Gouldian Finch DNA may be detected in waterholes where they drink or bathe. Minden Pictures/Alamy Stock Photo.

Northern Australia Environmental Resources Hub

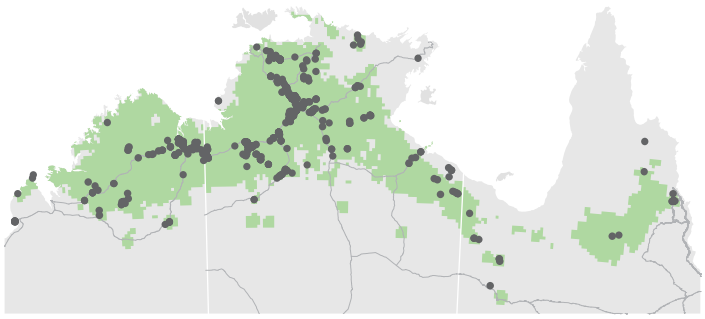
National Environmental Science Programme

Developing eDNA methods to detect Top End animals

Start-up factsheet

We need improved monitoring methods for remote areas

It can be difficult to detect animals in remote, data-poor environments like much of northern Australia where many logistical challenges and safety hazards also hamper monitoring. Conventional techniques such as trapping and visual counting are resource-intensive and logistically challenging, and many target species are rare or shy so survey intensity is very high. To better support planning, management and impact assessments, we need to better monitor the presence or absence of animals such as threatened species, pest species and species of high cultural value.



Areas where Gouldian Finches are 'likely to occur'
Observations of Gouldian Finches

Areas where the Gouldian Finch might be expected to occur in northern Australia, and where it has been observed. Sources: Species of National Environmental Significance (Commonwealth of Australia) and eBird.

eDNA can help survey land animals including the Gouldian Finch

Animals leave DNA traces of their presence in hair, skin, urine, faeces, sperm and eggs that are shed into their surrounding environment. This DNA can be found in the environment for a short time even after visible traces have disappeared, and is called eDNA. Early studies have demonstrated that eDNA from terrestrial animals can be

Overview

This project will:

- develop and validate eDNA probes for the endangered Gouldian Finch
- improve our understanding of the distribution and local occurrence of this threatened species
- develop eDNA sampling protocols that will inform protocols for regional environmental assessments
- test the extent to which this eDNA method can be used to detect terrestrial animals by comparing its utility and cost-effectiveness with traditional sampling methods. If the eDNA method performs well, it will significantly improve monitoring of key species in remote, data-poor areas.

detected in soil or in waterbodies where they drink or bathe. More research is required to determine which terrestrial species can be readily detected, to develop species-specific probes, to identify practical sampling and analytic methods and to know how to appropriately interpret results.

This project will investigate the use of eDNA to detect a key terrestrial animal species in the Top End. The approach will be trialled on the endangered Gouldian Finch with field validation using water samples from sites where the abundance of finches is closely monitored. If this trial is successful, stage two of the project will compare eDNA test performance against existing survey methods under a major government program assessing biodiversity values in remote, data-poor regions. This will allow both validation and an assessment of cost-effectiveness and potential complementarity.

Project activities

- Analyse existing data to identify whether a suitable probe exists for the Gouldian Finch and if not, develop a suitable probe through DNA sequencing and bioinformatics
- Optimise eDNA probe markers using DNA from other finch species and aviary water samples to ensure the method only detects the Gouldian Finch

This project is developing eDNA methods to specifically detect the Gouldian Finch even when other finch species are present.

- Develop detailed protocols for field sampling, sample preservation, DNA extraction and analysis and data management
- Sample for eDNA in waterholes where finch populations are intensively monitored and validate results against finch monitoring data
- Develop a workplan to test the extent to which the eDNA method can be applied in a regional-scale biodiversity assessment program
- Implement the plan (stage two).

Anticipated outputs

- Report on the potential for eDNA methods to detect key terrestrial species
- Report assessing the use of eDNA for detecting Gouldian Finch, and for other species if stage two goes ahead
- Protocols and training manual for sampling design, sample collection and transport, analysis and interpretation
- Workshops, video, presentations and summary reports
- Scientific publications.

Who is involved?

This project is being led by Professor Karen Gibb from Charles Darwin University and Dr Alaric Fisher from the Northern Territory Department of Environment and Natural Resources.

Associate Professor Simon Jarman, Trace and Environmental DNA (TrEnD) laboratory, Molecular and Life Sciences, Curtin University, WA will lead the bioinformatics and initial probe design.

Professor Gibb and Dr Fisher will be assisted by researchers from Charles Darwin University and the Department of Environment and Natural Resources.

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For further information and project updates, visit the project webpage at www.nespnorthern.edu.au/projects/nesp/terrestrial-edna

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