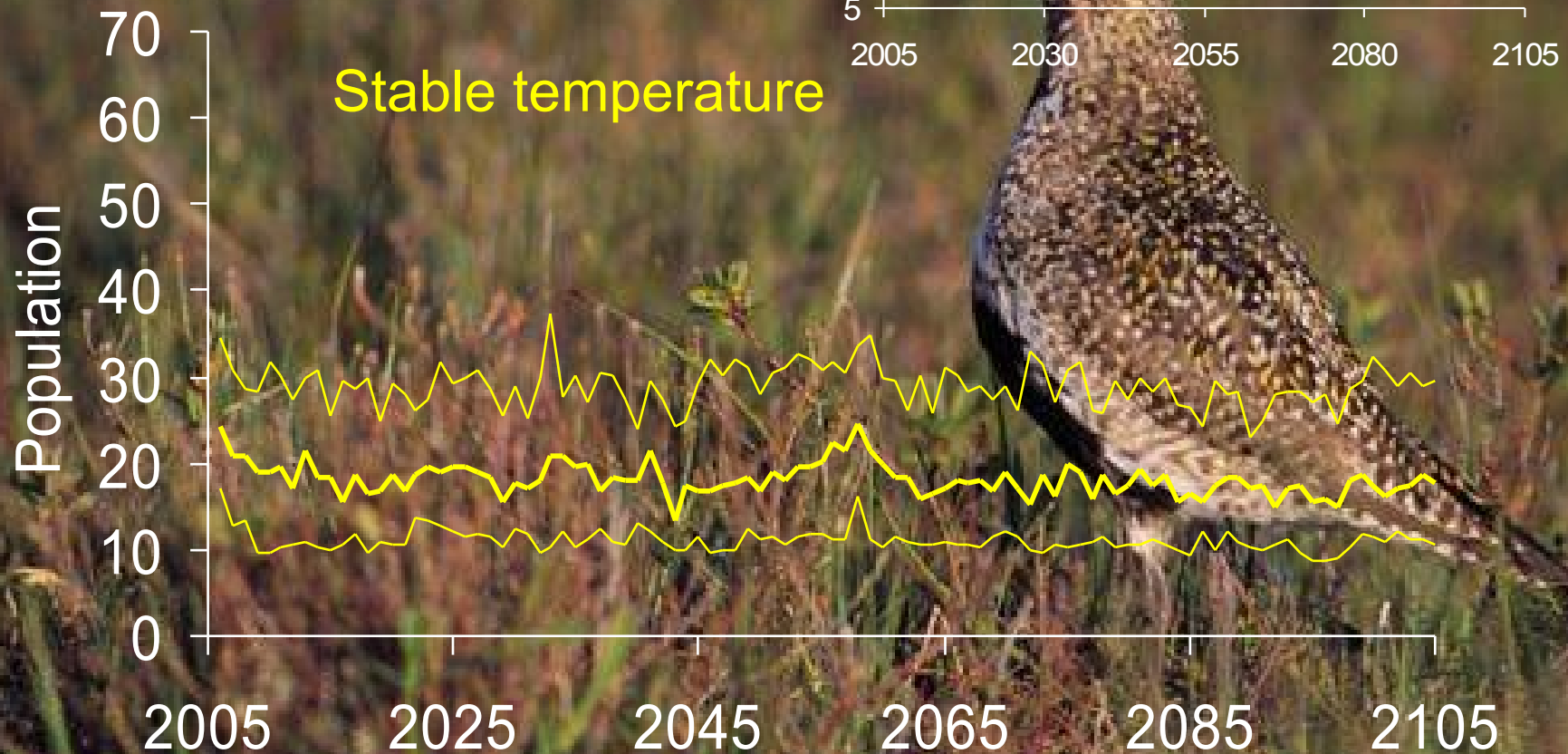
Climate effects on plover populations



