Joe Millard—Computational Ecologist
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Summary

I'm a postdoctoral researcher at the Natural History Museum (London), primarily interested in the causes and consequences of global pollinator biodiversity change, and the power of monitoring biodiversity change and public biodiversity awareness in real-time. Prior to my current postdoc I worked at the Leverhulme Centre for Demographic Science as a data scientist and honorary non-stipendiary research fellow (Nuffield College). I completed a PhD in computational ecology jointly between UCL, the Institute of Zoology, and the RSPB. Previously I also worked at UNEP-WCMC building automated data handling systems for wildlife trade data, and at the journal Scientific Reports in manuscript peer-review and decisions.

Education and qualifications

PhD Computational Ecology (Minor corrections) – UCL London NERC DTP (2017-2021)
Thesis: Causes and consequences of global pollinator biodiversity change in the Anthropocene

- CASE (Collaborative Award in Science and Engineering) PhD in collaboration with UCL (Dr Tim Newbold), the Institute of Zoology (Dr Robin Freeman), and the RSPB (Prof Richard Gregory).
- Taught statistical programming on two computational biology modules, for a total of more than 100 hours. Covered statistical methods (lme4, anova, lm), programming (basic Python), data handling (piping, dplyr verbs), and functional programming in R.

MSc Biodiversity and Conservation (Distinction, 1st) – The University of Leeds (2014-2015)
Thesis: A Satellite Telemetry Investigation of Caspian Seal *(Pusa caspica)* Activity Budgets (77)

- Awarded the second highest overall mark in the year for my data science research project and the highest thesis mark at 80.5%.

BSc Zoology, Upper second-class honours (2:1) – The University of Leeds (2011-2014)
Thesis: Of Molecules and Morphology: An Extended Review of the Eutherian Radiation (69)

Employment and volunteering summary

Postdoctoral researcher – the Natural History Museum, London (March 2022-present)

- Funded on the NERC project GLiTRS (https://glitrs.ceh.ac.uk/), a consortium building a global threat-response model for insect biodiversity change.
- Lead post-doc on meta-analyses and in combining multiple data types (expert elicitation, space-for-time, and meta-analyses) to develop the core threat-response model for insect biodiversity.
- Supervised 22 students (5 primary supervisor; 13 co-supervisor), led catch-up meetings with groups of masters students and post docs, introduced new starter students to the museum, and NHM-side lead on GLiTRS recruitment during period of line manager absence.
- Project lead on the Species Awareness Index (https://doi.org/10.1111/cobi.14096) and Dynameta (https://doi.org/10.1016/j.softx.2023.101439)

Postdoctoral data scientist and honorary non-stipendiary research fellow – Leverhulme Centre for Demographic Science & Nuffield College, University of Oxford (September 2021-March 2022)

- Lead on three research projects: 1) a systematic text-analysis review of the causes of human sleep disturbance; and 2) changes in Twitter activity following the COVID-19 pandemic; and 3) the effects of extreme night-time temperature on sleep disturbance, using ERA-5 hourly temperature data and Twitter scraping.
- Helped design a set of data management plans for the collection of multiple forms of publicly donated data (e.g. social media, genetic, genealogy, GPS), and worked with external companies to ensure a secure backend database.
- Co-authored a SAGE Number 10 briefing on the reintroduction of COVID-19 preventative measures.

Programme Assistant – UNEP-WCMC (September 2016-June 2017)

- Collaborated with Dr Aly Pavitt to develop two new automated systems in R for the processing of CITES data, replacing a previous system built in VBA, and bringing processing time down from 3-4 hours to 5-10 seconds.
- Delivered workshops on Shiny to the Species Programme, the wider centre, and a specialist technical GIS hub.
- Involved in producing a data handling guide for the Ecuadorian environmental ministry and an Amazonian regional trade overview, and wrote ~12 trade reviews for the European Commission.

