



Australian Government

Department of Climate Change, Energy,
the Environment and Water



Supervising Scientist

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Using eDNA to examine eukaryotic communities in shallow groundwater of tropical sandy creek

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21 February 2025



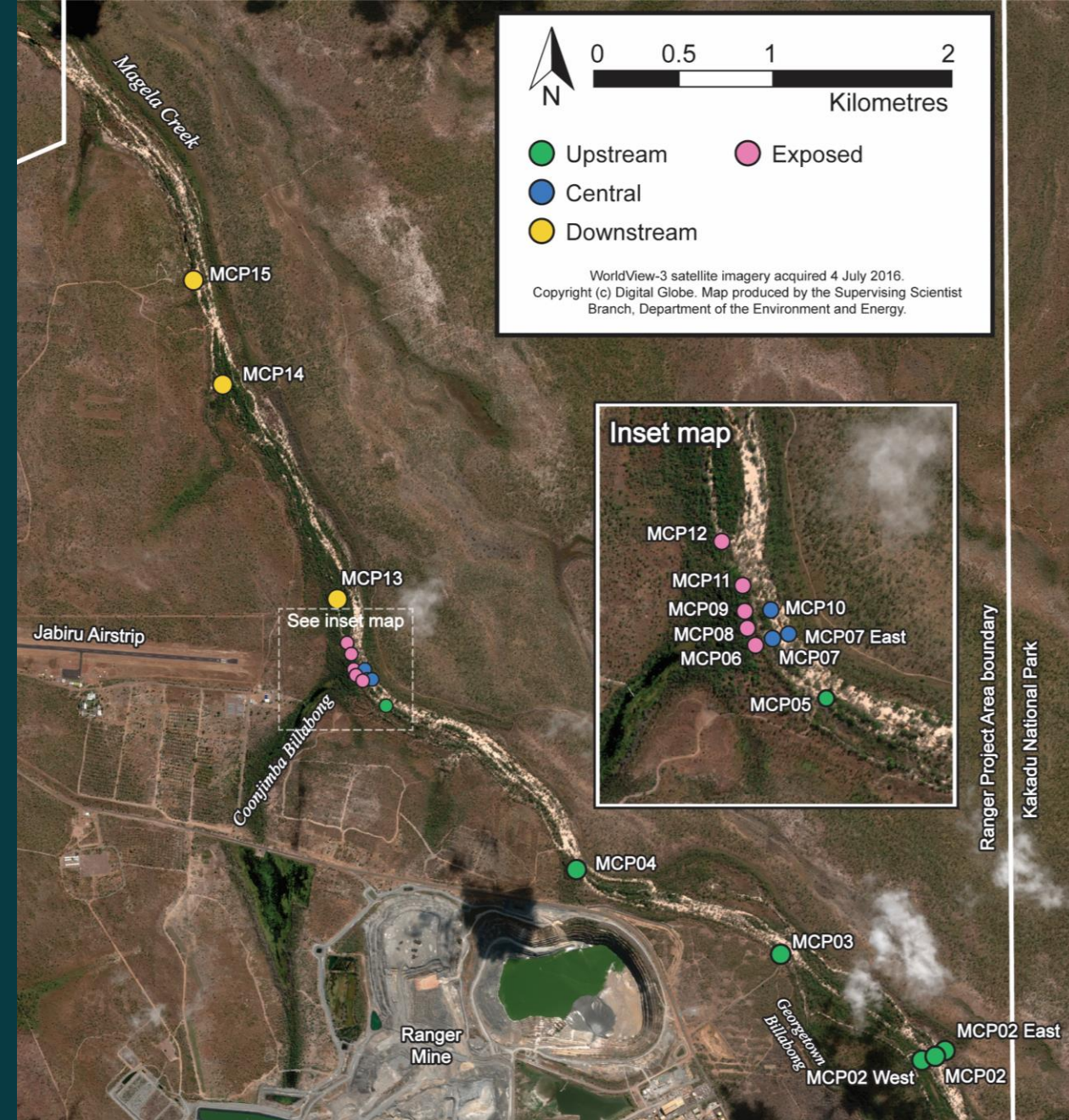
Objective

- Assess response of eukaryotic communities in a shallow tropical sand bed aquifer to contamination by saline mine water

Sampling context

- Groundwater sampled in creek channel during dry season from piezometers to 2m depth
- Sites were located upstream and downstream of a minewater contamination plume
- Contamination included elevated magnesium and sulfate

Key Question: Are shallow groundwater communities at ecological risk from contamination?





