

Patrick Alexander Walkden, PhD

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I specialise in modelling the impacts of current and future environmental change on biodiversity and its contributions to people. My work supports the monitoring of progress towards global and regional biodiversity targets while informing adaptive policy responses. I have extended functional trait-based measures of biodiversity to obtain deeper insights into ecological assemblage structure and the consequences of anthropogenic change for species, assemblages and ecosystem functioning, and to formulate a model- and functional diversity-based biodiversity indicator. I love collaborative research and am currently working with a multi-disciplinary and multi-institutional team on a UK government-funded project to develop and model scenarios for the goals and targets of the KMGBF. Beyond research, I have actively promoted environmental science by leading the Changing Planet seminar series at the Grantham Institute for three years and co-founded a science communication event to foster inclusive and vibrant communities. With strong R-based analytical skills in data analysis, management, and programming, as well as excellent interpersonal and organizational abilities, I am confident I can excel as a postdoctoral researcher.

Research Experience

Postdoctoral Researcher

July 2024 - Present

Natural History Museum

- I am a core member of a multi-institutional team conducting a global review of models for scenario analysis, assessing the capabilities and gaps in the current modelling landscape to inform the Kunming-Montreal Global Biodiversity Framework. Through a multi-stage screening and interview process this review has evaluated a broad range of models, spanning multiple countries and domains, on their individual and complementary strength for informing the implementation of KMGBF. This work has contributed significantly to an interim report for a UK-government funded project and will be submitted to a high-impact peer-reviewed journal upon completion.
- I have developed a common schema representing land use and land use management in two separate land-use classification systems (LandSyMM & PREDICTS) in order to model and project the biodiversity consequences of policy actions under different future scenarios. These models will underpin the projections of the Biodiversity Intactness Index (BII) under these alternate pathways that represent different levels of ambition and value perspectives. This work will be submitted to a peer-review journal upon completion.

PhD Researcher

October 2020 – June 2024

Science and Solutions for a Changing Planet Doctoral Training Partnership, Life Sciences, Natural History Museum & Imperial College London

- I developed and applied novel analytical techniques to assess how the altered functional structure of avian assemblages in human-modified habitats impacts ecosystem integrity. This work has demonstrated how functional trait approaches may aid in quantifying ecosystem integrity to inform environmental frameworks for policy, mitigation and restoration. This work is currently in preparation for *Nature Ecology & Evolution*.
- I prototyped a global model- and functional diversity-based biodiversity indicator that incorporates species' functional traits and provides spatially explicit estimates of how human impacts have affected ecological integrity globally. Such an indicator can inform decision makers how best to distribute limited resources and conservationists what interventions will produce the greatest benefits to nature. This work is currently in preparation for *Ecological Indicators*.
- Whilst undertaking a funded placement at Cornell University, I used the massive citizen science database, eBird, to unravel the environmental and functional trait determinants underpinning the population trends of bird species across the US. Providing such a mechanistic understanding of why birds respond the way they do to environmental change, will be invaluable to develop strategies to protect the most threatened species in the US today. This work is currently in preparation with colleagues at Imperial, Cornell and the University of Aberdeen and will be submitted to a high-impact peer-reviewed journal.

Education

PhD

October 2020 – June 2024

Natural History Museum & Imperial College London

My PhD thesis was titled "Functional implications of land use and climate change for bird assemblages worldwide", during which, I worked with many active researchers in an intensive research environment, where being able to work to a deadline and convey information in a clear, confident, and succinct manner are essential to foster good collaborative relationships. Throughout my time developing the three encompassing data chapters of my PhD I have broadened the suite of skills available to me to be able to successfully continue as an independent postdoctoral researcher.

Supervisors: Professor Andy Purvis (Natural History Museum) and Professor Joseph Tobias (Imperial College London).

Master of Research (MRes) – Ecology, Evolution & Conservation (*Distinction*)

September 2018 – September 2019

Imperial College London

Through taught modules, workshops, and two independent research projects I continued to gain a thorough understanding of a broad range of topics relevant to this PhD and well as developing many research skills

Thesis 1 – “The ecological implications and evolutionary outcomes of living on islands: testing the “island rule” in birds.” - (72%) Supervised by: Professor Joseph Tobias

Thesis 2 – “Sensitivity of bee species to land-use and climate change – a European perspective.” (78%). Supervised by Professor Andy Purvis

Bachelor of Science (BSc) – Biology (*First class with Honours*)
University of Sussex

September 2012 – June 2017

Supervision and teaching experience

- I have co-supervised four master’s students spanning two institutions: Imperial College London and UFZ Helmholtz-Centre for environmental research.
- In the role of Graduate Teaching Assistant at Imperial College London, I both supported and actively led the teaching of undergraduate and graduate students in numerous subjects including Statistics, Maths, Ecology, Conservation, Evolution, Paleobiology and Field skills.

