The eDNA method is an exciting new method for monitoring aquatic environments, photo Michael Douglas.

Northern Australia Environmental Resources Hub

National **Environmental Science** Programme

Developing eDNA methods for tropical waters

Start-up factsheet

The challenge

In northern Australia, traditional techniques used to detect aquatic species can be difficult, labour-intensive and expensive due to factors such as remote locations, expansive geographic regions, limited and variable site access, and hazards such as crocodiles. To support sustainable development in the north, we need to better understand and keep track of the health of our rivers, creeks and waterholes and the plants and animals that live in them. A method that allows managers and researchers to overcome many of these challenges would therefore be greatly beneficial.

Surveying for aquatic species may be as simple as collecting a water sample, photo JCU.

What is environmental DNA (eDNA)?

eDNA is DNA that has been released by an animal into its aquatic environment, via faeces, hair, urine, skin, sperm or eggs. This DNA only lasts a short time in the environment before it is broken down. Water, sediment or soil samples taken from waterways contain this DNA and so will give information about which species are present in that environment without having to catch the target animal.

How does the project eDNA method work?

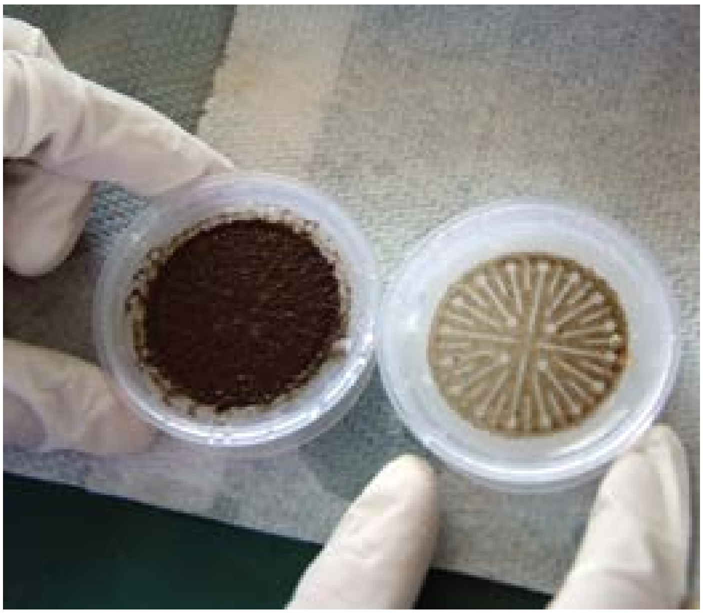
The eDNA method for this project uses genetic primers or probes that provide unique genetic identifiers for particular species, to amplify DNA codes from a water or sediment sample. DNA extracted from samples is matched against the primer or probe for that species. For example we can identify if a species of turtle at any life stage is present in a body of water by analysing the eDNA material in a water sample from that location. In other words, surveying an aquatic field site may be as easy as collecting a water sample.

How will this research help?

Analysing environmental DNA (eDNA) is a relatively new technology which detects the presence of DNA from aquatic species in small water samples. **The technique has a number of advantages over traditional monitoring, including:**

- Time and cost-efficiency.
- Increased accuracy.
- Ability to detect a wide range of species from a single water sample.
- Targeted detection, e.g. of rare species or new pest species.
- Greater safety when sampling in the field.

This project will develop eDNA technology and trial field programs for an array of northern Australian aquatic species of conservation and management significance. It aims to significantly improve the efficacy of field surveys and monitoring, to provide a cost-effective tool to dramatically improve our knowledge of aquatic biodiversity in northern Australia. The information generated from this study can be used to inform planning processes, impact assessments and development decisions.



eDNA techniques are proving to have a wide range of applications in both marine and freshwater systems, photo JCU.

Key project activities

Project activities include:

1. Develop eDNA probes for up to 10 key aquatic species across different taxonomic groups.
2. Conduct field programs to test the probes and answer management questions relevant to the selected species.
3. Trial improved methods for field sampling and transporting eDNA samples, and understand how logistical and environmental factors affect detection probability.

The last point is critical for determining how eDNA monitoring could be rolled out in northern Australia and which species and situations it's best suited for.

Anticipated research outcomes

Planned outputs from this project include:

- eDNA probes for key aquatic vertebrate species.
- Protocols for eDNA field sampling.
- Increased information on the distribution of key species.
- Increased information on the distribution of pest species.
- Comparisons of the effectiveness of eDNA to traditional sampling methods.
- Public awareness about the application of eDNA probes, including public forums, technical reports, and online promotion.

Who is involved?

The project is led by Professors Damien Burrows and Dean Jerry from James Cook University (JCU). They will be assisted by other researchers at JCU, University of Western Australia, Charles Darwin University, Griffith University and CSIRO.

Contact: damien.burrows@jcu.edu.au, 07 4781 4262.

Visit: www.nespnorthern.edu.au

James Cook University Australia
The University of Western Australia
Charles Darwin University
Griffith University
CSIRO

This project is supported through funding from the Australian Government's National Environmental Science Programme.

Northern Australia Environmental Resources Hub

National Environmental Science Programme

nespnorthern.edu.au nesp.northern@cdu.edu.au

/NESPNorthern @NESPNorthern

April 2017