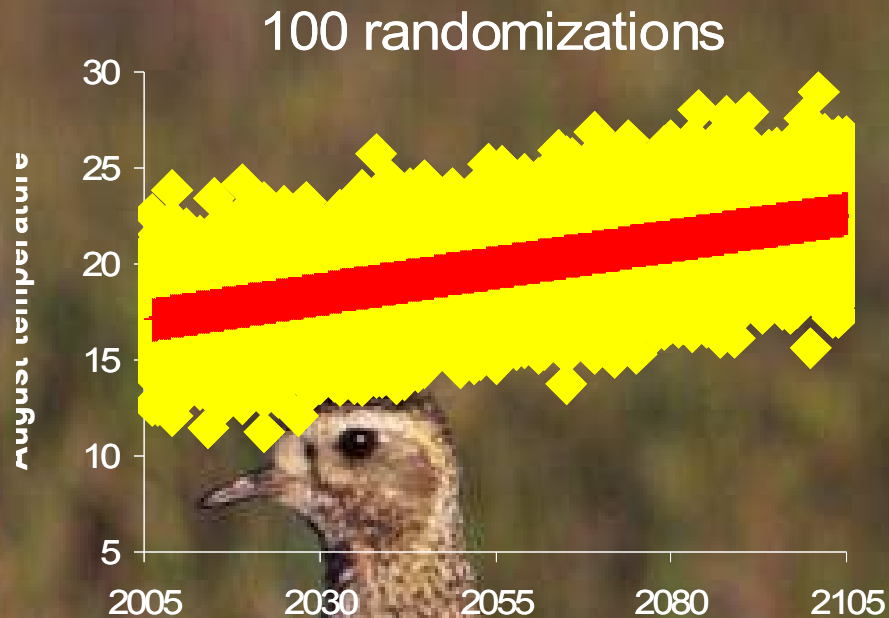
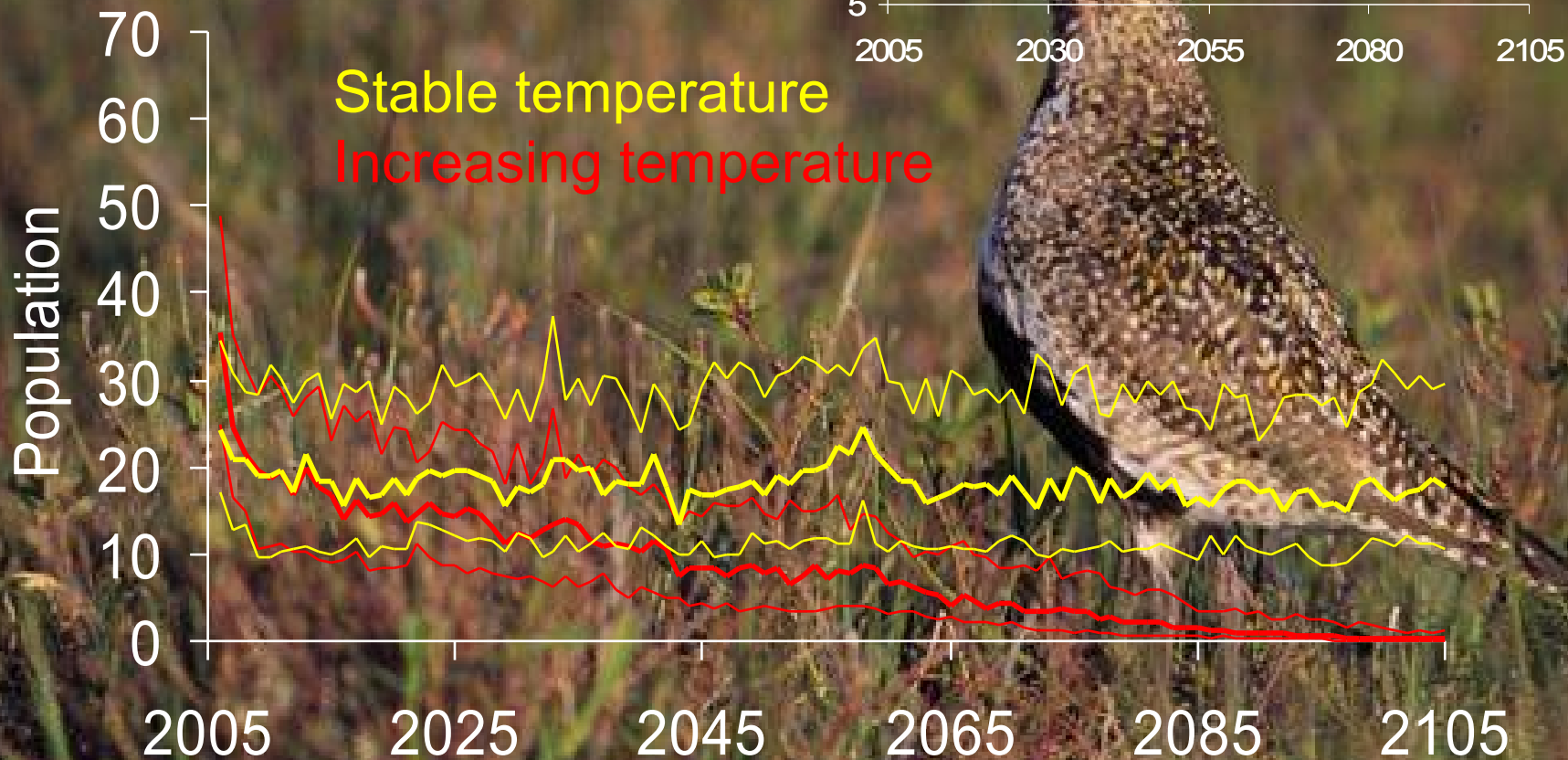
Golden Plover trend



