Sebastian Hoefer

Postdoctoral Researcher at James Cook University
Ecology – Biodiversity Assessments – Ecoacoustics – Wildlife Conservation
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EDUCATION

Doctor of Philosophy (Ecology/Ecoacoustics)
James Cook University, Australia – 2020 to 2024
Conducted research on the value of passive acoustic monitoring to enhance terrestrial vertebrate biodiversity assessments. Focused on optimising field survey design and data analysis to enable cost-effective large-scale and long-term monitoring of biodiversity.

Honours (Behavioural Biology)
Macquarie University, Australia – 2018
Studied the relationship between social behaviour and cognitive abilities of five Australian skinks.

Bachelor of Science (Biology)
Freie Universität Berlin, Germany – 2015 to 2018
Graduated with High Distinction (top 5% of class) and received two highly competitive scholarships. Established a partnership between the university's scholarship program and the Leibniz Institute for Zoo and Wildlife Research (IZW) and managed a film project focused on science communication.

EXPERIENCE

Postdoctoral Research Fellow
James Cook University, Australia – 2024 to present
- Leading multiple large-scale ecoacoustic monitoring projects across Australia focusing on reliable detection of threatened and introduced species, revealing dial and seasonal activity patterns, and assessing the impact of solar farms and urbanisation on vertebrates.
- Designing and delivering comprehensive workshops to build capacity in passive acoustic monitoring with indigenous rangers, government and private sector stakeholders.
- Collaborating with Indigenous ranger groups to develop and implement large-scale, long-term acoustic monitoring projects that support looking after Country.

Ecologist
Bush Heritage, Australia – 2024 to 2025
- Designed and led a comprehensive vertebrate biodiversity assessment for the new block at the Tarcutta Hills Reserve, employing diverse monitoring methods (e.g., bird and spotlight surveys, live-animal trapping, passive acoustic monitoring, and camera trapping).
- Conducted vegetation assessments to evaluate habitat characteristics, and analysed the data using AI models, resulting in a detailed biodiversity report for conservation management.

Threatened Species Monitoring
James Cook University, Australia – 2023
- Led field surveys to monitor Black-throated Finch populations using passive acoustic monitoring and in-person surveys to optimise survey methods and enable effective conservation action.

Data Scientist
Gulf Savannah NRM/James Cook University, Australia – 2022 to 2023
- Analysed camera trapping data for the Better Biodiversity Grazing Landscapes project by implementing a machine learning pipeline to efficiently detect and identify wildlife in thousands of images, achieving species-level identification accuracy.
- Results informed land management practices and conservation strategies in the project area.

Biodiversity Assessments

James Cook University, Australia – 2021 to 2022

- Designed and conducted 7–day terrestrial vertebrate biodiversity surveys twice per year at six sites throughout eastern Australia. Each survey consisted of passive acoustic recorders, pitfall traps, funnel traps, Elliott traps, cage traps, arboreal cover boards, camera traps, spotlight surveys, bird surveys, eDNA sampling, and vegetation surveys.
- Collaborated with Traditional Owners, and research/conservation organisations, managing teams of 20+ people for remote fieldwork and data collection to assess the effectiveness of acoustic monitoring for comprehensive terrestrial biodiversity assessments.

Research Assistant

Cape Eleuthera Institute (CEI), The Bahamas – 2019 to 2020

- Developed a research project collaborating with international partners studying local snake populations and led the institute's behavioural and ecological research on sea turtles.
- Organised and led scientific and educational remote field surveys with >50 people and initiated a community engagement programme to educate locals and visitors about snake conservation.

Research Assistant

Freie Universität Berlin, Germany – 2016 to 2018

- Responsible for insect and plant husbandry, setting up and analysing feeding experiments and behavioural tests on beetle-plant interactions to identify compounds related to the natural plant defence against beetle infestations and help develop new strains of resistant crops.

