**Progress Report SP 2020-068**

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

**BCS Ecosystem Science**

## Project Core Team

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X X
**Project Team** granted
**Program Leader** granted
**Directorate** required

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## Context

Ecological monitoring is a key element of adaptive conservation management projects, but can be resource intensive. In recent years techniques such as camera traps, audio recorders and satellite tracking have improved effectiveness of monitoring programs. Metabarcoding and environmental DNA (eDNA) are emerging technologies that may be used to enhance environmental monitoring. While no single tool can provide all the information necessary for monitoring, eDNA has some advantages over other methods in some situations. For example, significant taxonomic expertise is often required to identify taxa, especially invertebrates, but such expertise is increasingly unavailable. Additionally, some existing methods are not ideal for detecting elusive or poorly known taxa and can be laborious. eDNA may overcome some of these limitations, and this project will examine how eDNA can be effectively used as a monitoring tool, complementing existing methods and projects in DBCA.

## Aims

- Apply eDNA and metabarcoding methods to a range of survey and monitoring projects to evaluate whether they can effectively replace or compliment traditional ecological sampling.

## Progress

- Soil and leaf litter and pitfall trap samples from FORESTCHECK fire chronosequence sites near Dwellingup are currently undergoing statistical analyses and being written up as a manuscript.
- Samples of zooplankton from the Pilbara have been extracted and sequenced and are currently undergoing bioinformatic analyses.
- Water samples were collected from rivers in the south-west of Western Australia were analysed and the results were used in a Masters student's thesis and are being written up as a manuscript. Two more Master students have been recruited to further investigate DNA movement in rivers and the effect of peat on eDNA.
- Soil microbiome samples were collected from Yarragil experimental catchments and statistical analyses of the metabarcoding data are underway and this is being written up as a manuscript. The shotgun data is still undergoing bioinformatic analyses.
- A collaboration with the Cane Toad management group is developing an eDNA tool for tracking cane toad movement.

## Management implications

- Results of these projects will help inform how eDNA can be applied in future monitoring projects.
- The development of standard protocols for eDNA collection, extraction and sequencing could contribute to standardisation across the department and potentially other agencies as this approach starts to be implemented.
- The development of reference barcode libraries will improve species discovery, knowledge of species' ranges and ecological requirements and provide greater understanding of ecosystem conservation values.

## Future directions

- Complete continue to barcode species to add to the WA reference library as opportunities arise.
- Synthesise the results of the freshwater eDNA projects to produce guides on how they can be incorporated into existing management.
- Write a paper on the responses of the soil microbiome to ecological thinning.

- Write a paper on the utility of eDNA for understanding the effect of fire on invertebrate diversity.