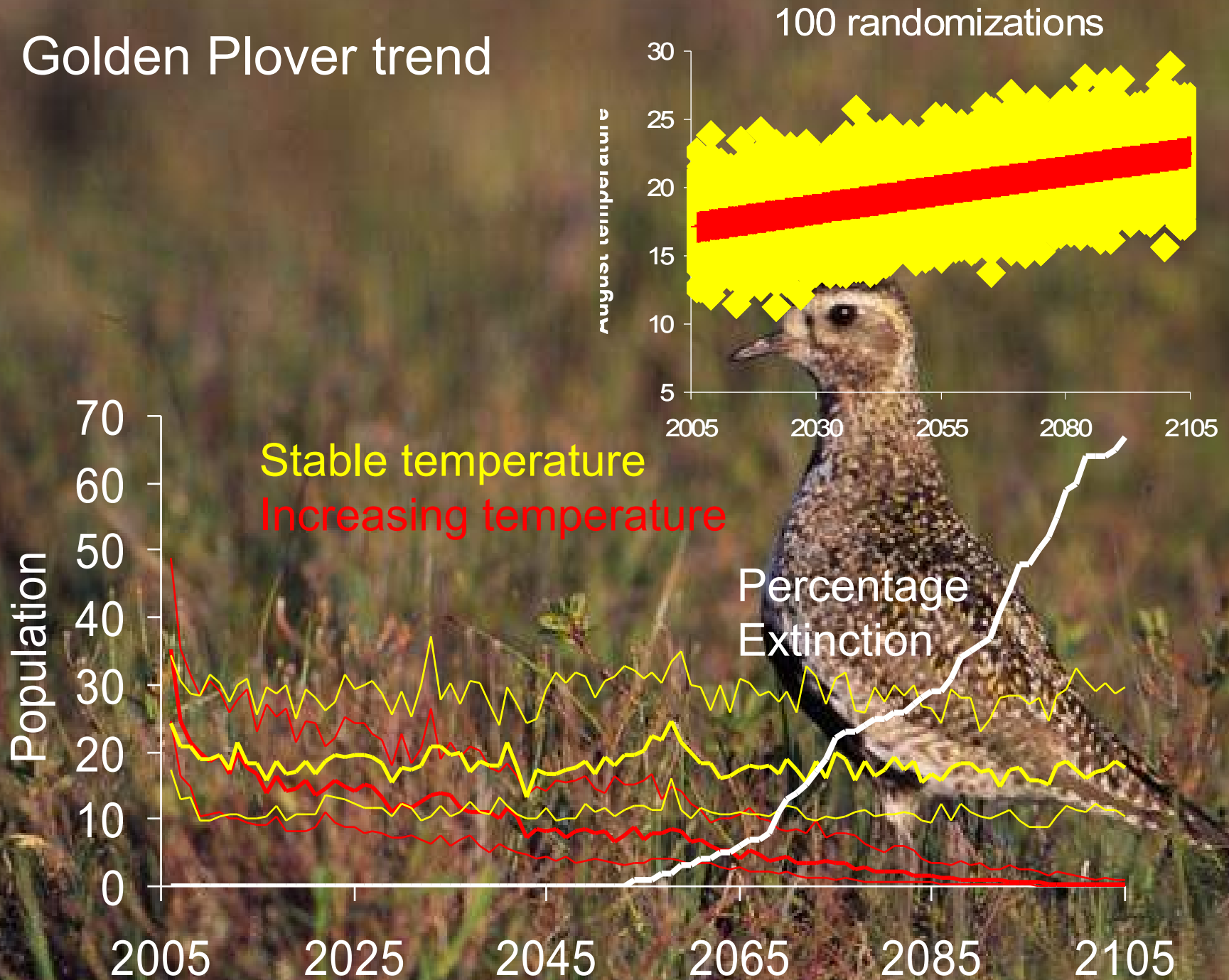
Golden Plover trend



Golden Plover trend



Golden Plover trend



Summary

High August temperatures reduce crane flies by up to 95%.

Accounts for golden plover population fluctuations.

Significant extinction risk if climate trends continue.

Results widely applicable to other upland / northern species.

Urgent need to understand potential for adaptive management to counter effects?



