Invertebrate increases in British anthropogenic habitats

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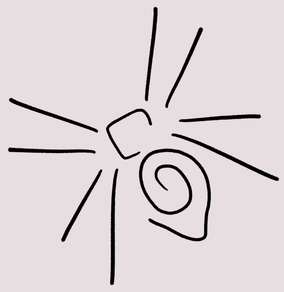
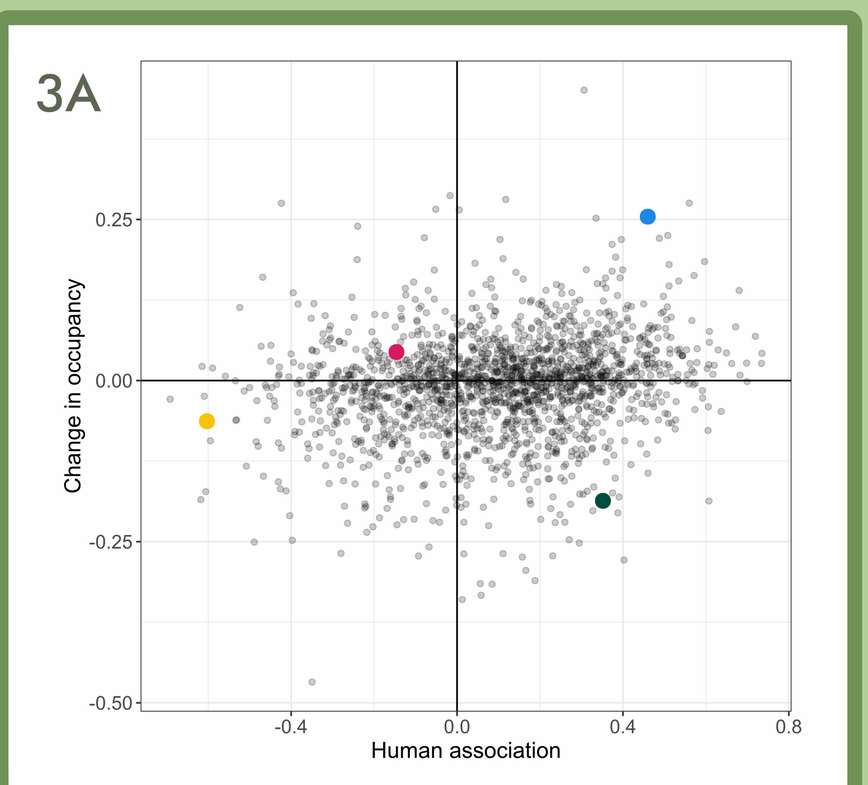
Overview

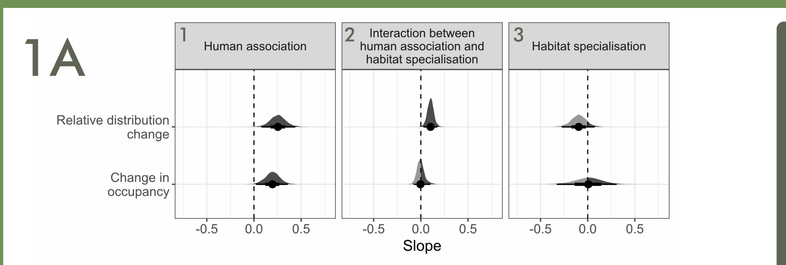
- Humans have had increasingly large impacts on the world's ecosystems, generating a set of more-or-less human-modified (anthropogenic) environments[1].
- Ongoing and future responses of species to these different levels of modification will determine the capacity of biodiversity to adjust to human associated ecosystem change.
- Analysing 38,265,792 site-specific records of 2,106 invertebrate species from 14 taxonomic groups between 1981-2000 and 2001-2020, we find that 'human-associated' species in Great Britain have been increasing relative to 'human-avoiding' species.

