

Bangor University – MSc by Research Project

New insights into seabird diet from eDNA

Subject area: Marine Ecology

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Project description:

Seabirds are the world's most threatened birds with their populations facing threats from sources such as global climate change, pollution, habitat loss and competition with fishery activity. Seabirds are also popular, charismatic and relatively well studied, but despite this there is still much to learn about these animals and new techniques need to be developed and improved in order to increase our understanding of their ecology. One of the simplest yet hardest aspects to understand is what these birds eat and how that might vary between days, years, places and individual birds. Traditional methods provide limited information and/or are challenging to implement. In this project you will assist in the development of environmental DNA ('eDNA' or DNA metabarcoding) to understand the diets of two seabird species that breed on Puffin Island, Anglesey. eDNA works on the principle that organisms leave traces of their DNA behind them in their environment. In the case of diet reconstruction, DNA from prey can be found in the digestive tracts of predators. You will use swabs taken previously from European shags (*Gulosus aristotelis*) and common guillemot (*Uria aalge*) and work in the laboratory and with bioinformatics computing to extract DNA and establish what species of fish and invertebrates these birds have been eating. The project will continue the work of a successful previous student who established the protocols for guillemots. Here you will examine a second season of guillemot swabs and for the first time look at our shag samples. Your overarching research question is 'what have these birds been eating'. The use of eDNA to reconstruct diet is non-invasive and still relatively new in this context. You will continue one of the first studies of its type and not only learn a suite of valuable skills, but also contribute to an important ongoing research project.

Suggested background reading:

Paprocki, N., Blair, S., Conway, C., Adams, J., Nerkowski, S., Kidd, J. and Waits, L. (2024), Comparison of Seven DNA Metabarcoding Sampling Methods to Assess Diet in a Large Avian Predator. *Environmental DNA*, 6: e70000. <https://doi.org/10.1002/edn3.70000>

Campioni, L., Ventura, F., Granadeiro, J., Madeiros, J., Gjerdrum, C., Silva, M., 2023. Combining bio-logging, stable isotopes and DNA metabarcoding to reveal the foraging ecology and diet of the Endangered Bermuda petrel *Pterodroma cahow*. *Mar. Ecol. Prog. Ser.* 723, 151–170. <https://doi.org/10.3354/meps14468>

McInnes, J.C., Jarman, S.N., Lea, M.-A., Raymond, B., Deagle, B.E., Phillips, R.A., Catry, P., Stanworth, A., Weimerskirch, H., Kusch, A., Gras, M., Cherel, Y., Maschette, D., Alderman, R., 2017b. DNA Metabarcoding as a Marine Conservation and Management Tool: A Circumpolar Examination of Fishery Discards in the Diet of Threatened Albatrosses. *Front. Mar. Sci.* 4, 277. <https://doi.org/10.3389/fmars.2017.00277>

Further info:

The outputs from your project will contribute to a large research project 'ECOWind Accelerate' (<https://ecowind.uk/projects/ecowind-accelerate/>). This project seeks to see how the installation of offshore wind farms will combine with climate change to affect seabed habitats and evaluate the consequences of this for seabirds. You will get the chance to interact with project researchers and see how your work fits in with work packages on animal tracking, at-sea surveys and environmental modelling. You will also get the chance to assist in summer fieldwork to see how the samples you will have analysed are collected from birds in their natural habitat.

Ideal candidate:

You should be a graduate in ecology, zoology, biology, marine biology, environmental science or a similar subject. No specific experience is required as we recognise that you are unlikely to have encountered these specialist skills in your experiences to date. Instead we want someone who is ready and eager to learn new and sometimes complex concepts. You also need to be numerate and able to work with meticulous care in the laboratory; following instructions and working as a team.

Start date: Jan / Apr / Oct

Funding: You will need to be self-funded, but all costs for your project in the laboratory and field will be covered by ECOWind-Accelerate funding.

How to apply:

If you are interested in this project, the first step is to contact the supervisors (details above). They will then advise you if and how you should make a formal application to the University. When contacting us, you should briefly outline your academic background and explain your interest in the project, as well as attach a CV.

Do not submit a direct application for a postgraduate research degree to Bangor University without first making contact.

Alternatively you could contact the member of staff responsible for postgrad studies:

School Director of Postgraduate Research Studies (School of Ocean Sciences): Dr James Waggitt
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