



Australian Government

Department of the Environment, Water, Heritage and the Arts

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

Project 3.7.1 – Marine and Estuarine indicators and thresholds of concern

Project Leader: Dr Katharina Fabricius, Australian Institute of Marine Science.

Summary

All activities within the MTSRF Project Marine and estuarine indicators have commenced, and all are on track. A first draft of a major report on biomarkers in Barramundi has almost been completed, new people have been employed, a summary of data on biofilms, coral and seagrass indicators has been completed and the prioritisation of potential indicators commenced.

For reference: Milestone extracted from Project Schedule

Description

- Progress update for objectives a,b,d (above). [AIMS]
- Progress update for objective c (above). [QDPI]
- Progress update on the literature review on potentially useful ecological indicators of the condition of North Queensland's estuaries. [JCU, GU]
- Progress update on development of the conceptual framework. [AIMS]
- Collation of Catchment to Reef products related to the activities listed in objectives a-d available for uploading to website. [AIMS]
- Plan of communication outputs and products for year one and summary of any liaison activities undertaken to date, including minutes of meetings/workshops if applicable. [AIMS]

Project Results

Milestones and progress so far:

- ***Progress update for objectives a,b,d:***

Objective a) Field testing and analysis of marine biofilms (bacteria, diatoms, foraminifera) for their suitability to indicate changes in water quality. [AIMS]:

We have advertised for a scientist position, and Sven Uthicke is now being employed by AIMS to work on this from 1st January 07. An interim report summarising all biofilm indicator data investigated so far has been completed as final part of the Catchment-to-Reef CRC report (see below). It will form the basis for prioritisation and rigorous tests for their suitability of candidate indicators. A field trip is now being prepared for 8 – 18th January to the Whitsundays, to fill some data gaps that were identified in the report.

Objective b) Field testing and analysis of coral reef organisms and physiological change tested for their suitability to indicate changes in water quality and ecosystem condition. [AIMS]

We have now employed Tim Cooper as experimental scientist at AIMS to work on this from 1st January 07. An interim report summarising all coral indicators tested so far has been almost completed. First field trip will be 8 – 18th January to the Whitsundays, to fill some data gaps that were identified in the report.

Objective d) Analysis of stress markers in estuarine barramundi in response to contrasting water quality in four estuaries. [AIMS]

Laboratory analyses of 10 stress markers in replicate fish from 5 rivers are now completed. Data have been analysed, suggesting strong and consistent responses in 3 of the measures tested. A first draft of the report has been written by Craig Humphrey et al. Completion expected in 1 month time.

- ***Progress update for objective c. [QDPI]***

Objective c) Report on relationships between seagrass communities and sediment properties along the Queensland coast. [QDPI]
Data are all in data base, preliminary data analysis commenced.

- ***Progress update on the literature review on potentially useful ecological indicators of the condition of North Queensland's estuaries. [JCU, GU]***

Literature review on potentially useful ecological indicators of the condition of North Queensland's estuaries [JCU, GU]

A research assistant has been employed for the review. To date 495 references have been acquired. Around half of those have been assessed and summarised into a data base so they are readily accessible for inclusion in the review as required.

Key issues to be examined in the review have been identified. An outline for the review has been established (see below) and detail is being added as reference materials are evaluated.

Review - General outline:

- Principle purpose of review: What effects/changes can be detected?
- Focus on ecological indicators: fish, invertebrates, plants
- Key issues (effects/changes): environmental flows, pesticides (+ other toxicants), nutrients, habitat alteration/loss, fishing pressure
- Confounding issues: classes of estuary (typical riverine vs dry tropics) or wetland (freshwater, saline, brackish, artificial) – transferability between systems
- Geographic range: Tropical/sub-tropical (southern boundary Bundaberg)

Other considerations: standardisation of sampling methods

- Progress update on development of the conceptual framework. [AIMS]

Initial design planning has started, and more detailed work on it will start later this fy.

