## Concept Plan SP 2020-068

# Evaluating the application of eDNA and metabarcoding as biodiversity and monitoring tools

### Ecosystem Science

### Project Core Team

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|---|---|
| **Supervising Scientist** | Adrian Pinder |
| **Data Custodian** | Adrian Pinder |
| **Site Custodian** | |

### Project status as of May 3, 2021, 4:45 p.m.

Approved and active

### Document endorsements and approvals as of May 3, 2021, 4:45 p.m.

| | |
|---|---|
| **Project Team** | granted |
| **Program Leader** | granted |
| **Directorate** | granted |

# Evaluating the application of eDNA and metabarcoding as biodiversity and monitoring tools

## Biodiversity and Conservation Science Program

Ecosystem Science

## Departmental Service

Service 6: Conserving Habitats, Species and Communities

## Aims

This project aims to apply eDNA and metabarcoding methods to a range of survey and monitoring projects to test whether they can effectively replace or supplement traditional ecological sampling.

Individual projects will include:

- A pilot project to develop eDNA protocols for detecting two species of conservation concern: the rakali (*Hydromys chrysogaster*) and Carter's freshwater mussel (*Westralunio carteri*) using eDNA.
- Testing utility of eDNA and metabarcoding for assessing responses of forest invertebrate communities to fire and silviculture using FORESTCHECK sites and protocols.
- Using eDNA to investigate spatial and/or temporal patterns in wetland biodiversity (e.g. surveying for threatened fish in the Muir-Byenup Ramsar site).

Other potential applications include:

- eDNA from flowers to examine plant/pollinator interactions.
- Using meta-barcoding to examine the impacts of invasive redclaw crayfish on Pilbara river pool zooplankton communities (invasive animal grant application submitted to DAWE).

## Expected outcome

This project will provide informed recommendations as to which kinds of research and monitoring questions these emerging genetic methods can be successfully applied to and develop protocols for collection and analysis of samples. In addition, where these methods are successfully applied the individual projects should produce new knowledge to inform conservation decision-making. Projects will also contribute to sequence libraries of species present in the environments investigated, as well as a better understanding of temporal, spatial and environmental patterns of species occurrence.

## Strategic context

This project addresses many of the strategic goals in the DBCA Science Strategic Plan 2018-2021 including;

- **Theme 1**: Biodiversity knowledge, **approaches**: 'Conduct biological survey, including genetic survey, in priority management areas, and for key species and ecological communities', and 'Effectively acquire and share knowledge of biodiversity'.
- **Theme 2**: Conservation of threatened species and ecological communities, **approach**: 'Provide scientific basis for monitoring of threatened species and ecological communities'.
- **Theme 3**: Management of invasive species and pathogens, **approach**: 'Improve effectiveness of monitoring and management of invasive species and pathogens'.
- **Theme 5**: Impacts of climate change on biodiversity and ecosystem function, **approach**: 'Undertake research and monitoring to advance knowledge on the vulnerability of species and ecosystems to climate change'.
- **Theme 8**: Innovative science and effective use of technology, **approach**: Identify and realise opportunities for adoption of technical advances and innovative approaches for conservation.

These tools have the potential to advance many aspects of the department's research program and the tools and resulting data could be utilised both within the department and the wider conservation and management community.

## Expected collaborations

This project will involve collaborations within DBCA and with other government departments, universities, other research institutions and private organisations; including, but not limited, to DWER, DPIRD, ECU, UWA, Flinders University, WAM, and the South Australian Museum. We will work with stakeholders and existing expertise within the department when scoping and designing projects. For the rakali project Peter Mawson and the Perth Zoo have provided tissue samples, Geoff Barrett (Swan Region) has provided his knowledge on rakali and guidance on identifying signs of rakali in the field. In the FORESTCHECK project Lachie McCaw and Allan Wills have provided advice on sampling sites, and other experimental design components and are involved in the project. We are also working with external entities to make sure that we are using existing knowledge and data sets effectively, for example we are working with DWER (Tim Storer, Ursula Salmon and Dominic Heald) to identify and sample rakali sites and have obtained biological samples from the WAM. We are also exploring the potential to involve students (most likely master's and PhD level) in the different projects that arise from this research and have been talking to Deirdre Gleeson (UWA), Anna Hopkins (ECU) and Jim Mitchell (Flinders University). We have included a zooplankton metabarcoding project on a grant application (with Stantec, DWER, DPIRD and Curtin University) to the Department of Water, Agriculture and the Environment to design an eDNA redclaw detection tool and better understand the impact of redclaw on Pilbara river pools.

## Proposed period of the project

Sept. 8, 2020 – July 1, 2023

## Staff time allocation

| Role | Year 1 | Year 2 | Year 3 |
|---|---|---|---|
| Scientist | 1 | 1 | 1 |
| Technical | .2 | .2 | .2 |
| Volunteer | | | |
| Collaborator | | | |

## Indicative operating budget

| Source | Year 1 | Year 2 | Year 3 |
|---|---|---|---|
| Consolidated Funds (DBCA) (excludes allocation from FORESTCHECK) | 15000 | 15000 | 15000 |
| External Funding (have applied for redclaw grant with funding for metabarcoding). | | ?13000 | |