

Concept Plan SP 2023-007

Surveys of aquatic fauna communities in the Swan-Canning tributaries using eDNA

BCS Rivers and Estuaries Science

Project Core Team

X X **Supervising Scientist** Kerry Trayler
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Project status as of March 9, 2023, 1:30 p.m.

X X New project, pending concept plan approval

Document endorsements and approvals as of March 9, 2023, 1:30 p.m.

X X
Project Team granted
Program Leader required
Directorate required

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Program

BCS Rivers and Estuaries Science

Departmental Service

Service 6: Conserving Habitats, Species and Communities

Background

Environmental DNA (eDNA) is increasingly used to assess biodiversity in aquatic and terrestrial ecosystems. It has been demonstrated to detect the presence of species from trace quantities of genetic material sampled from the environment and can therefore provide information on vulnerable and rare species without the risks and impacts of traditional surveying methods. Sampling methods are becoming more standardised and have proven to be effective for surveying aquatic fauna communities, particularly in sensitive ecosystems.

In recent years, DBCA has been developing capacity to utilise eDNA methods across a broad range of applications (SPP 2020-068) including surveying aquatic fauna in freshwater ecosystems. Methods have shown great potential for DBCA to survey aquatic communities.

The Southern River – Wungong Brook drainage network is a large tributary of the Canning River and has been identified in recent years as a system under increasing pressure from urbanisation, impoundment, sedimentation and invasive species. Biodiversity data on the biota of Southern-Wungong is sparse, limited to small-scale, targeted surveys. Therefore, this project proposes to undertake a broad-scale survey of aquatic fauna to improve understanding of the biodiversity values of the system, and the distribution of taxa that are significant for management, conservation, and cultural values.

Aims

This project aims to use environmental DNA to describe the aquatic faunal community of the Southern-Wungong river network.

To achieve this aim, eDNA methods will be used to survey a comprehensive suite of fauna of the Southern River and Wungong Brook. Prior to undertaking the survey, the project will undertake a literature review and engage with agency, NRM and indigenous groups to improve on existing information and build two-way knowledge exchange with stakeholders with an interest in management of the Canning waterways. Sampling protocols will be refined and sample collection undertaken by DBCA under high and low flow periods. DNA extractions, sequencing and analyses will be undertaken by ECU bioinformatics program. Indicative timeframes are provided below:

- 2022-23 – consultation; literature review, develop project plan, site selection, develop sampling plan and documentation, and preparation of required equipment.
- 2023-24 - Sample collection by RES. DNA extractions and sequencing by ECU.
- 2024-25 – ECU bioinformatics, data analysis and reporting to DBCA. Data report drafting and review September to November 2024.

Expected outcome

The project will deliver new information on biodiversity values of a waterway that is under pressure and contribute to the Canning Waterways Management Plan. It will deliver new methods and knowledge for the management of invasive species. The project will also build engagement with indigenous and non-indigenous groups and support student learnings in waterways science.

Strategic context

The strategic context of this projects aligns with multiple elements of the DBCA Science Strategic plan and associated Rivers and Estuaries Science Program Plan 2022-25, specifically:

Discover- the project will build waterway biodiversity understandings through survey and research; and by inclusion of an invasive suite in the eDNA assessment, the project will contribute to invasive management through innovation.

Conserve – through provision of biodiversity knowledge of native and invasive species and their distribution this project will inform conservation, adaptive management and decision making for the Canning River tributary

and contribute to evidence-based management of feral species. Through engagement with NRM, indigenous and agency groups this project will build on existing partnerships and inform the Canning Waterways Management Plan and enhance two-way exchange of knowledge with Aboriginal people.

Protect – The project will provide scientific knowledge supporting the development of management plans.

Inspire – This project is working with ECU and will provide opportunities for students to develop knowledge and skills in waterways science.

The project also contributes to the Swan-Canning River Protection Strategy through improved understanding of the biophysical environment and ecosystem of the Riverpark, and the development of ecological monitoring approaches to investigate and map the extent of feral fish and invasive aquatic species.

The project is a deliverable under the Canning Waterways Interim Action Plan and data produced will be utilised by land and water managers developing the Canning Waterways Restoration Plan.

Expected collaborations

The project will be undertaken in collaboration with Ecosystem Science who have led departmental development of eDNA methods for the collection, processing, analysis and reporting of eDNA by DBCA (SPP 2020-068). With their guidance RES will produce a sampling and analysis plan to guide the work, in the Southern – Wungong, with a view to its application in other systems.

The project will be undertaken in collaboration with Edith Cowan University, who will conduct DNA extractions on samples collected by DBCA, send the DNA for sequencing and perform bioinformatics and data analysis. ECU will provide the raw results of the metabarcoding analysis to DBCA, as well as a data report that summarises the species found at each site and key findings or management considerations, such as detections of new invasive species, rare or vulnerable species. DBCA and ECU will collaborate in publication of results.

Proposed period of the project

March 9, 2023 – June 30, 2025

Staff time allocation

to	X	X	X	X
Role	Year 1	Year 2	Year 3	
Scientist	0.1	0.06	0.05	
Technical	0.04			
Volunteer				
Collaborator				

Indicative operating budget

to	X	X	X	X
Source	Year 1	Year 2	Year 3	
Consolidated Funds (DBCA)	5000	10000	5000	
External Funding				