Management for adaptation



Drain blocking has potential to...

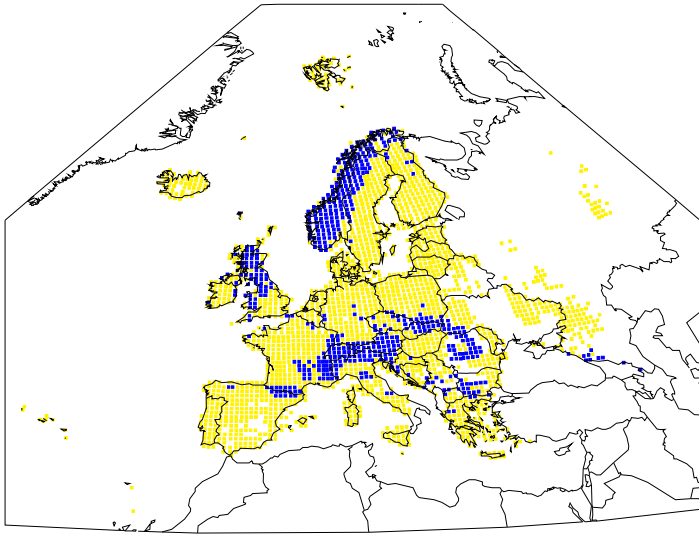
Restore degraded habitats

Improve water retention

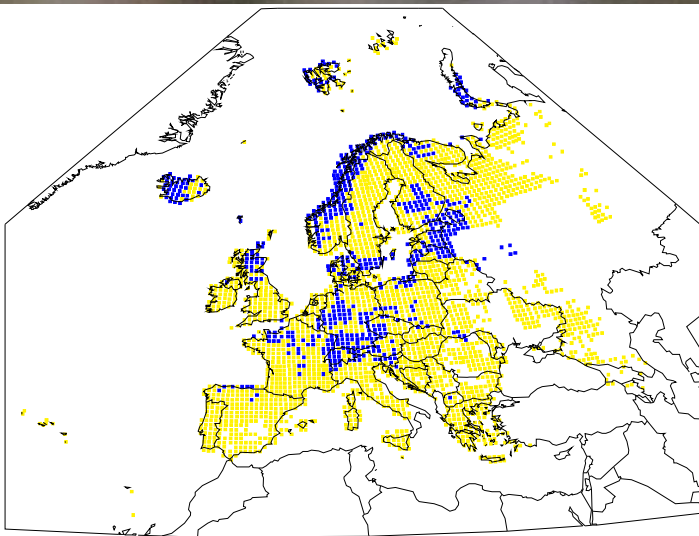
Reduce loss of carbon in soils

Increase resilience of crane fly abundance

Ring ouzel



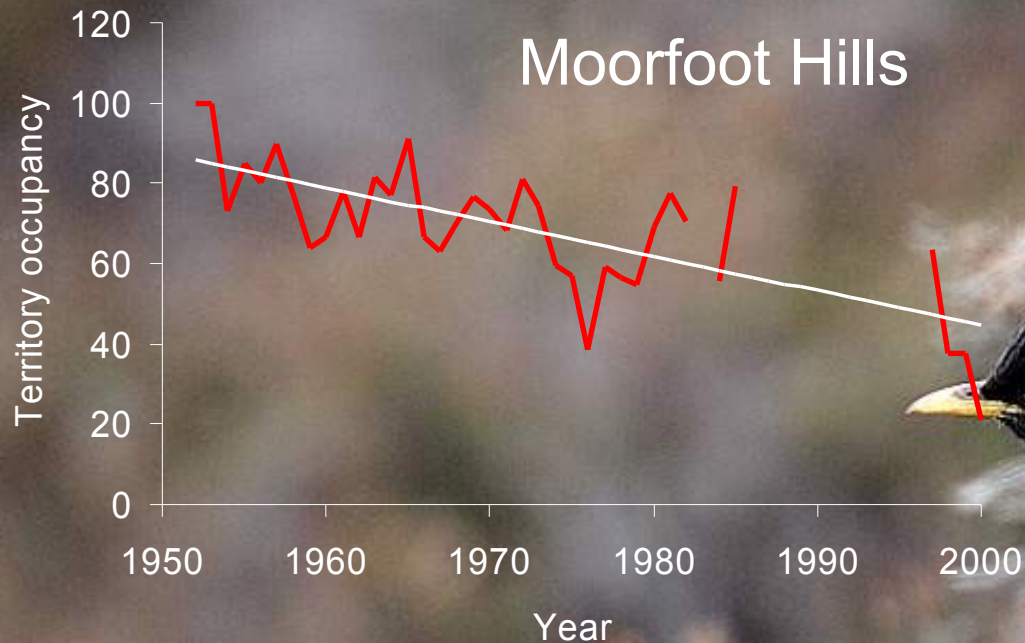
Current distribution