Volunteering

Australia/Greece – 2015 to 2024

- Conducted spotlight surveys as part of the long-term monitoring of a reintroduced Greater Bilby population (Australian Wildlife Conservancy, Yookamurra - 2019), assisted in managing a major sea turtle conservation project with >100 volunteers (Archelon, Greece - 2015 to 2017), and assisted various colleagues and students with fieldwork throughout my PhD (JCU, 2021 to 2024).

Casual Academic

James Cook University, Australia – 2021 to 2024

- Demonstrated and lectured for Australian Terrestrial Diversity (BZ2725), Population and Community Ecology (BZ3220), Conservation Biology (BZ3215), Wildlife Ecology and Management (BZ5740), Fundamentals of Ecology (BS2460), Toolkit for the Field Biologist (BZ5990), Ecological Research Methods (BZ3230), Biological Invasions (BZ3235), Introduction to Biodiversity (BS1007), Introduction to Biological Processes (BS1001) and Quantitative Methods in Science (SC5202).

Student Supervisor

James Cook University/Cape Eleuthera Institute/Spanish National Research Council – 2019 to present

- Supervised and mentored research technicians, undergraduate, and post-graduate students at multiple institutions, providing instruction in field techniques, scientific methodology, data management and analysis, software and equipment use, and overseeing student research projects, including their integration into larger research programs.

Research Class Teacher

Cape Eleuthera Institute (CEI), The Bahamas – 2019 to 2020

- Developed interactive, field-based lessons focused on understanding the scientific process from establishing hypotheses and data collection to analysis and interpretation, which enabled students to create their own research project and present findings at a scientific symposium.

Visiting Researcher

Sakaerat Environmental Research Station, Thailand – 2019

- Assisted with the radio-tracking and morphometric data collection of cobras, pythons, and cat snakes to study their movement and habitat use, and conducted field surveys to record local herpetofauna and find new individuals for radio tracking.

Collaboration

Leibniz Institute for Zoo and Wildlife Research, Germany/Namibia – 2017 to 2018

- Established a partnership between the IZW and the Freie Universität Berlin. Assisted with cage and camera trapping for a cheetah monitoring project in Namibia, and analysed camera trap footage for abundance and distribution data used in IUCN Red List assessments.
- Dissected wild and zoo animals to determine the cause of death and collected tissue samples to research and analyse wildlife diseases.

Public Outreach and Science Communication

- Passionate about sharing science and conservation stories with the public by actively blogging on social media and have been featured in BBC's "Meet the Scientist" and interviewed for NPR's Short Wave Science podcast.

SKILLS

Fauna survey/identification	Bird survey/bird banding	Vegetation assessment
Acoustic monitoring	Live animal trapping	Camera trapping
Project management	Experimental design	Academic/grant writing
Data analysis/visualisation	Spatial analysis/GIS	BirdNET & custom recognisers
4WD operation/maintenance	ATV operation	RYA powerboat operation
Wilderness First Aid	Teaching/mentoring	Science communication
Drone surveys	Radio-telemetry	TurtleCam
RStudio	Photography	Graphic design/editing
Animal dissection	Animal/Plant husbandry	German (native)

PUBLICATIONS

Passive acoustic monitoring outperforms observer-based methods for Australian frog communities

Hoefer, S., Allen-Ankins, S., McKnight, D. T., Nordberg, E. J. & Schwarzkopf, L. *Ecography* – 2026

Demonstrated that long-term passive acoustic monitoring using BirdNET embeddings detects greater frog species richness at substantially lower cost than observer-based monitoring, while showing that the methods are complementary.

Sensors vs Surveyors: Comparing passive acoustic monitoring, camera trapping and observer-based monitoring for terrestrial mammals

Hoefer, S., Allen-Ankins, S., McKnight, D. T., Nordberg, E. J. & Schwarzkopf, L. *Methods in Ecology and Evolution* – 2025

Examined the effectiveness of passive acoustic monitoring for comprehensive large-scale, long-term assessments of terrestrial mammal biodiversity. (Podcast episode)

Passive acoustic monitoring predicts higher avian diversity metrics than traditional bird surveys across multiple Australian bioregions

Doohan, B., **Hoefer, S.**, Allen-Ankins, S., Nilsen, V. & Schwarzkopf, L. *Ecological Indicators* – 2026

Evaluated PAM in combination with BirdNET for large-scale, long-term bird biodiversity assessments, compared to dawn and nocturnal in-person surveys.

