1. ABOUT THE DATASET

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Title: Dataset and R code associated with the manuscript "Biological traits predict ability of British wild bees to fill their climate envelopes"

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Description: This dataset contains biological traits and range filling metrics of 64 species of wild bee, as well as R code used to reproduce the results presented in the manuscript 'Biological traits predict ability of British wild bees to fill their climate envelopes'. This dataset contains bee presence data, climate envelope size, and life history traits (body size, habitat breadth, pollen foraging specialization (lecty), and overwintering stage). Climate envelopes were developed in Wyver, C., Potts, S.G., Edwards, M., Edwards, R. and Senapathi, D., 2023. Spatio‐temporal shifts in British wild bees in response to changing climate. Ecology and Evolution, 13(11), p.e10705.

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Related publication: Wyver, C., Potts, S.G., Roberts, S. P. M. R., and Senapathi, D. (2025). Biological traits predict ability of British wild bees to fill their climate envelopes. Ecological Entomology. Under Review

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2. TERMS OF USE

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3. PROJECT AND FUNDING INFORMATION

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Title: Mitigating risks to pollination services caused by climate change - PhD Project

Dates: Sept 19 - Jan 24

Funding organisation: BBSRC via Waitrose Collaborative Training Partnership

Grant no.:BB/T508895/1

WorldWide Fruit Ltd contributed to the funding and development of this project.

4. CONTENTS

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RangeFillingData.csv - A .csv file containing all the data used to re-create the results in the manuscript "Biological traits predict ability of British wild bees to fill their climate envelopes". It contains biological traits and range filling metrics of 64 species of wild bee. It also contains traits data, comprising of four life-history traits (body size, habitat breadth, pollen foraging specialization (lecty), and overwintering stage, emergence period and voltinism) for each species.

- 8 variables, 64 rows

Variables:

- Species: taxonomic name for each of the 64 species of bee used in this analysis. Character

- Suitable.Habitat.Area: The number of grid squares containing suitable climate for the bee species. Derived from Wyver, C., Potts, S.G., Edwards, M., Edwards, R. and Senapathi, D., 2023. Spatio‐temporal shifts in British wild bees in response to changing climate. Ecology and Evolution, 13(11), p.e10705. Numeric

- Presence.Cells: The number of cells in Suitable.Habitat.Area containing a presence record from the Global Biodiversity Information Facility (GBIF). This dataset can be downloaded from https://doi.org/10.15468/dl.axexgg. https://doi.org/10.15468/dl.axexgg. Numeric

- Percent: The percentage of cells in Suitable.Habitat.Area containing a presence record (Presence.Cells/Suitable.Habitat.Area)\*100. Numeric

- Habitat.Breadth: Number of habitats able to be used by each species, according to the European Red List of Bees. Numeric

- Body.Size: Mean interteguar distance, used as a proxy of size for each species. Numeric

- Lecty: Pollen foraging specialization of each species. Character

- Overwintering: Overwintering stage of each species. Character

RangeFillingCode.R - R script used to produce the analysis in the manuscript "Climate-driven phenological shifts in emergence dates of British bees". It contains details of the models used to understand how traits influence a species ability to fill its climate envelope.

Tree.tre - A phylogenetic tree containing the 64 species of wild bee used in this analysis. Derived from Hedtke, S. M., Patiny, S., & Danforth, B. N. (2013). The bee tree of life: A supermatrix approach to apoid phylogeny and biogeography. BMC Evolutionary Biology, 13(1). https://doi.org/10.1186/1471-2148-13-138

5. METHODS

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Bee range filling was calculated using presence-only records of bee observations, obtained from GBIF in Great Britian, and from climate envelopes, created in Wyver et al. (2023) Spatio-temporal shifts in British wild bees in response to changing climate.

A range filling percentage was calculated (the number of grid squares classified as suitable climate with an observation record, as a percentage of total number of grid squares classified as suitable climate.), and linear regression modelling used to test for the effects of three biological traits on the range filling percentage.