Australian Government

Department of the Environment and Water Resources

Marine and Tropical Sciences Research Facility (MTSRF) June 2007 Milestone Report

Project 1.3.1: Improved knowledge of biota, habitats and risks

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Summary

The coral reef data has been resolved into a common-denominator format and the database design is complete. Preliminary analyses to characterise reefs is underway. The gap analysis has commenced and indicates that while some gaps have been filled from data sourced by this project, the biotic resolution of this data (video) is not as high as that obtained from more traditional sampling devices (e.g. sled, trawl).

For reference: Milestone extracted from Project Schedule

Progress Report 2.

1) Progress report on coral reef characterisation: reef assemblage classifications and mapping*

2) Progress report on data gaps identified for the region, gaps filled from data sourced during this project.*

3) Report identifying areas for future work in the region to fill remaining data gaps.

4) Summary of communication activities undertaken through the course of year 1 of project.

*Final report for activity due August 2007 following review of work and provision of comments that will carry beyond June 2007 and hence beyond this contract time frame.

Project Results

DESCRIPTION OF THE RESULTS ACHIEVED FOR THIS MILESTONE

1. Progress report on coral reef characterisation: reef assemblage classifications and mapping

The reef database design has been completed, although it has been quite challenging to achieve a design that is able to resolve the diverse characteristics of all of the input datasets into a common denominator format, without losing important information. All data will be loaded onto the database shortly and then analyses to characterise the Torres Straits reefs can proceed.

We have begun some preliminary analysis of the reef datasets. The data from several reef surveys has been integrated to describe the patterns of distribution and abundance of seagrass and live coral cover on the reefs of Torres Strait. We used data from 3048 sites sampled on 47 reefs, between 1995 and 2005.

Seagrass was found on 32 of the 47 reefs sampled in Torres Strait (Figure 1). Seagrass cover was highest on the reefs in the northern and central regions of Torres Strait and absent on the ribbon and platform reefs of eastern Torres Strait, patterns of distribution and abundance which corresponded well with the extent of freshwater influence in Torres Strait.

Thalassia hemprichii, *Enhalus acoroides* and *Halophila ovalis* were the dominant seagrass in terms of percentage cover. In general the species richness was highest on the Warrior reef complex and reefs to the west of the Warriors, with *Halodule uninervis*, *T. hemprichii*, *Syringodium isoetifolium*, *Halophila spinulosa*, *H. decipiens*, *Thalasodendron ciliatum*, *Cymodocea rotundata* and *C. serulatta* recorded. Species richness dropped rapidly eastwards of the Warrior reef complex so that *H. ovalis* and *T. hemprichii* were the only seagrasses recorded on the reefs in the central eastern region.

Preliminary analysis indicates that the patterns of seagrass density by reef is well described by a simple regression model (>70% variation explained) of seagrass cover and the inverse distance to the main sources of terrigenous sediments in Torres Strait: a group of continental islands north of Cape York, and the Mai and Fly Rivers in Papua New Guinea. The results of the regression analyses implicate river runoff and factors associated with terrigenous sediments as having a positive influence on the growth of seagrass on the reefs of Torres Strait.

Live coral was found on all Torres Strait reefs (Figure 2). The percentage cover of live coral was highest on the ribbon reefs which mark the seaward edge of the Great Barrier Reef and was lowest on the reefs of central Torres Strait, close to the Papua New Guinea mainland and the reefs north of the Australian mainland where there were numerous large continental islands.