The use of BirdNET embeddings as a fast solution to find novel sound classes in audio recordings

Allen-Ankins, S., **Hoefer, S.**, Bartholomew, J., Brodie, S. & Schwarzkopf, L. *Frontiers in Ecology and Evolution* – 2025

Demonstrated how BirdNET's deep-learning embeddings can efficiently identify new sound classes across diverse taxonomic groups with minimal effort, offering ecologists and conservationists a simple tool for broad acoustic monitoring without needing specialised knowledge in deep learning.

Short term effects of attaching animal borne devices on the behavior of juvenile green turtles

Robinson, N. J., Doñate-Ordóñez, R., Chatzievangelou, D., Brooks, A. M. L., Cuffley, J., Fields, C. Y. A., **Hoefer, S.**, Pinou, T., Smith & A., Mills, S. *Ecology and Evolution* – 2024
Investigated the behavioural effects and dive patterns of juvenile green turtles following biologger attachment, to understand the short-term impacts of handling and device attachment on marine turtles.

Diverse methods for diverse systems: a large-scale comparison of reptile sampling methods

Hoefer, S., McKnight, D. T., Allen-Ankins, S., Nordberg, E. J. & Schwarzkopf, L. *Herpetologica* – 2024
Examined the effectiveness of diverse survey methods for assessing reptile biodiversity in the open eucalypt woodlands of eastern Australia over an extensive temporal and spatial scale.

Passive acoustic monitoring in terrestrial vertebrates: a review

Hoefer, S., McKnight, D. T., Allen-Ankins, S., Nordberg, E. J. & Schwarzkopf, L. *Bioacoustics* – 2023
Reviewed the current knowledge on the efficacy of passive acoustic monitoring for terrestrial vertebrate surveys and identified factors that influenced its performance.

Effectiveness of acoustic indices as indicators of vertebrate biodiversity

Allen-Ankins, S., McKnight, D. T., Nordberg, E. J., **Hoefer, S.**, Roe, P., Watson, D. M., McDonald, P. G., Fuller, R. A., Schwarzkopf, L. *Ecological Indicators* – 2023
Compared observer-based surveys with acoustic diversity indices from automated recorders for bird and frog biodiversity and identified useful indices.

Cubophis vudii vudii (Bahamian Racer). Growth and movement

Hoefer, S., Mills, S., Rotger, A., Robinson, N. J. *Herpetological Review* – 2021
Reported on growth rates and movement patterns of a Bahamian snake.

Semi-automated photo-identification of Bahamian Racers (*Cubophis vudii vudii*)

Hoefer, S., Rotger, A., Mills, S., Robinson, N. J. *Acta Herpetologica* – 2021
Identified recaptured snakes using a semi-automated photo identification software.

What the dead tell us about the living: using roadkill to analyse diet and endoparasite prevalence in two Bahamian snakes

Hoefer, S., Mills, S., Pinou, T. & Robinson, N. J. *Ichthyology and Herpetology* – 2021
Used roadkill to describe novel prey items and endoparasite loads in Bahamian snakes. Featured in the media (Twitter Post).

Healing of skin biopsies in wild juvenile green turtles *Chelonia mydas*

St. Andrews, L. C., **Hoefer, S.**, Boyd, L., Paladino, F. V. & Robinson, N. J. *Chelonian Conservation and Biology* – 2021
Reported on healing rates of skin biopsy punches in green sea turtles in the wild.