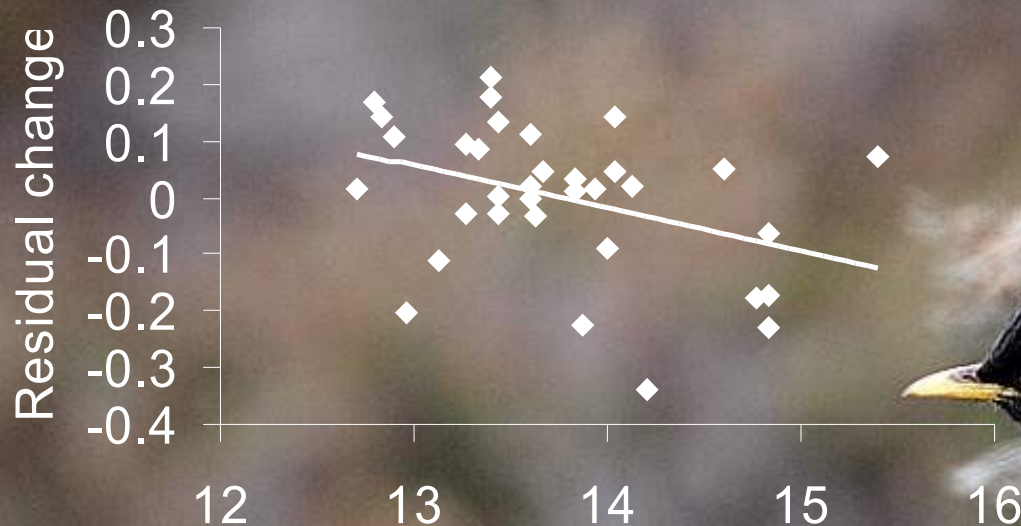
Future high emission
distribution



Widespread population declines

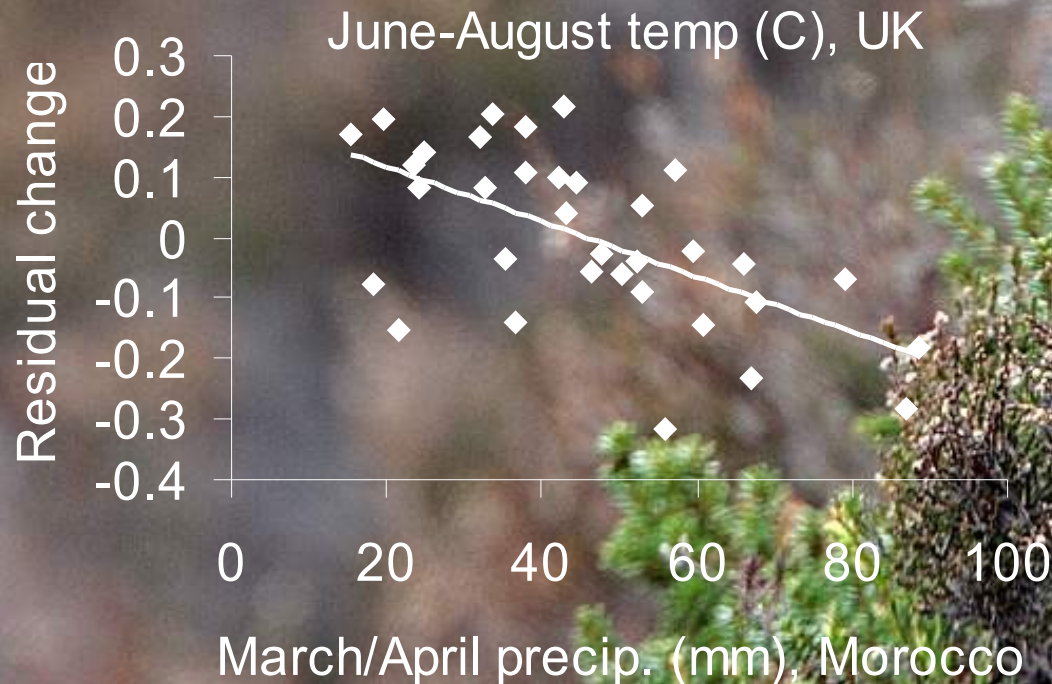


Ring ouzel population change in Moorfoot hills



Model describes observed annual changes

UK summers warmer – trend sufficient to explain observed ring ouzel decline (Beale et al. 2006).