Publishing Assistant – Nature Publishing Group (November 2015-September 2016)

- Applied my broad academic knowledge to rapidly assign manuscripts to the editors at Scientific Reports, and then responsible for manuscripts to decision.
- Trained in the handling and identification of clinical trials and responsible for vetting trials before acceptance.
- Responsible for the growth and maintenance of the Ecology and Evolution section of the editorial board.
- Presented accepted ecological papers to the editorial team and wrote paper summaries for our Facebook page, published to more than 100,000 followers.

Major invited talks, symposia, and workshops

- **Royal Society Recovering Nature event: building on Georgina Mace's work to ensure a biodiverse and liveable future** – invited as one of 12 contributed speakers building on Georgina's work
- **ICCB 2023 round-table symposium: Large scale monitoring of perceptions of nature: state of the art and ways forward** – co-author on accepted proposal (unable to attend in person)
- **NACCB 2024 (upcoming)** – invited speaker for symposium "Analysing text data for conservation", including panel member in a closing discussion
- **Taming complexity in ecology** – 2.5 day invite only workshop in Bad Blankenburg
- **Nature data unlocked** – 2 day invite only workshop in Cambridge on future biodiversity model needs
- **BES Hackathon (upcoming)** – co-lead organiser on 'Next-generation monitoring of human-nature interactions' hackathon
- **NHM & Turing AI Lunch Series 2023** – invite only lunch for AI scientists working in the natural and environmental sciences
- **Linnaean Student Conference 2019** – The importance and diversity of animal pollination (https://www.youtube.com/watch?v=qn0sCxJiTdI&t=5854s)
- **Seminars:** University of Cambridge (2024); Natural History Museum (2022); University of Oxford (2021), University College London (2019); University of São Paulo, Brazil (2019)

Prizes, awards, and grants (£96940 as of March 2024)

- **Masters project funding to date (March 2024)** – secured 7 primary supervisions, contributing £1500 each to the museum (total £10500)
- **Taming complexity in ecology** – fully funded by workshop convenors (total ~£1500)
- **GEOBON 2023, Montreal** – fully funded on the NHM Science Investment Fund (total ~£3000)
- **PhD Conference travel fund** – contribution towards BES Ecology Across Borders 2021 (total £500)
- **London NERC PhD studentship (2017-2021)** – fully funded PhD scholarship on the environmental science London NERC DTP (total ~£77,000)
- **CASE (Collaborative Award in Science and Engineering) funding (2017-2021)** – additional PhD funding from the RSPB (total £3000)
- **Cambridge University bench fees –** fully funded to join the University of Cambridge as a visiting researcher (total £1440)
- **Capgemini Tech4PositiveFutures challenge 2022** – finished as one of the top 6 pitches for a €100k prize applying tech to biodiversity problems

- **BES Quantitative Ecology Hackathon 2020** – awarded "best presentation" for our plant species identifying AI Shiny app (https://methodsblog.com/2020/03/12/quantitative-sig-hackathon/)
- **Linnaean Student Conference 2019** – won a place as speaker for my abstract on pollinator biology
- **Leeds University Science Magazine Writing competition 2015** – won first prize for my piece "The polar bear: a tale of two futures"
- **IEMA Student Sustainability Conference 2015** – won a committee place for my essay on sustainability issues, and later invited to meet CEO of IEMA

Journals reviewed for

- Conservation Letters; Ecosystem Services; Ecography; Scientific Reports; Global Ecology and Biogeography; Communications Earth & Environment; PLOS ONE

Publications

Published:

1. Scheepens, D., **Millard, J**., Farrell, M., Newbold, T., (Accepted). Large language models help facilitate the automated synthesis of information on potential pest controllers. *Methods in Ecology and Evolution.*
2. Veríssimo, D., Johnson, T.F., **Millard, J.,** and Roll, U., 2023. Adopt digital tools to monitor social dimensions of the global biodiversity framework. *Conservation Letters*, e12991.
3. **Millard, J.**, Outhwaite, C.L., Ceauşu, S., Carvalheiro, L.G., da Silva e Silva, F.D., Dicks, L.V., Ollerton, J. and Newbold, T., 2023a. Key tropical crops at risk from pollinator loss due to climate change and land use. *Science Advances*, 9(41), p.eadh0756.
4. Johnson, T.F., Cornford, R., Dove, S., Freeman, R. and **Millard, J.**, 2023. Achieving a real-time online monitoring system for conservation culturomics. *Conservation Biology*, 37, e1409.
5. Skinner, G., Cooke, R., Keum, J., Purvis, A., Raw, C., Woodcock, B.A. and **Millard, J.**, 2023. Dynameta: A dynamic platform for ecological meta-analyses in R Shiny. *SoftwareX*, p.101439.
6. Cornford, R., **Millard, J.**, González-Suárez, M., Freeman, R. and Johnson, T.F., 2022. Automated synthesis of biodiversity knowledge requires better tools and standardised research output. *Ecography*, 2022(3), p.e06068.
7. **Millard, J.**, Gregory, R.D., Jones, K.E. and Freeman, R., 2021. The species awareness index as a conservation culturomics metric for public biodiversity awareness. *Conservation Biology*, 35(2), pp.472-482.
8. **Millard, J.**, Outhwaite, C.L., Kinnersley, R., Freeman, R., Gregory, R.D., Adedoja, O., Gavini, S., Kioko, E., Kuhlmann, M., Ollerton, J. and Ren, Z.X., Newbold T., 2021. Global effects of land-use intensity on local pollinator biodiversity. *Nature Communications*, 12(1), p.2902.
9. **Millard, J.**, Freeman, R. and Newbold, T., 2020. Text-analysis reveals taxonomic and geographic disparities in animal pollination literature. *Ecography*, 43(1), pp.44-59.
10. Newbold, T., Adams, G.L., Albaladejo Robles, G., Boakes, E.H., Braga Ferreira, G., Chapman, A.S., Etard, A., Gibb, R., **Millard, J.**, Outhwaite, C.L. and Williams, J.J., 2019. Climate and land-use change homogenise terrestrial biodiversity, with consequences for ecosystem functioning and human well-being. *Emerging Topics in Life Sciences*, 3(2), pp.207-219.

Submitted:

11. **Millard, J.,** Christie, A., Dicks, L., Isip, J., Johnson, T.F., Skinner, G., Spake, R., ChatGPT is likely reducing opportunity for support, friendship, and learned kindness in research. *Methods in Ecology and Evolution*
12. Johnson, T.F., Simmons, B**., Millard, J.,** Strydom, T., Danet A., Evans, L., Pressure to publish introduces LLM risks. *Methods in Ecology and Evolution*

In preparation:

13. **Millard, J.,** 2023b. Mobilise central bank digital currency to bend the curve of biodiversity loss. *EcoEvoRxiv*. DOI: https://doi.org/10.32942/X2TC7H
14. Williams, J., Newbold, T., **Millard, J.**, Groner, V., Pearson, R., Important pollinators respond less negatively to anthropogenic land use than other animals
15. **Millard, J.,** Bladon, A., Cooke, R., Dicks, L., Outhwaite, C., Purvis A., Rodger, J., Skinner, G., Isaac, N. J. B. A cross-threat meta-analytic database for insect biodiversity change
16. Cooke, R., Outhwaite, C., Bladon, A., **Millard, J.**, Rodger, J., Dong, Z., Dyer E., Edney, S., Murphy, J., Dicks, L., Hui, C., Jones, I., Newbold, T., Purvis, A., Roy, H., Woodcock, B., & Isaac, N. J. B. Harnessing the breadth of evidence on global insect biodiversity change
17. **Millard, J.,** Automation is not a useful framing for the role of AI in scientific research

Preprints:

18. **Millard, J.,** Akimova, E., Ding, X., Leasure, D., Zhao, B. and Mills, M., 2023. Stringent COVID-19 government restrictions were associated with a marked increase in Twitter activity in Europe.