Where's wallaby? Using environmental DNA to detect mobile, elusive terrestrial pest species

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Biography:

Gracie Kroos is a second-year PhD student at the University of Otago in Dunedin, where she also completed a Master's degree in genetics in 2023. Her research focuses on using environmental DNA in terrestrial ecosystems for the detection of pest species. Currently she is exploring the use of different substrates such as air, spiderwebs and water to detect pest wallaby species in New Zealand, aligned with the national wallaby eradication programme funded by Ministry for Primary Industries.

Abstract:

Monitoring terrestrial pest species is important for many conservation and pest management applications. However, detection is challenging for species that are rare, exhibit cryptic behaviours, or are highly mobile. Wallabies are nocturnal, elusive, and mobile pest species introduced to New Zealand from Australia in the late 1800's. Across large landscapes, wallabies occur at very low densities making their surveillance and management challenging using standard detection tools.

Recent research has demonstrated that environmental DNA (eDNA) captured from diverse substrates can rapidly identify terrestrial vertebrate diversity in an area. Leveraging these findings, we aimed to investigate the utility of airborne, spiderweb and water eDNA as targeted monitoring tools for wallaby pest species in New Zealand.

We designed two novel, probe-based quantitative PCR (qPCR) assays targeting the mitochondrial ND2 gene of key pest wallaby species in New Zealand: Notamacropus eugenii and Notamacropus rufogriseus. These assays were found to be highly specific, both in silico and in vitro, amplifying the genomic DNA of target species but not closely related/ co-occurring mammalian species. Subsequent limit of detection (LOD) and limit of quantification (LOQ) analyses found our assays could detect low quantities of target DNA. To validate our assays in the field, we sampled air, spiderweb and water eDNA from captive wallaby parks and carried out field experiments to determine the sensitivity and accuracy and establish parameters of certainty. Overall, our novel, wallaby-specific eDNA assays show promise as targeted monitoring tools for low-density populations of elusive, highly mobile terrestrial pests.

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ABOUT eDNA

The Southern environmental DNA Society (SeDNA) is a newly established Australian and New Zealand society of environmental DNA researchers and end users. We aim to promote best practices and help the adoption of methods across sectors.

Our mission is promoting science and industry collaboration across Australia and New Zealand to advance best practice eDNA methods and adoption in government, private and community sectors.

Visit our website to find more about the society and what we do here. Membership registration is open on our website.

https://sednasociety.com/

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In the spirit of reconciliation we acknowledge the Traditional Custodians of country throughout Australia & New Zealand and their connections to land, sea and community. We pay our respect to their Elders past and present and extend that respect to all peoples today.