Ring ouzel summary

Declines not linked to variation in productivity

Population declines greatest following warm summers

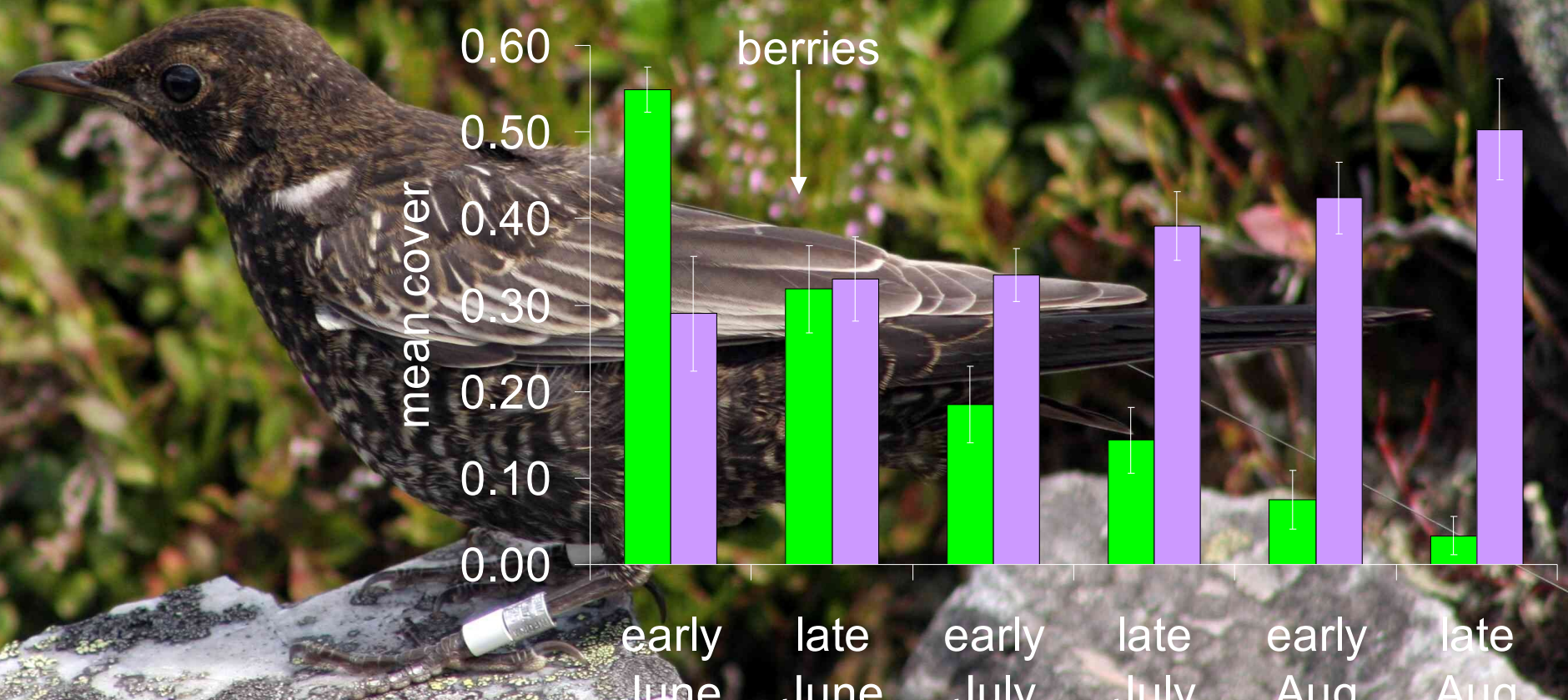
Climate change already contributing to ring ouzel declines in UK?

Research required to investigate mechanism – may be linked to reduced earthworm / berry availability limiting post-fledging survival / adult condition