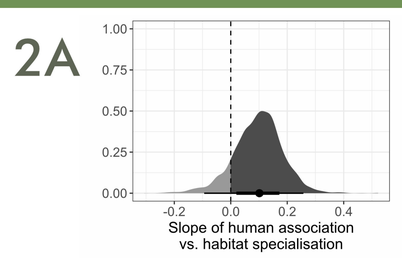
Methods

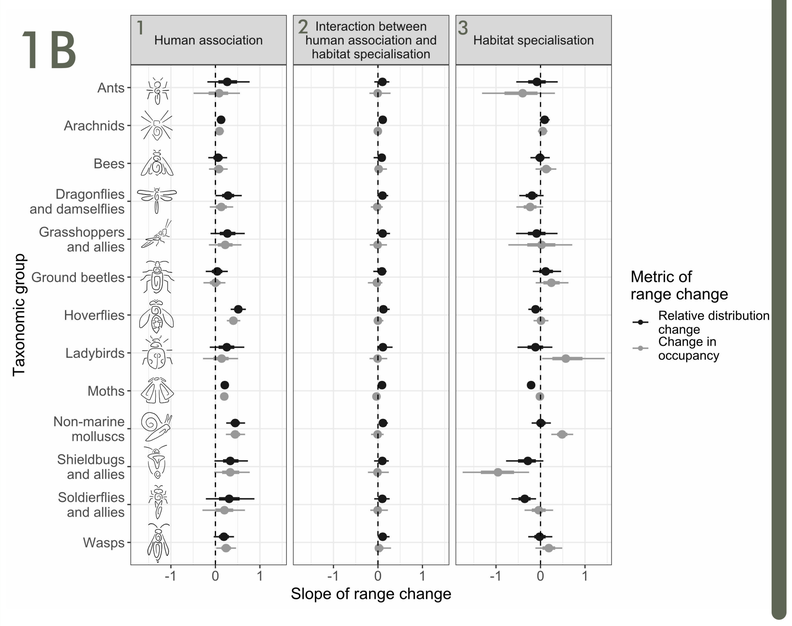
- Adapted model from previous research[2] on habitat associations and habitat specialisation.
- Biological records data modelled with the 2019 UKCEH land cover map[3] at 1 hectare spatial resolution to identify habitat associations per species.
- Five expert interviews conducted to quantify levels of human modification for each land use type.
- Used to produce human association of each species
- Range shifts calculated as relative change in distribution and absolute change in occupancy
- Relationship between range shift, human association and habitat specialisation calculated