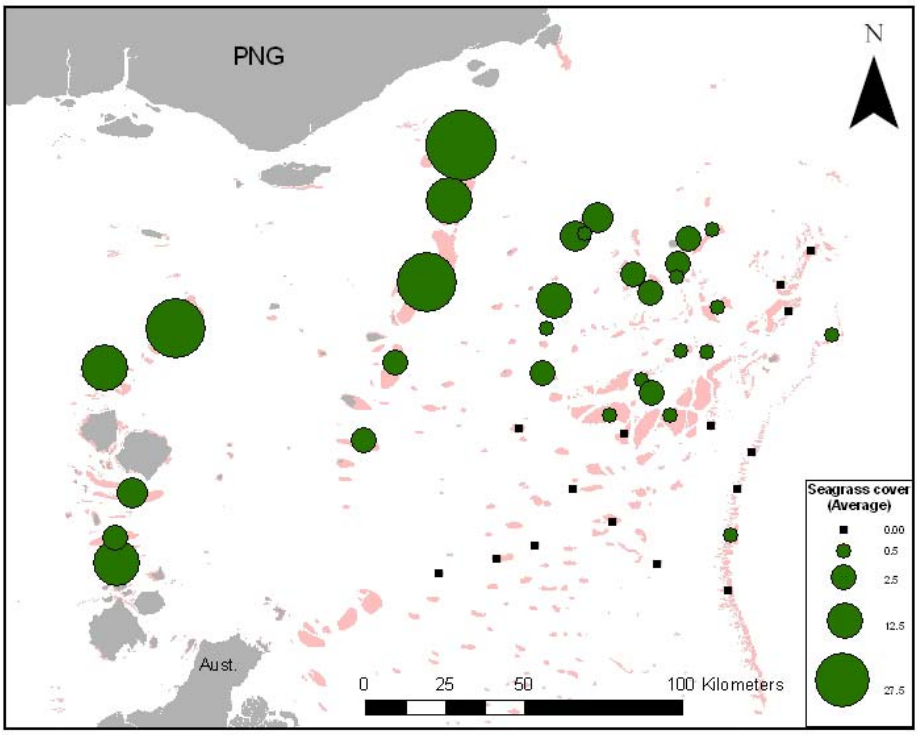

Figure 1. Bubble plot and of average percentage seagrass cover of 47 individual reefs of Torres Strait.

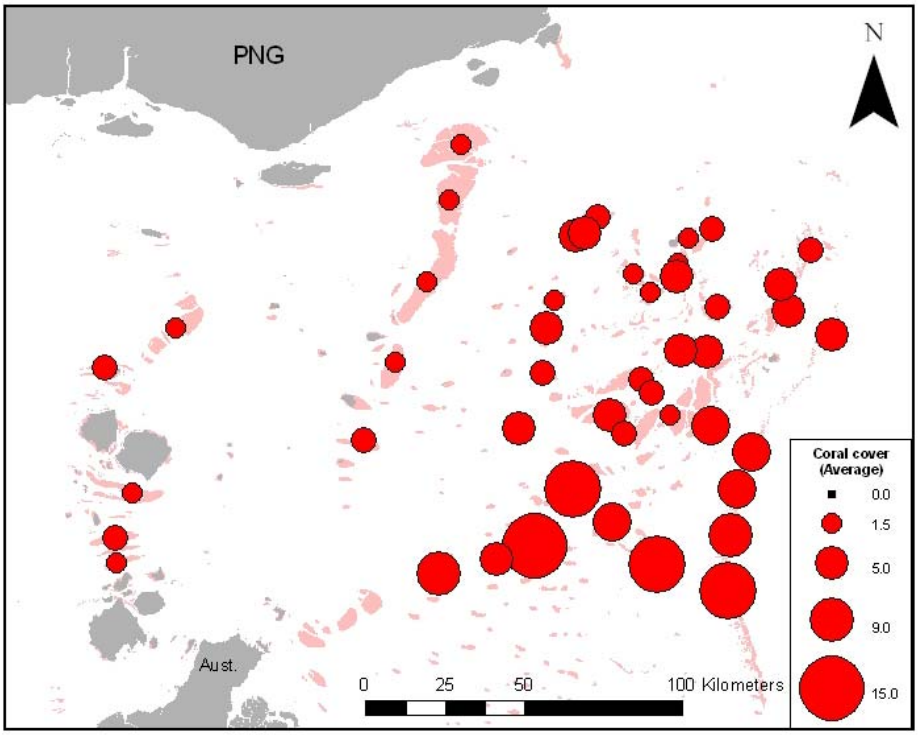

Figure 2. Bubble plot and of average percentage cover of live coral of 47 individual reefs of Torres Strait.

2. Progress report on data gaps identified for the region, gaps filled from data sourced during this project.

During the CRC Torres Strait project: 'Mapping and physical characterisation of key biotic and physical attributes of the Torres Strait Ecosystem', 216 sites throughout Torres Strait were sampled during two different cruises. Three different types of sampling devices were used: Modified prawn trawl, towed video and epibenthic sled. Of the 216 sites only 108 were sampled with all three devices (Table 1).

Table 1. The number of sites sampled with each sampling device during the CRC Torres Strait project: 'Mapping and physical characterisation of key biotic and physical attributes of the Torres Strait Ecosystem'.