Key skills, achievements and qualifications

- Quantitative Analysis:
 - Geospatial and Temporal modelling
 - Species distribution models
 - Mixed effects models
 - Trait-based modelling approaches
 - Bayesian inference
- Multi-system approaches:
 - Global
 - Island
 - Tropical
 - Temperate
- Multi-taxon focus:
 - Insects
 - Birds
- Mammals
- Fully literate with R, GIS (in R) and MS Office.
- Scientific Writing and presentation
- Data Management, Manipulation and Visualisation
- Science Communication
- Co-founder of the Unloved Animals Club
- MRes Ecology, Evolution, & Conservation Course representative, 2018-2019
- Seminar Representative for the SSCP DTP, 2020-2023
- NHM student committee member, 2020-2023
- Awarded Imperial Global Fellows Fund Grant of ~£2500 (placement during May – August 2023 at Cornell University).

Publications

- **Walkden, P. A.**, Burian, A, Blonder, B, Weeks, T. L, Titley, M. A., Purvis, A, Tobias, J. A. (in prep.). The scale of human impacts on ecosystem integrity revealed by avian functional traits.
- **Walkden, P. A.**, Tobias, J. A, Purvis, A. (in prep.). The functional integrity of bird communities worldwide.
- **Walkden, P. A.**, Stillman, A, Johnston, A, Tobias, J. A, Purvis, A, Miller, E. T. (in prep.). Functional traits mediate sensitivity to local pressures in North American birds.
- Weeks, T. L, **Walkden, P. A.**, Edwards, D. P, Lees, A. C, Pigot, A. L, Purvis, A, Tobias, J. A. (in revision). Land-use change undermines the stability of avian functional diversity. *Nature*.
- Webster, C. H, Barker, J, Curnick, D, Gollock, M, Hansford, J, Hoffmann, M, Pettorelli, N, Turvey, S. T, **Walkden, P. A.**, Wang, J, Rosindell, J, Gumbs, R. (in review). Prioritising Functionally Distinct and Globally Endangered (FuDGE) sharks for conservation action. *Science Advances*. Preprint at Doi: <https://doi.org/10.1101/2024.06.05.597292>
- Tobias, J. A, Sheard, C, Pigot, A. L, Devenish, A. J. M, Yang, J, Sayol, F, Neate-Clegg, M. H. C, Alioravaian, N, Week, T. L, Braber, R. A, **Walkden, P. A.**, *et al.* (2022). AVONET: morphological, ecological and geographical data for all birds. *Ecology Letters*. 25:3 (581-597). Doi: <https://doi.org/10.1111/ele.13898>
- Benítez-López, A. L, Gallego-Zamorano, J, Huijbregts, M. A. J, Milá, B, Santini, L, **Walkden, P. A.**, & Tobias, J. A. (2021). The island rule explains consistent patterns of body size evolution in terrestrial vertebrates. *Nature Ecology & Evolution*, 5, 768-786. Doi: <https://doi.org/10.1038/s41559-021-01426-y>

Conference presentations and posters

- The Ecological Society of Germany, Austria and Switzerland (GfÖ) Annual meeting 2023: Leipzig, Germany. *The functional integrity of bird communities worldwide*. **Invited talk for the session:** Ecosystem health from theory to practice.
- British Ecological Society (BES) Annual meeting 2022: Edinburgh, England. *Impacts of land use change on the ecological functioning of global bird communities*. **Oral presentation.**
- Natural History Museum Student Conference 2022: London, England. **Organised the conference.**
- Natural History Museum Student Conference 2021: London, England. **Organised the conference.**

Referees

Professor Andy Purvis
Research Leader in Life Sciences
Natural History Museum
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Professor Joseph Tobias
Professor of Biodiversity & Ecosystems
Imperial College London
j.tobias@imperial.ac.uk