Ongoing research

To identify key resources for ring ouzel and relate to population

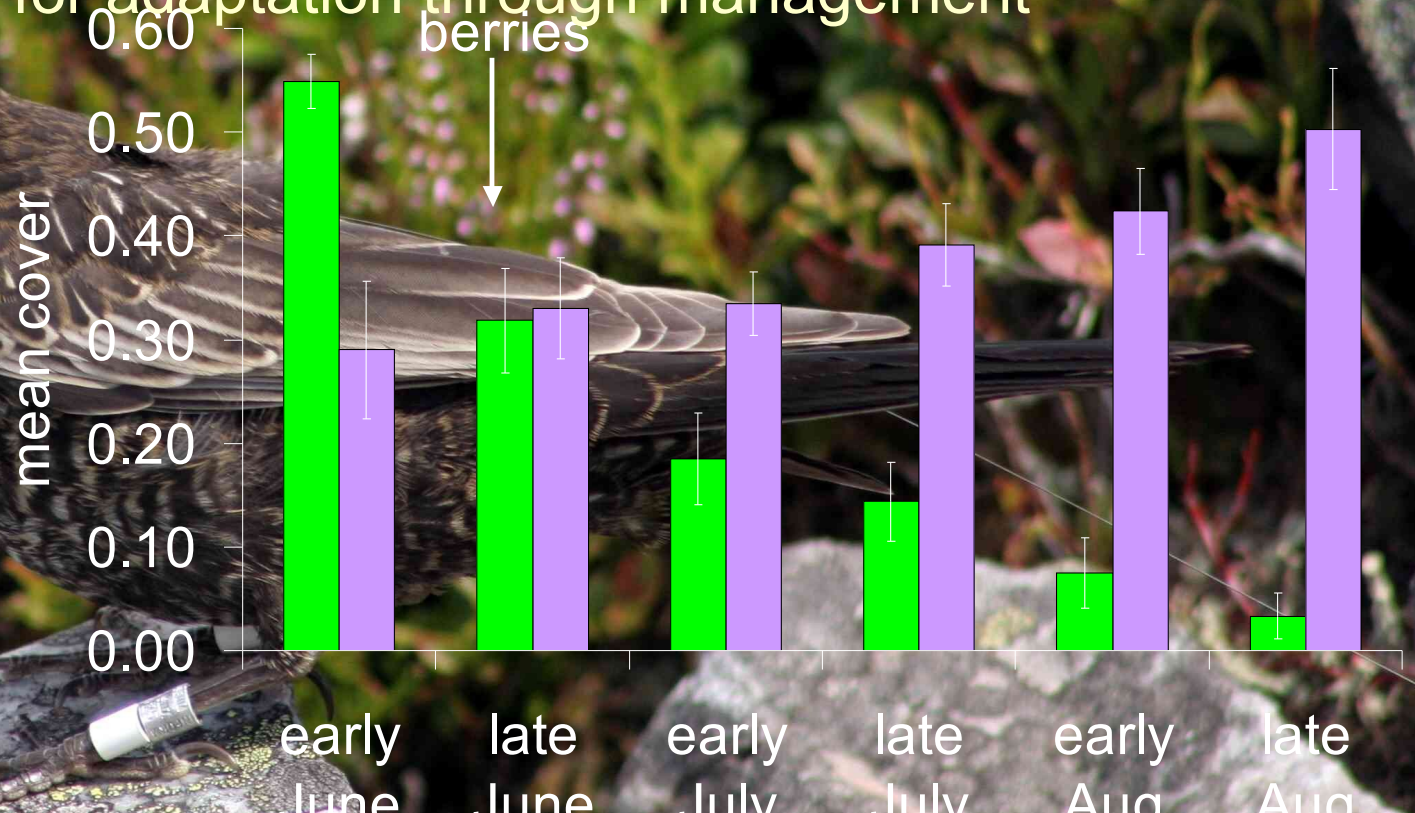


Ongoing research

To identify key resources for ring ouzel and relate to population

Understand impacts of climate on those resources

Explore potential for adaptation through management



Conclusions

Evidence that climate change is having detectable impacts on upland birds

Future effects likely to be more severe, and to result in species loss if current trends continue

BUT DON'T GIVE UP!– there is the potential to improve resilience of populations through adaptive management