Morphological sampling

- Using phreatic net and microscope identification
- Time intensive
- Limited by taxonomic knowledge
- Focus on meio/macro-fauna

eDNA sampling

- Using amplicon sequencing of filtered water samples
- Faster and more comprehensive
- Limited by reference databases
- Focus on entire community

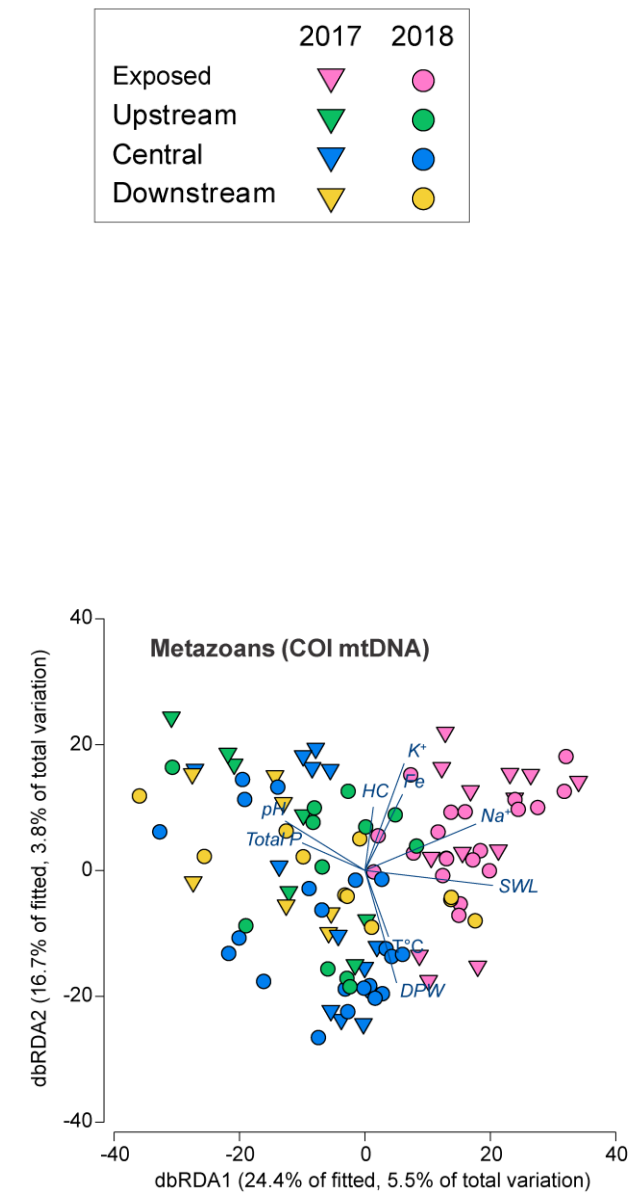
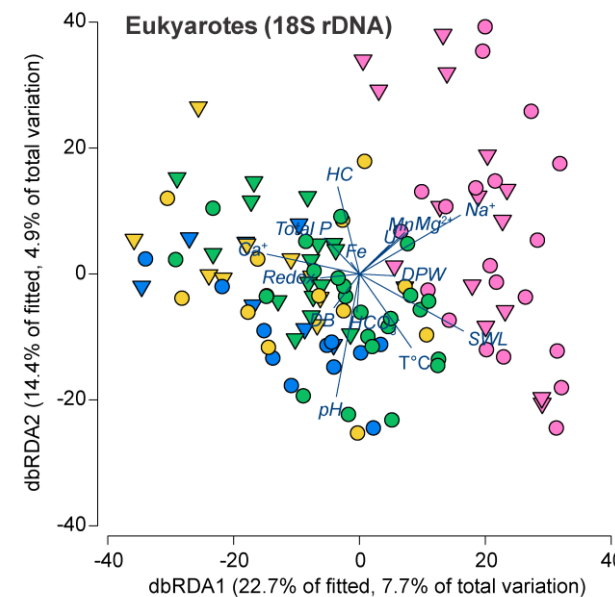
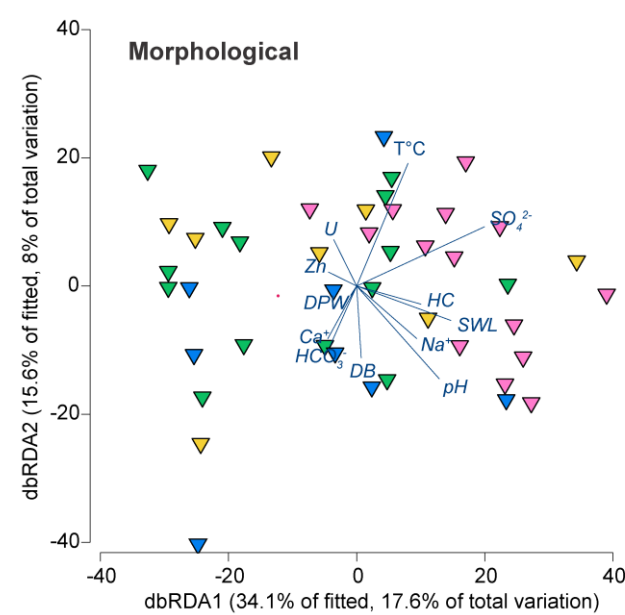
Findings