Sampling device	Number of Sites
Sled only	2
Trawl only	32
Video only	17
Sled and Trawl	9
Sled and Video	48
Video and Trawl	0
Trawl, Sled and Video	108

Some sites were not sampled because of gear breakdown, but many (17) were not able to be sampled with the trawl or sled because of the presence reef or rocks which may have snagged on the seabed. During the previous project the video data was sub-sampled and analysed primarily for habitat characterisation rather than the identification, measurement and enumeration of biota. The trawl and sled data on the other hand, provided comprehensive distribution and abundance information on the benthic species assemblages found at the sites sampled with these devices. One of the objectives of the present project was to fill some of the gaps by reanalysing the video data and to, as far as possible, identify all biota. Because of the inherent limitations of video (e.g. poor visibility, movement of the target animals, inability to distinguish fine details necessary for accurate identification etc.) the taxonomic resolution obtained from the video data (mean percentage of taxa identified to genus per site = 28.4%) will not be as comprehensive as that from devices such as the trawl and sled (mean percentage of taxa identified to genus per site = 80.7%) identified, so it was necessary to reanalyse all the video, not just those sites that were sampled by video only.

Most of the sites that were sampled by video only were to the west of the Orman Reefs but others were spread out across most of the study area: to the southwest of Badu, in the Endeavour Strait, around Darnley Island and to the south of the Hibernia Passage (Figure 3).

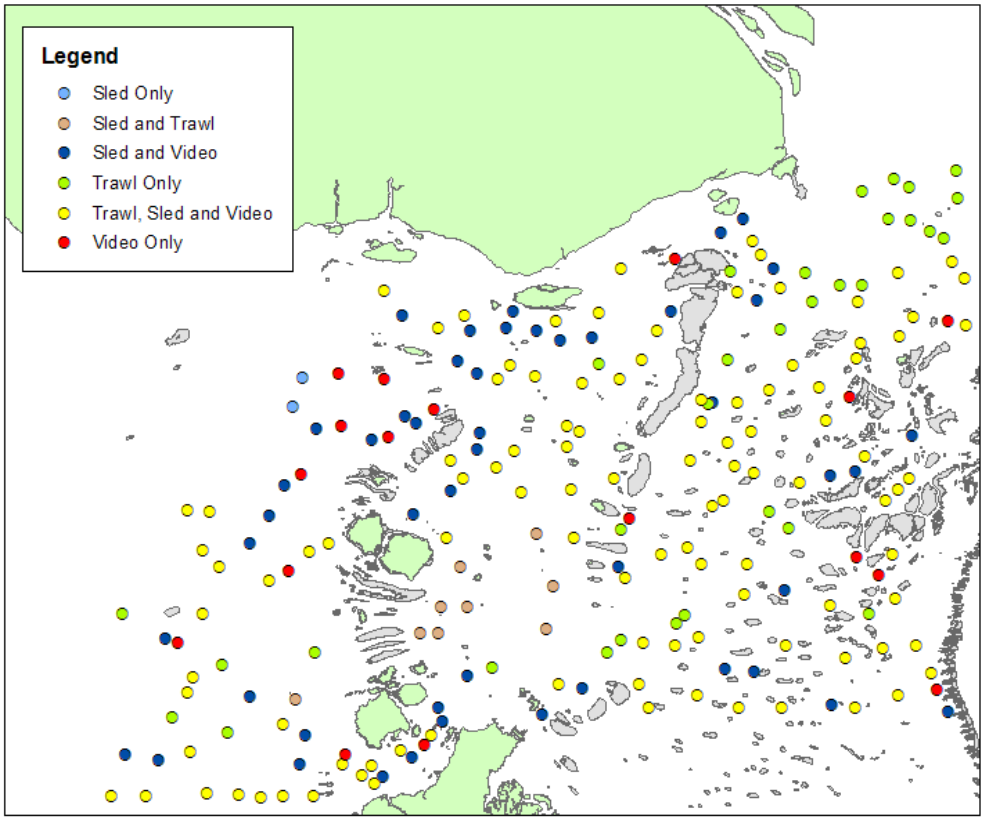

Figure 3. Torres Strait – map showing sites during the CRC Torres Strait project: 'Mapping and physical characterisation of key biotic and physical attributes of the Torres Strait Ecosystem'.

3. Report identifying areas for future work in the region to fill remaining data gaps.

The sample design undertaken for the CRC Torres Strait project was based on a bio-physical stratification of the TSPZ continental shelf. The biological data used for this design was collated from numerous legacy projects and had a wide coverage for more general habitat descriptions such as coded substrate (1452 of 1501 sites) and epibenthos abundance (1336 of 1501 sites) categories. A somewhat more detailed substratum description that included the relative cover of several substrate categories was possible at 968 of 1501 sites, and algal & seagrass percent cover was possible at 490 of 1501 sites. These two quality levels of data were identified: low- and mid-level data. Although this data had limited taxonomic information for biodiversity studies, it did have a relatively comprehensive spatial coverage (apart from significant gaps in the west and north-east; Figure 4).

