Workshop: Integrating eDNA into bioassessment and monitoring of subterranean fauna in Western Australia

What will the future look like?

Wednesday 28 February 2024

Workshop outcomes

Western Australia is leading the nation when it comes to using standardised sequencing and metabarcoding information for environmental monitoring of subterranean fauna. In the past three years considerable knowledge has been gained through the ARC Linkage project: *Taking eDNA underground: transforming assessment of subterranean ecosystems*. The aim of the project was to develop a novel environmental DNA (eDNA) approach using new assays and a DNA barcode reference library for comprehensive, accurate, cost effective and reproducible monitoring of the Pilbara's unique groundwater communities.

1. Data sharing and databases

The sharing of subterranean fauna species identification data is very important. A huge amount of DNA sequence data is siloed in consultancies and research institutions and not available publicly. The benefits of sharing data hugely outweigh the cost of not sharing. To facilitate a better process for data sharing, it is proposed that a policy be developed which clearly articulates how sequence data can be made publicly available (with a standardised coding system), and which also considers a temporal aspect as some data cannot be made available immediately due to confidentiality agreements.

It is also important to have a centralised database/platform that is freely accessible and easy to navigate. The ARC Linkage project *Taking eDNA underground* has presented an opportunity to showcase how an effective custom reference library of sequences can be developed by researchers in collaboration with taxonomic specialists and industry partners. The project also identified the importance of taxonomic metadata in developing custom reference libraries.

Formal processes and sufficient funding are needed to encourage the appropriate curation and management of data. The BOLD (Barcode of Life Data System) database has been mentioned as an example of a suitable platform.

2. Standardised approach for sampling and analysing eDNA

A need was identified for scientists, industry and consultants to work together to develop a standardised approach to sampling and for identification of subterranean fauna. A discussion was held about the benefits of an agreed approach, and how to best communicate this, e.g., using qPCR versus metabarcoding and whether to use eDNA to support targeted sampling.

eDNA can identify what assemblage or groups are detected in an area, with a bit more certainty than traditional sampling, which helps to reduce uncertainty in relation to regulatory decision making. However, it was recognised that multiple complementary approaches to sampling would provide more robust information.

Developing a SOP (Standard Operating Procedure), or similar, could help to guide the application of eDNA approaches as a complementary tool to sampling and identifying subterranean fauna present at a location.

3. Regulatory guidelines

How will the results from eDNA sampling be used to help regulators make decisions around subterranean fauna?

eDNA information can provide an understanding on what species/communities are in a development footprint and may be useful in baseline surveys to confirm habitat suitability and to inform detailed and targeted surveys.

A need was identified for high-level guidance on protocols, with flexibility to keep up with emerging technologies and approaches.

The option of establishing an independent technical committee with expertise in the field, where you can submit interpretations of results for peer review, was discussed. This reference group could help facilitate the EIA-process. Further scoping and discussion is needed to determine the feasibility of creating a committee for this purpose.

4. Training

A need to train consultants and industry staff in the use of eDNA approaches was also identified, so they can confidently and accurately interpret and analyse the results of subterranean fauna sampling. Curtin University is developing training in the form of a microcredential: *Environmental DNA sampling* which could be of interest for anyone wanting to upskill in the area.

5. Degradation

Degradation of eDNA was identified as a research knowledge gap, that needs to be addressed. Variable rates of DNA degradation can confound results. How quickly DNA degrades in groundwater is likely to be context/site specific and addressing this question requires a robust experimental approach.

6. Cost

Scientists from the ARC Linkage project: *Taking eDNA underground: transforming assessment of subterranean ecosystems* have been working at the cutting edge of eDNA science. The ARC grant facilitated the setup of a research team with exceptional expertise in eDNA and subterranean fauna that has access to world class laboratory facilities for undertaking eDNA research. Historically expensive, the cost of genetic sequencing is becoming cheaper, thereby potentially allowing for large numbers of samples to be analysed more economically.

A new ARC grant (≥ 1.2 million) could be an option to enable further cutting-edge research into the use of eDNA to assess and monitor subterranean fauna.