Size matters: sexual dimorphism in the pelvic spurs of the Bahamas boa (*Chilabothrus strigilatus*)

Hoefer, S., Robinson, N. J. & Pinou, T. *Herpetology Notes* – 2020
Quantified the strong sexual dimorphism in the pelvic spurs of Bahamian boa.

Are lizards capable of inhibitory control? Performance on a semi-transparent version of the cylinder task in five species of Australian skinks

Szabo, B., **Hoefer, S.** & Whiting, M. J. *Behavioral Ecology and Sociobiology* – 2020
Compared the performance of a basic cognitive ability between Australian skinks. Featured in the media (Blog Post).

Validating the use of drones for monitoring the abundance and behaviour of juvenile green sea turtles in mangrove creeks in The Bahamas

Robinson, N. J., Bigelow, W., Cuffley, J., Gary, M., **Hoefer, S.**, Mills, S., Blanco, A. M. *Testudo* – 2020
Validated the use of UAVs for sea turtle abundance and behaviour surveys in The Bahamas.

Cubophis vudii vudii (Bahamian Racer). Diet

Hoefer, S., Robinson, N. J. & Jones, A. *Herpetological Review* – 2020

Described a feeding event and a new prey item for a non-venomous Bahamian snake.

Tail bifurcation in a Brown Anole, *Anolis sagrei* (Duméril & Bibron, 1837)
Hoefer, S. & Robinson, N. J. *Herpetology Notes* – 2020
Reported on incomplete caudal autotomy in an Anolis species. Featured in the media (Anole Annals).

Autohaemorrhaging in a Bahamian Pygmy Boa, *Tropidophis curtus barbouri*
Hoefer, S., Mills, S. & Robinson, N. J. *Herpetological Bulletin* – 2019
Recorded a novel defensive behaviour in a non-venomous snake. Featured on the cover of the issue. Featured in the media (BBC Wildlife Magazine, Short Wave Science).

Range extension of the Black-banded Trinket Snake, *Oreocryptophis porphyraceus* (Cantor, 1839) in Lam Dong Province, Vietnam
Hoefer, S. *IRCF Reptiles & Amphibians* – 2019
Described the range extension of a cryptic and rare species of snake.

GRANTS AND AWARDS

JCU Dean's Award for Higher Degree by Research Excellence – 2026
JCU CSE Incentive Award for Excellence in Research – 2024 (A$500)
JCU Competitive Research Training Grant – 2023 (A$2,500)
JCU Competitive Research Training Grant – 2022 (A$2,500)
Australian Society of Herpetologists Travel Grant – 2022 (A$250)
James Cook University Postgraduate Research Scholarship – 2020 (A$254,802)
PROMOS Scholarship – 2018 (€1,200)
AuslandsBAföG – 2017/2018 (€2,526)
Deutschlandstipendium Scholarship – 2016 (€3,600)

SCIENTIFIC CONFERENCES

6th World Ecoacoustics Congress, Cairns, Australia – 2026, (Talk, workshop, organising committee)
Ecological Society of Australia 2025, Adelaide, Australia – 2025, (Workshop)
10th World Congress of Herpetology, Kuching, Malaysia – 2024, (Talk)
5th World Ecoacoustics Congress, Madrid, Spain – 2024, (Talk)
Ecoacoustics Symposium, Melbourne, Australia – 2024, (Talk)
Zoology and Ecology North Queensland Conference – 2023, (Talk) *Won best talk
Zoology and Ecology North Queensland Conference – 2022, (Talk)
Australian Society of Herpetologists Conference, Adelaide, Australia – 2022, (Talk)
Australian Herpetological Society – 2020, (Talk)
Australasian Society for the Study of Animal Behaviour – 2020, (Talk)
South Australian Herpetological Society – 2020, (Talk)
Herpetological Seminar Series – 2020, (Talk)
Animal Behaviour Live – 2020, (Talk)

REVIEWS FOR JOURNALS

Bioacoustics
Biological Invasions
Oecologia
Austral Ecology
Ichthyology & Herpetology
Canadian Journal of Zoology
Mammalian Biology