- ***Plan of communication outputs and products for year one and summary of any liaison activities undertaken to date, including minutes of meetings/workshops if applicable. [AIMS]***

Katharina Fabricius contributed to a 2-days workshop 'Reef health indicators and thresholds of concern' with program 1.1.2, held 28/29 November and gave presentation on the state of reef health indicator development conducted so far in the Marine Water Quality Program. It was agreed to focus synthesis efforts of reef health indicators on water quality issues for the remaining year (with Alan Butler, Bill Venables, Glenn De'ath).

Meeting with GBRMPA (Hugh Yorkston, Carol Hunching, David Haynes, Lee Gray, et al) on coordination of GBRMPA needs with MTSRF research priorities, with regards to ecosystem health indicators (25th Oct 06).

- ***Collation of Catchment to Reef products related to the activities listed in objectives a-d available for uploading to website. [AIMS]***

An Interim Report for Task 6 of the 'Catchment to Reef' has been submitted, and is presently under review. It's structure is as follows:

Candidate bioindicator measures to monitor exposure to changing water quality on the Great Barrier Reef. An Interim Report , by Katharina Fabricius, Sven Uthicke, Tim Cooper, Craig Humphrey, Glenn De'ath and Jane Mellors

Executive Summary

Chapter 1: Introduction

- 1.1 Water quality and coral reefs
- 1.2 Bioindicators for changing water quality
- 1.3 About this study

Chapter 2: Physico-chemical characteristics of the water column and sediments, Whitsunday Islands

- a) Water column characteristics
- b) Sediment characteristics
- c) Irradiance
- d)

Chapter 3: Benthic biofilms

- a) Foraminifera
- b) Benthic diatoms / microphytobenthos
- c) Benthic bacteria
- d)

Chapter 4: Coral genetics: RNA - DNA ratio as an indicator for changing light and nutrient exposure

Chapter 5: Coral physiology as potential bioindicators for changing water quality

- a) Coral colour
- b) Tissue thickness
- c) Chlorophyll a, symbiont density, protein content
- d) Skeletal density

Chapter 6: Review of the effects of changing water quality on inshore corals and coral reefs

Chapter 7: Changes in algal, coral and fish communities and abundances of potential indicator species along water quality gradients

Chapter 8: Coral benthos, taxonomic richness and recruitment along a water quality gradient in the Whitsunday Islands

- a) Changes in benthic cover and the taxonomic richness of hard corals, octocorals and algae
- b) Changes in densities and taxonomic richness of hard coral and octocoral juveniles
- c)

Chapter 9: Temporal variation in seagrass biomass and tissue nutrients in relation to sediment properties

- a) Sediment properties
- b) Seagrass properties
 - a. Biomass
 - b. Tissue nutrients
- c) Sediment-seagrass interactions

Chapter 10: Conclusions

Once the review is completed, it will be uploaded onto the web site, which is also completed now: <http://www.catchmenttoereef.com.au/Start.html>

Communications, major activities or events

During milestone reporting period

- Katharina Fabricius gave presentation to Townsville LMAC on land-sea interactions and World Heritage values on Magnetic Island (with Steve McGuire, 2nd Dec 2006).
- Katharina Fabricius contributed to a 2-days workshop 'Reef health indicators and thresholds of concern' with program 1.1.2, held 28/29 November and gave presentation on the state of reef health indicator development conducted so far in the Marine Water Quality Program. It was agreed to focus synthesis efforts of reef health indicators on water quality issues for the remaining year (with Alan Butler, Bill Venables, Glenn De'ath).
- Meeting with GBRMPA (Hugh Yorkston, Carol Hunching, David Haynes, Lee Gray, et al) on coordination of GBRMPA needs with MTSRF research priorities, with regards to ecosystem health indicators (25th Oct 06).

During next milestone reporting period

During the next reporting cycle, a 10-days and a 7 -days field trip to the Whitsunday Islands will be conducted to complete some of the data collections, to deploy instruments for a month, in order to better characterise water quality conditions along the ecological gradients tested. The CRC Report will be completed, and the Barramundi Estuarine Health Biomarkers Report will be completed.

Forecast variations to planned milestones

No variations planned.