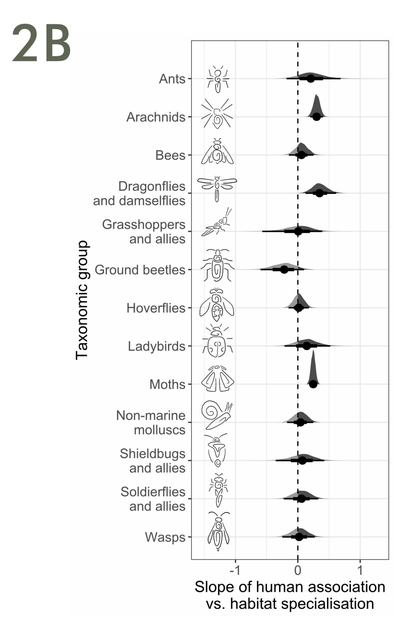


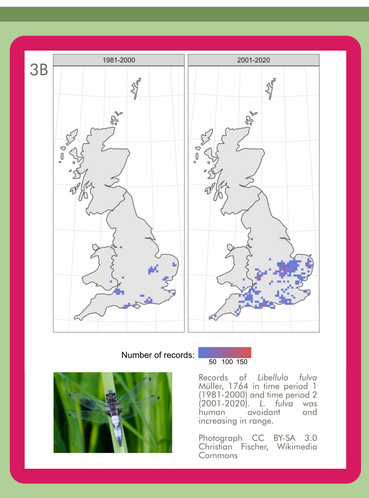


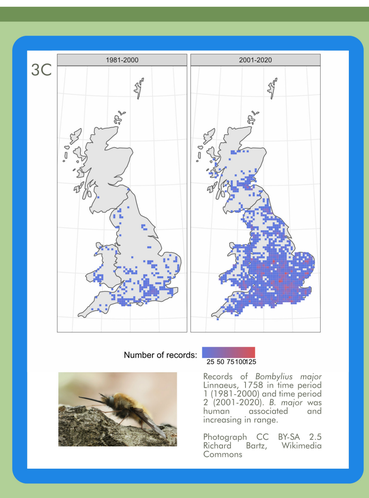


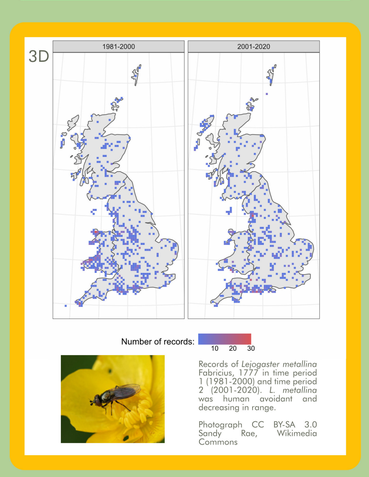


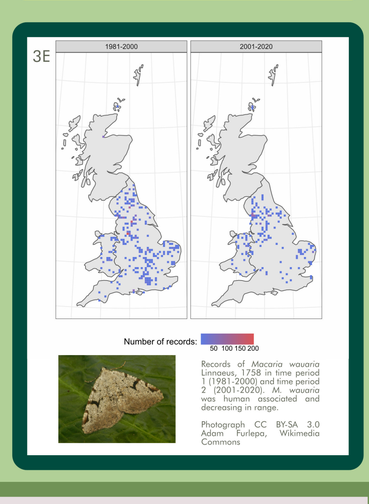












Results

- Human-associated invertebrates are more likely to increase in distribution than human avoidant species, across all taxa (1A, 1B).
- Inconsistent relationship between habitat specialisation and changes in distribution, with a trend towards decreases for habitat specialists (1A, 1B).
- Inconsistent interaction between human association and habitat specialisation (1A, 1B).
- No relationship between human association and habitat specialisation (2A). The relationships that exist are inconsistent between taxa (2B).
- Taxa exist across the spectrum of human association and range shifts (3A); four of these are selected as exemplars (3B, C, D, E).

Conclusions

- Species associated with human modified environments are disproportionately likely to be increasing in their ranges and include both habitat generalists and specialists.
- The species which are most associated with human environments are not primarily habitat generalists.
- We should consider the presence of habitat specialists in human modified environments when making conservation decisions in the future. The current research highlights the complexity of these relationships and the importance of keeping this in mind when considering the variety of environments created in the Anthropocene.

Acknowledgements

Taxonomic Group	Recording Scheme	Scheme Managed By
Bees, wasps and ants	Bees, Wasps and Ants Recording Society	Mike Edwards and Stuart Roberts
Butterflies and moths	Butterfly Conservation	Richard Fox and Nigel Bourne
Dragonflies and Damselflies	British Dragonfly Society Recording Scheme	David Hepper
Grasshoppers and Allies	Grasshoppers and Related Insects Recording Scheme	Peter Sutton and Björn Beckmann
Ground Beetles	Ground Beetle Recording Scheme	Chris Foster
Hoverflies	Hoverfly Recording Scheme	Stuart Ball and Roger Morris
Ladybirds	UK Ladybird Survey	Helen Roy and Peter Brown
Non-marine molluscs	Conchological Society of Great Britain and Ireland	Ben Rowson
Shieldbugs and allies	Terrestrial Heteroptera Recording Scheme	Tristan Bantock

We would like to acknowledge the recording schemes detailed in the table, left, and their respective scheme organisers, for allowing us to access their data, for the hard work they do managing these valuable datasets, and for providing advice on how species should be treated in our analysis.

This project was undertaken on the Viking Cluster, which is a high performance compute facility provided by the University of York. We are grateful for computational support from the University of York High Performance Computing service, Viking and the Research Computing team.

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