Morphological data

- No significant changes in community composition linked to contamination
- Limited detection of broader ecological impacts

eDNA data

- Detected significant change in eukaryotic communities
- Changes strongly correlated with elevated Mg, SO₄ and Na and water levels
- Revealed subtle environmental impacts missed by morphological data

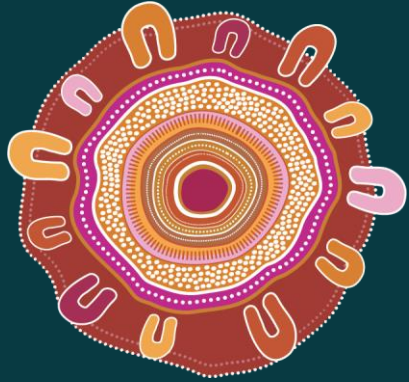


Key insights and implications

- eDNA detected community level responses missed by traditional methods
- Use of stygofauna sampling alone may lead to misleading impact assessments in sandy aquifers
- Stygofauna sampling collected key stygobitic taxa not identified in eDNA samples
- Recommend
 - Combine morphological and eDNA approaches for more accurate ecological risk assessment
 - Use of eDNA to develop candidate guideline values for field-effects toxicity estimates for contaminants of concern
 - Broader adoption of eDNA can improve monitoring and management in similar environments.



Syncarid – Bathynellidae MCP04 (2018)



We acknowledge the Traditional Owners of the land on which this work was undertaken, the Bininj/Mungguy, and recognise their continuing connection to land, waters and culture. We pay our respects to their Elders past and present.

Thank you.

Chandler L, Harford AJ, Hose GC, Humphrey CL, Chariton A, Greenfield P & Davis J 2024. Saline mine water influences eukaryote life in shallow groundwater of a tropical sandy stream. *Science of The Total Environment* 946, 174101.

Chandler L, Harford AJ, Hose GC, Humphrey CL, Chariton A, Greenfield P & Davis J 2021. Saline mine-water alters the structure and function of prokaryote communities in shallow groundwater below a tropical stream. *Environmental Pollution* 284, 117318.