NEED – good monitoring of upland processes and populations

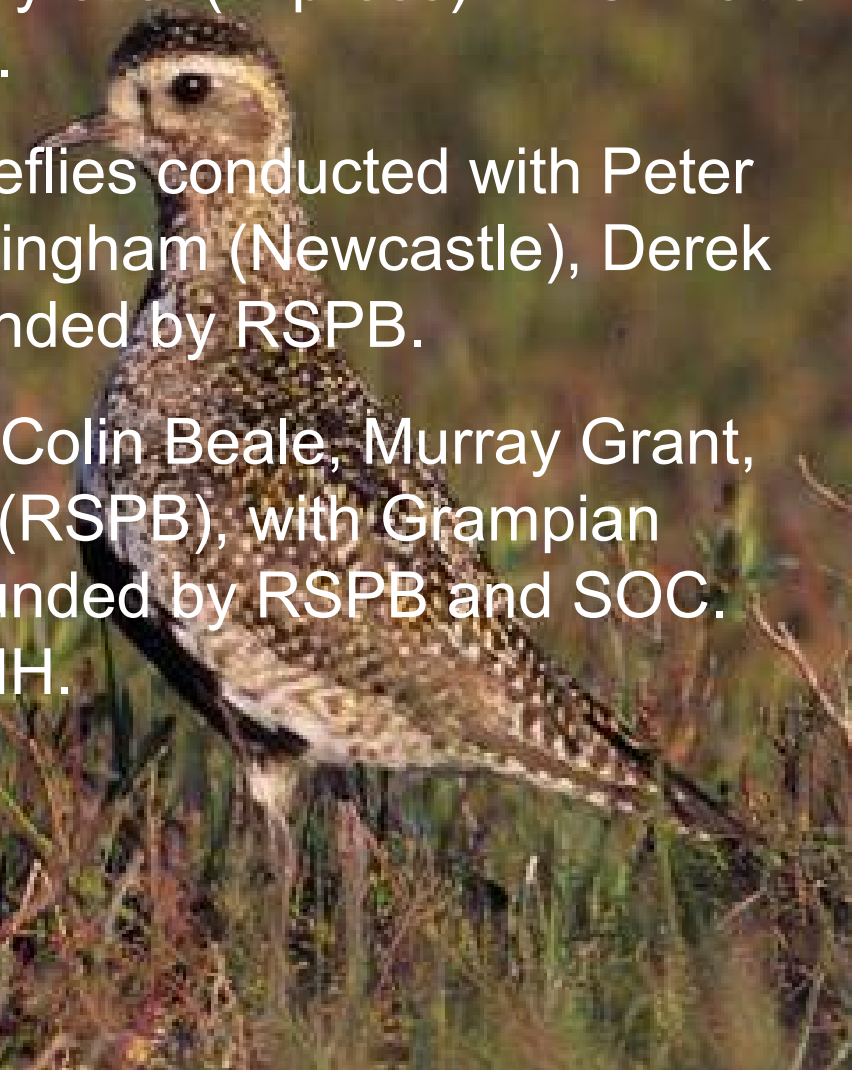
- research to understand mechanisms of climate impacts to inform future management

Acknowledgements

Bird distribution maps from Huntley et al (in press) - A Climatic Atlas of European Breeding Birds.

Work on golden plovers and crane flies conducted with Peter Dennis (Aberystwyth), Mark Whittingham (Newcastle), Derek Yalden (Manchester). Analysis funded by RSPB.

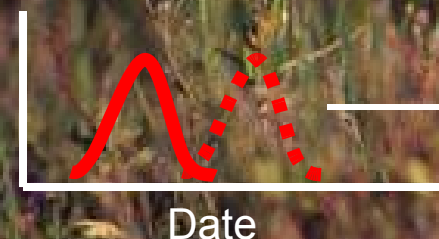
Work on ring ouzel conducted by Colin Beale, Murray Grant, Innes Sim and Graham Rebecca (RSPB), with Grampian Ringing Group. Fieldwork costs funded by RSPB and SOC. Analysis funded by RSPB and SNH.



Golden Plover demographic model

To confirm findings, we refine existing productivity model (Pearce-Higgins & Yalden 2003, Pearce-Higgins et al. 2005).

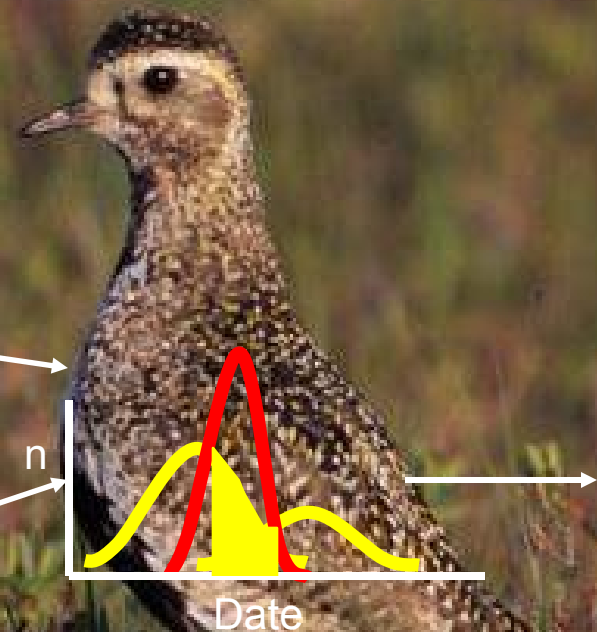
Timing of laying / hatching related to spring weather



Timing of tipulid emergence related to May temperature



Size of emergence related to August temperature



Tipulid abundance encountered determines daily chick survival

Overlap and size of emergence determines tipulid abundance encountered by chicks