This low- and mid-level data was used in conjunction with an extensive range of physical datasets to generate the sampling design for the CRC project. The design was quite comprehensive and provided for 440 benthic sampling sites, however the project did not have sufficient funds to sample all of these sites and so approximately half were chosen. Consequently, there are gaps in the coverage of the complete bio-physical spectrum across the Torres Strait. Never-the-less some of the gaps in the north-east and west have been filled. The north-western section of the Torres Strait has always proved to be difficult to sample as this area is very shallow and poorly charted.

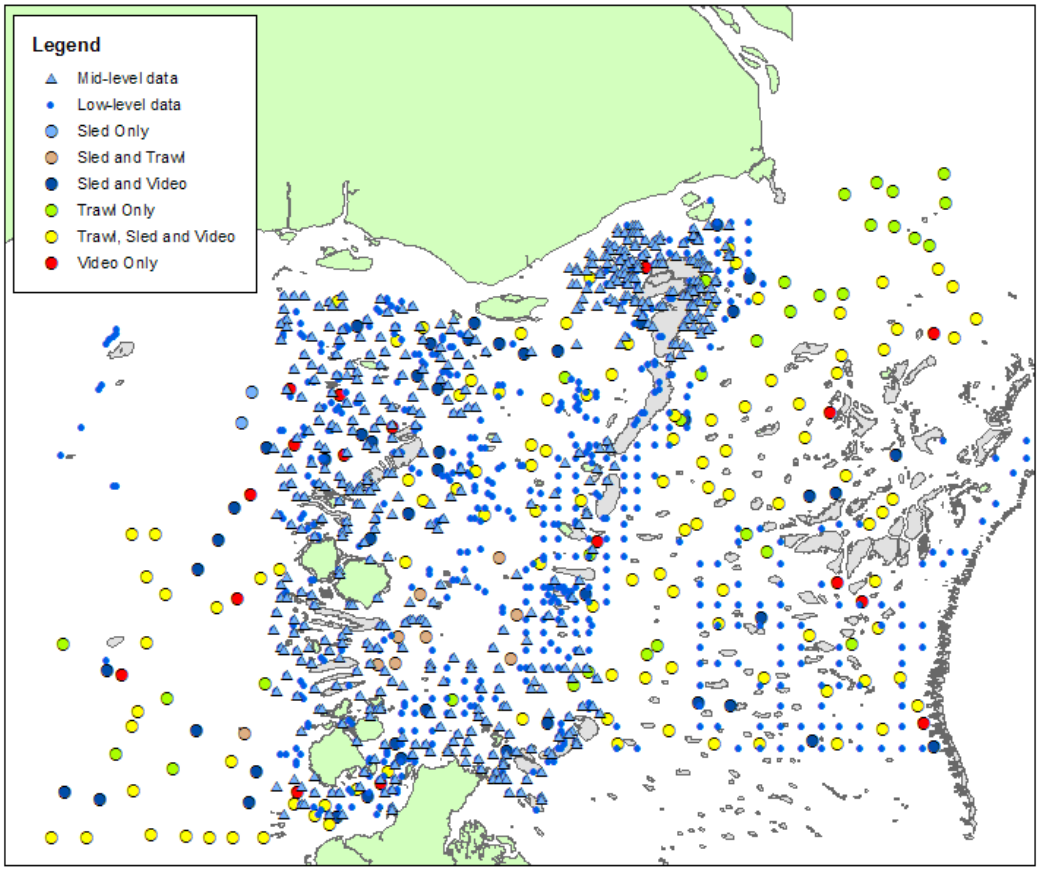

Figure 4. Torres Strait – map showing the so-called low- and mid-level data sites used in the sample design for the CRC Torres Strait project: 'Mapping and physical characterisation of key biotic and physical attributes of the Torres Strait Ecosystem' overlaid with the sites actually sampled by the CRC Torres Strait project.

Problems and opportunities

Progress on the collation, analysis and mapping of the reef-top data has not progressed as quickly as originally anticipated. In part, this has been due to staff commitments on other overdue projects and also there have been some technical issues concerned with attempting to combine data collected from a wide range of legacy projects into a common-denominator format. However, at this stage we do not anticipate that the project will run over the scheduled completion date of 31 August 2007.