

WAMSI Biannual Progress Report
to 30 November 2007 for
WAMSI Node 1 Project 2 (WAMSI Code 1.2):
Coastal ecosystem characterisation, benthic ecology,
connectivity and client delivery modules

WAMSI project reference no: 1.2

Project title: Coastal ecosystem characterisation, benthic ecology, connectivity and client delivery modules

Node Leader: John Keesing

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Project duration: 1 July 2006 to 30 June 2011

Due date for current milestone report: 20 December 2007

Executive Summary: This project explores a range of important ecological processes affected by natural biophysical dynamics or by human influences such as fishing. The project also explores new ways of looking at ecological connectedness through molecular biology techniques and also supports the ongoing development of the Data Interrogation and Visualisation Environment (DIVE) developed in SRFME to enable delivery of data and model products to the WA government and other users of the research results in WAMSI Node 1. A model has been developed to determine the factors most important in giving rise to the patterns of habitat distribution and habitat patchiness observed on coastal reefs. Field measurements to characterise habitat patchiness and the influence of wave energy on habitat patchiness have been made and these will be used to test and refine the model. Preliminary field data shows clear trends along a cross-shore gradient, with larger gaps in the canopy in the outer Marmion reef sites relative to sites offshore in slightly deeper water, or at sites in the middle of the lagoon. Gap habitats also comprised a larger proportion of the total reef area at the outer reef sites. This pattern may be related to higher wave induced sea bed water velocity, and higher disturbance, at the outer sites, but this awaits more detailed modelling of sea floor velocities, as well as further direct measurements at a subset of the sites. Work has begun to contrast ecological processes in fished and non-fished areas at Rottnest Island and Marmion Marine Park with field data collection completed at inshore sites in Marmion, with abundance of consumers (predatory and herbivorous fish and invertebrates) obtained from reef, seagrass and sand habitats. Fieldwork was also completed at a number of sites at Rottnest Island, focusing on abundances of consumers and consumption of kelp on reef habitats. This work revealed useful insights into potentially important indicator characteristics of fish communities which differ between fished and non-fished areas and may have important consequences for animals and plants at lower trophic levels. Preliminary analyses have yielded insights into the potential for differences in patterns among different spatial management units. For example, abundance of western rock lobsters in fished areas is comparable at Marmion and Rottnest, but abundances are far higher in

an un-fished area at Rottnest than in an un-fished area at Marmion. The project examining dispersal patterns of marine organisms using a sea urchin model has made progress in genetic sequencing of three sea urchin species to look for genetic variation within species across a large geographic range. Particle-track modelling has started to determine likely dispersal patterns for larvae and the output of some of those results are shown in this report. Results from research carried out in Node 1 of WAMSI are made accessible to WA State government agencies via interactive visualisation software called DIVE. This software has been improved over the last year and modifications made to improve accessibility across different computing networks and security systems. Most recently, the functionality of DIVE has been substantially extended. New features include the display of five new features and in addition, the display has been improved by more efficient labelling, and resizable panels. If the displayed variables cover different geographic areas, it is now also possible to zoom to particular datasets by clicking on the variable of interest.