

HONOURS PROJECT

Project Title: Utilizing eDNA approaches to advance knowledge about Dugongs

Supervisor(s): Dr Zoe Richards, Dr Tina Berry and Dr Rose Lines (Collaborating with Dr Kathryn McMahon from Edith Cowan University and Dr William Robbins from DBCA).



Project

Environmental DNA (eDNA) is emerging as a powerful tool for species detection and monitoring. Organisms constantly shed small amounts of DNA into their environment (for example - feces, skin and saliva), and sampling eDNA from the environment rather than directly from the donor organism provides an option for rapid detection of species without physical capture or visual confirmation. In this regard, it is useful to detect rare, cryptic, low-density or elusive animals such as marine mammals. To date eDNA monitoring techniques have been developed for a range of marine mammals including manatees, dolphins and seals however they have yet to be successfully designed for Dugongs or seagrasses. Dugongs frequent various parts of the Western Australian coastline including Shark Bay, Ningaloo Reef, Exmouth Gulf and the Kimberley. Monitoring their population, habitat use and dietary habits is challenging due to their elusive behavior and low density. In this project we will develop species specific markers to detect dugongs and to distinguish seagrass species to assist in identifying their main diet. We will test the assays on water collected from known and unknown dugong occupied habitats along with seagrass tissues. We will also use eDNA metabarcoding to examine the food preferences of dugongs by examining their skat. The results of this study will provide a new way to monitor Dugongs and seagrasses and provide new insight into the food preferences of this vulnerable marine mammal.

Funding: eDNA Frontiers; Department of Biodiversity Conservation and Attractions; Edith Cowan University

Special Requirements: This project will involve participating in fieldwork to Shark Bay/Exmouth Gulf. The student is required to be a competent snorkeler and have a driver's license and own transport as the student will be required to intermittently visit the institutions of collaborators. An interest in marine mammals and eDNA is essential. Good organization, databasing, writing and interpersonal skills is preferred. Some molecular laboratory skills or the desire to learn molecular taxonomic and bioinformatic skills is desirable.

References:

- Hunter, M.E., Meigs-Friend, G., Ferrante, J.A., Kamla, A.T., Dorazio, R.M., Diagne, L.K., Luna, F., Lanyon, J.M. and Reid, J.P., 2018. Surveys of environmental DNA (eDNA): a new approach to estimate occurrence in Vulnerable manatee populations. *Endangered Species Research*, 35, pp.101-111.
- Valsecchi, E., Bylemans, J., Goodman, S.J., Lombardi, R., Carr, I., Castellano, L., Galimberti, A. and Galli, P., 2019. Novel Universal Primers for Metabarcoding eDNA Surveys of Marine Mammals and Other Marine Vertebrates. *bioRxiv*, p.759746.
- Gales, N., McCauley, R.D., Lanyon, J. and Holley, D., 2004. Change in abundance of dugongs in Shark Bay, Ningaloo and Exmouth Gulf, Western Australia: evidence for large-scale migration. *Wildlife Research*, 31(3), pp.283-290.