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Gouldian Finches drinking from a waterhole.

Northern Australia Environmental Resources Hub

National Environmental Science Programme

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IMPACT STORY 2019

Finding finches – using eDNA to track endangered birds

Gouldian finches live in small and mobile groups, and are difficult to find using standard field survey methods. NESP researchers have developed an eDNA test for the Gouldian finch *(Erythrura gouldiae)*; the first for an endangered bird species. Gouldian finches live in small and mobile groups, and are difficult to find using standard survey methods. The test allows the finches to be detected from water samples collected from the small pools where they drink.

Find out more about this project

NESP Northern Hub

Water samples from the field can be taken back to the lab and analysed for presence of Gouldian Finch eDNA.

It's one of the great conundrums of conservation management: often the animal species of most concern are the most difficult and time-consuming to find. Some of these species are rare, while others are cryptic, hiding high in the canopy or deep in their burrows. Some are highly mobile, never staying in one place for too long. Others avoid the traps traditionally used by scientists to monitor animal populations.

> "Often you need to go out and do an enormous amount of sampling – a lot of sites, a lot of time – in order to get enough detections of a species to have any scientifically robust idea of what's happening. We're always looking for tools which will allow us to sample those species or particular groups of species more efficiently."
> – Dr Alaric Fisher, Executive Director, Flora and Fauna Division within the Northern Territory Department of Environment and Natural Resources (DENR).

Research funded by the Australian Government's National Environmental Science Program (NESP) has developed a potentially breakthrough tool for one species: a test that detects the environmental DNA (eDNA) of the Gouldian finch *(Erythrura gouldiae)* in water collected from the small pools where they cluster to drink. It is the first time that an eDNA test has been successfully used to detect a threatened bird species.

> "The test shows a lot of promise."
> – Alaric Fisher

Despite their rainbow colouring, Gouldian finches are difficult to find. They are highly mobile and sparsely scattered across the landscape, often occurring in mixed flocks with other seed-eating birds. But, as a listed threatened species, the impact on Gouldian finches and their habitat must be considered in proposals for new developments.

Detected eDNA was verified against field observations from waterholes where the samples were collected.

DENR will use the eDNA test as part of their regional surveys that provide baseline information for proposed development activities.

The eDNA test was developed and validated through a collaboration between Charles Darwin University (CDU), the University of Western Australia (UWA), DENR and Jawoyn Rangers. Dr Fisher says the project exemplified the power of NESP research to foster partnerships between organisations whose expertise ranged from genome sequencing to operational bird surveys to Indigenous knowledge of country.

The research was led by CDU Professor Karen Gibb. UWA Professor Simon Jarman and his team designed the two-in-one quantitative polymerase chain reaction (qPCR) test that recognises and makes multiple copies of a specific region of mitochondrial DNA found in estrildid finches and a species-specific probe to detect Gouldian finch DNA.

Researchers at CDU then further developed the eDNA test in the lab before trialling it in aviaries at the Territory Wildlife Park. The final hurdle was

Gouldians cannot get their required water from their diet, so must visit waterholes to drink.

validating the eDNA test under field conditions. In late 2018, researchers from DENR and Jawoyn Rangers collected water samples from Yinberrie Hills, where Gouldian finches have been monitored since 1996. This data allowed Ms Alea Rose to validate the eDNA detected in water samples against concurrent observations of the finches drinking.

Jawoyn Ranger Mike Allangale says he enjoyed the early mornings waiting with binoculars, pen and paper for the finches to come to the waterholes to drink. The rangers were trained in bird survey techniques and the stringent water sampling protocols required for eDNA analysis.

Jawoyn Rangers plan to use the eDNA test as part of their collaborative monitoring with DENR to show how their program of early season burning is benefitting the recovery of Gouldian finches.

Jawoyn Ranger Mike Allangale was part of the team that validated the eDNA analysis with bird surveys and water sampling.

"That's why we do fire management early. Because if it's going to be after August – that's a late fire – it'll probably damage sites and there'll be no finches around"
– Mr Mike Allangale, Jawoyn Ranger

Research outputs

Scientific paper

- Development and validation of an environmental DNA test for the endangered Gouldian finch (November 2019)

News release and articles

- Powerful genetic tool aids endangered Gouldian finch (news release, November 2019)
- Endangered birds leave genetic clues in their drinking water (Cosmos article, November 2019)
- Rare bird's detection highlights promise of 'environmental DNA' (Nature News article, November 2019)

Report

- Standard operating procedures for collecting and extracting Gouldian Finch eDNA (January 2020)

Factsheets

- Developing eDNA methods to detect Top End animals (project update, October 2019)
- Developing eDNA methods to detect Top End animals (start-up factsheet, August 2018)

Videos

- Terrestrial eDNA project update (January 2019)
- Finding finches - using eDNA to track endangered birds (video, July 2020)

Project webpage

- Developing eDNA methods to detect Top End animals

Attributions

- Project leaders: Karen Gibb (CDU), Alaric Fisher (NT DENR)
- Alea Rose, Kimberley Day (CDU), Brydie Hill (NT DENR), Simon Jarman (UWA)
- Ryan Barrowei, Kenny Duffill, Mike Allangale (Jawoyn Rangers)
- David Loewensteiner, Hamish Campbell (CDU), Andrea Crino (Deakin University), Paul Barden, Joanne Heathcote (EMS Consulting)
- Territory Wildlife Park

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