

Progress Report SP 2014-004

Improving the understanding of West Pilbara marine habitats and associated taxa: their connectivity and recovery potential following natural and human induced disturbance

Marine Science

Project Core Team

Supervising Scientist	Richard D Evans
Data Custodian	Richard D Evans
Site Custodian	Richard D Evans

Project status as of July 11, 2016, 12:59 p.m.

Approved and active

Document endorsements and approvals as of July 11, 2016, 12:59 p.m.

Project Team	granted
Program Leader	granted
Directorate	granted

Improving the understanding of West Pilbara marine habitats and associated taxa: their connectivity and recovery potential following natural and human induced disturbance

RD Evans, S Wilson, M Byrne, R Douglas, R Binks, B Macdonald

Context

The focus of work for Wheatstone Development Offset Project B will be to add to the understanding of west Pilbara marine habitats (including coral and seagrass communities) and associated taxa, including their level of connectivity and their recovery potential should they be impacted by natural and human induced disturbance. This research aims to build on existing knowledge and integrate with current and proposed connectivity projects on habitat-forming taxa and associated taxa in the tropical north-west of Australia. Broad-scale connectivity studies of flora and fauna within and between the offshore islands of the north-west continental shelf have shown varying levels of connectivity. Previous studies have also shown limited connectivity between inshore and offshore marine communities but there have been no studies looking at connectivity and recovery potential between locations within the Pilbara region, and their connections with the broader inshore locations of Ningaloo to the south-west, and the Kimberley to the north-east.

Aims

- Determine levels of population connectivity and assess the extent and spatial scales of local adaptation.
- Correlate genetic parameters with modeling of environmental variables to determine factors that have a significant influence on connectivity.
- Investigate coral demographics and recruitment to understand how the environment influences the corals in the Pilbara.

Progress

- Coral recruitment settlement tiles were deployed and collected in the Onslow region for the third year of the temporal study of recruitment processes.
- A third in-situ assessment of recruit corals on Onslow region reefs was undertaken using quadrats with underwater visual census and digital photographs.
- Pre-dredging benthic images provided by Chevron were analysed to understand the size-class frequency distribution of corals in the Onslow region.
- DNA extractions for mangroves, seagrass and fish were completed.
- Sequencing for fish, mangroves, and seagrass were completed and data analyses have commenced.
- Coral extractions are still in progress with some delays caused by taxonomic and technical issues.
- One paper on techniques to identify cryptic species of coral is in press with *Coral Reefs*.
- A paper on coral population genomics and connectivity is in review with *Global Change Biology* and a review of dredging impacts on fishes has been submitted to *Fish and Fisheries Review*.
- A *Landscape* article titled *Understanding Marine Connectivity* is in press.

Management implications

- The project will improve our understanding of how well populations of marine species are linked, providing an indication on how fast they are likely to recover following natural and anthropogenic disturbances, with a focus on key habitat forming species that support important ecological processes.
- Understanding the extent of connectivity for different taxa will inform marine planners about how reserves and management zones can be configured to best facilitate propagule transfer among meta populations, therefore improving recovery potential after disturbance.

- Improved temporal understanding of the impact of natural and human disturbance in the Pilbara, as well as the demography and recovery potential of coral communities, will allow resource managers and industry to understand the resilience of the system, and allow for better spatial and temporal planning of developments and general use management zoning.

Future directions

- Laboratory work will continue for the coral connectivity study, including DNA extracting and sequencing, data analyses and manuscript preparation.
- Analyses of genetic data for fish, mangroves and seagrass species will continue.
- A manuscript for all genetic results will be prepared.
- The third year of data on coral settlement will be analysed.
- Analysis of benthic images from 'post dredge operations' period for coral demographics assessment and reporting.
- Analysis and prepare manuscript on coral recovery potential in the Onslow region.
- Coral settlement tiles will be re-deployed in February and May 2017 to determine settlement differentials across the period of spawning.