



Australian Government

Department of the Environment, Water, Heritage and the Arts

Marine and Tropical Sciences Research Facility Milestone Report, January 2009

Program 1: Status and Trends of Species and Ecosystems in the Great Barrier Reef

Project 1.1.4: Dating and mapping historical changes in Great Barrier Reef coral communities

Project Leader: Dr Jian-Xin Zhao, The University of Queensland

This report provides a plan for conduct of Year 3 MTSRF activities including a laboratory and field sample collection schedule.

Project Outputs / Milestones

Targeted Activity	Due Date
<ul style="list-style-type: none">Report on collection of coral rubble, dead <i>in situ</i> massive corals, wave-transported coral blocks and short cores from back-reef and lagoon settings in the central and southern Great Barrier Reef.	28 January 2009
<ul style="list-style-type: none">Dating results for coral rubble, <i>in situ</i> dead massive corals, and short cores from back-reef and lagoon environments in the central and southern Great Barrier Reef with appropriate attribution of MTSRF funding.	28 January 2009

Project Results

Description of the results achieved for this milestone

As planned, fieldwork and sample collection on Heron Reef were conducted from 8-15 November 2008, targeting surface death assemblages, cyclone-transported coral blocks and lagoon sediment cores. Over one hundred cyclone-transported coral/reef blocks were collected. However, lagoon sediment cores could not be collected due to rough conditions at sea. A contingent plan has been made to carry out another field trip to Heron Island in March 2009.

As planned, Tara Clark participated in the Australian Institute of Marine Science expedition to far northern Queensland, 3-22 December 2008, and collected surface death assemblages. Following is a summary report from Tara:

During the three weeks at sea aboard the research vessel 'Cape Ferguson' we visited some of the most remote coral reefs out of reach of terrestrial influence; providing some concept of what a 'pristine' reef would look like. Believed not to have suffered from any major mass bleaching events, COTS outbreaks and

adjacent to virtually unmodified catchments, the inshore reefs of far northern Queensland provide an ideal comparison to the reefs being studied in the Palm Islands region.

*During this voyage, four inshore reefs were sampled for this study including Douglas Islet (11°14.281'S; 142°59.397'E), Wizard Reef (11°31.448'S; 143°00.703'E), Clerke Island (11°58.350'S; 143°16.988'E) and Haggerstone Island (12°02.500'S; 143°17.587'E). The reefs were selected at the discretion of the cruise leader and the number of sites sampled was restricted by time. At each reef, two sites were sampled from the back reef environment. At each site, four twenty-metre transects were laid parallel to the reef flat and five grab samples of dead *Acropora* spp. were taken from the death assemblage (consisting of both rubble and in situ material). This sampling design reflects that used so far in the Palm Islands, with the exception that only two sites were sampled instead of three. While on board the vessel, sample bags were sorted through and coral fragments considered suitable for uranium series dating were kept. Several boxes containing the samples have already been couriered to the University of Queensland awaiting further preparation for dating.*

Live coral and seawater samples were also collected at each site to determine non-radiogenic thorium levels in order to provide a correction factor for our uranium-series coral ages.

*Unfortunately due to time constraints, we were unable to survey and sample dead massive *Porites*.*

Sediment samples were also collected for a foraminiferal study by a colleague.

Laboratory Schedule

Laboratory analyses were carried out whenever TIMS time became available. This laboratory work is still ongoing. Since the last milestone report in October 2008, the following results were obtained:

- Around Christmas time, Dr Kefu Yu together with visitor Miss Shu Li dated some forty-five cyclone-transported coral blocks from Heron and Wistari Reefs by U-series method. The results further confirm the finding of Zhao *et al.* (2009, *Quaternary International* 195: 122-127) that most of these blocks were uplifted over the past three hundred years, with the vast majority within the last one hundred years. Thirteen samples yield surface mortality ages that appear to match the time of Tropical Cyclone *Larry* in 2006.
- In addition, Tara Clark has also dated a new set of samples from the Palm Islands region. A set of samples with known ages are also being processed to determine the local correction factors for samples of unknown ages from the same region. The samples she collected from far northern Queensland will also be processed.

Explanation of Activity Changes

No substantive changes to the project are foreseen. Alexander is replacing Bishop for the scientific report due to Bishop's retirement from the CSIRO.

Communications, Major Activities and Events

During next milestone reporting period

Anticipated revised data for scientific report completion is 30 January 2008. Revised climate impact workshops for islands occurring mid April 2008 (date to be confirmed with the Torres Strait Regional Authority coordinator and Island councils). This trip will combine negotiations with councils post elections and engagement arrangements with TEK consultants.