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Variation in the recovery rates of an in-shore soft-sediment benthic community following a dredging event; core vs. periphery and species data vs. surrogates

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Abstract

Removal of sediment from the seabed is potentially a major disturbance for the resident macro-benthic communities. The present study investigates the different rates of recovery of an inshore macro-benthic community following a dredging event for re-nourishment of the nearby, severely eroded Palm Beach system, south-east QLD, Australia. Approximately, 23,000 m^3 of sediment was removed from an area of 200 m x 2 km at 20 m depth. An asymmetrical 'beyond BACI' design, of one impact and two control locations were remotely sampled once prior and three times post-dredging (1 week, 3 and 11 months). Using a nested, three tiered hierarchical design with four replicates taken at each *sampling station*. This was repeated three times within the dredged zone, with samples taken along one transect from the inner core and two from the periphery zone separated by a 75 m buffer. In addition to species data (SD), two reduced datasets of major taxonomic groups (MTG) and functional feeding groups (FFG) were also analysed and tested using the RELATE procedure (PRIMER version6) for their success as surrogates. Significant effects were detected by all three datasets between the pre and all three post-impact sampling episodes suggesting that at survey end the community had not recovered. Although not fully recovered significant effects were found between the core, the two periphery sites and control locations, suggesting a faster recovery time for the periphery compared to the inner core, highlighting the importance the scale of an impact has on the rate of recovery of soft sediment communities. Both the MTG and FFG were moderately successful in identifying an impact however less so at identifying the differences in the rate of recovery between the core and periphery.

This study will aid management in the monitoring and identification of impacts on soft sediment communities by providing quick impact assays using surrogate data; with suggestions for more sustainable approaches as results indicate that smaller sized dredge areas, such as strips, will have a faster recovery rate than the larger-scale block dredging.

Biography

Prior to undertaking her PhD Jennifer M. Rowland worked for various government agencies including NSW Fisheries, NSW DIPNR, NSW DPI and universities, UNE and SCU. Jennifer decided to return to university to complete her PhD and has submitted in June 2013 at the University of New England, Armidale NSW AUSTRALIA. She is now working for the Benthic Ecology Lab at Macquarie University in Sydney NSW Australia.