EARTHWATCH INSTITUTE FIELD REPORT

Project Title: Jamaica's Coral Reefs

Principal Investigator: M. James C. Crabbe

Position/Affiliations: Head, School of Animal and Microbial Sciences, University of Reading, UK

Research Site: Discovery Bay, North Coast, Jamaica, West Indies

Local Management Status of the Research Site(s) (e.g. National Park, RAMSAR Site, World Heritage Site, IBA etc.): -

Scientific names of primary species being studied: Massive and branching species of scleractinian corals

Key Research Objectives:

- Use transects, digital video photography and computer image analysis to record massive coral species numbers in different reef environments around Discovery Bay, Jamaica
- Lay new transects at sites where appropriate
- Record morphological measurements (using flexible tapes and vernier scales) and photograph (using digital video photography and computer image analysis) individual coral specimens in different environments in the park. Morphological data collected by hand will be verified by digital photography.
- Calculate survival curves and recruitment dates for corals
- Take DNA samples from branching and massive corals for zooxanthellae clade and heat shock protein analysis in the laboratory at Reading

Date this report was completed: 15 November 2004

Data Collection and Results

a) Give a concise account of the data you have collected during the past field season.

1. Laid three new sets of replicate transects each at Dancing Ladies, Pear Tree Bottom and Columbus Park sites
2. Measured massive corals 1m either side of all transects for growth
3. Measured branching *Acropora palmata* and *A. cervicornis* colonies for growth
4. Measured >1,000 individual massive colonies for estimated recruitment dates
5. Taken samples for DNA analysis of polyps and zooxanthellae

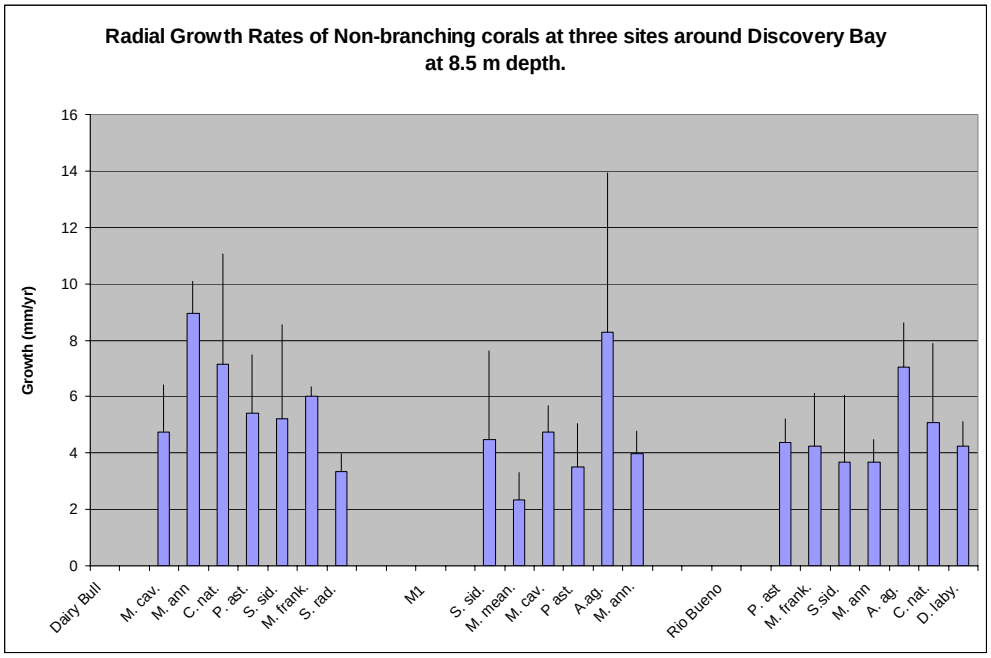
b) What progress have you made towards achieving your original objectives?

All objectives were met.

c) Please provide a summary of your results.

1. Estimated colony recruitment data on larger database substantiates previous findings – severe storms, particularly hurricane Allen, curtail recruitment of massive corals

2. Now can see that recruitment takes time to get back to previous levels, at least 2 years. This is probably owing to new bottom topography and stress on reproduction
3. DNA has been extracted successfully from coral and zooxanthellar samples, and clade analysis is ongoing. We found that two separate *Acropora cervicornis* colonies from an impacted site (Columbus Park) near Discovery Bay hosted two different clades of zooxanthellae (A and B respectively). Columbus Park has high levels of sedimentation (c. 50 g m^{-2} d^{-1}) while clade D is probably the preferred *Symbiodinium* for thermal adaptation, clade A, and possibly clade B, might be preferred in areas of high sediment impact.
4. Growth of massive corals is similar at all sites. For example the following is a graph of radial growth rates at three sites around Discovery Bay.



Significance/Benefits of Research

a) What is/are the significance/benefits of your research at the following levels?

- local (in the area of the research site) **Knowledge of the importance of coral reefs to the local community**
- national **Coral reefs around Jamaica need to be conserved sustainably**
- international **How anthropogenic and natural factors influence the growth and recruitment of coral reef colonies**

b) How do your findings contribute to issues of sustainability?

Coral reefs in Jamaica are hit by hurricanes, over-fishing and loss of Diadema sea urchins. Our work will map how the reefs are fairing, in terms of coral cover, biodiversity and growth. By carefully measuring a diversity of corals and their growth in Jamaica's ideal coral reef habitat, this project measures normal growth and predicts scenarios for how the corals will weather the future storms of environmental upheaval. This project has already uncovered novel findings: these environmental insults not only damage established coral colonies, they also destroy young colonies that represent the future of the coral reef. In the last three years, Earthwatch teams have laid new transects on the reefs, and measured over 3,000 massive coral surface areas. The study links in to other studies in the DBML area on fish populations, sedimentation, and *Diadema* sea urchin recovery.

Dissemination of Results

a) Have you provided details of results from your research to or within:

- Scientific papers (indicate status; e.g., peer reviewed or in progress/press)

Peer reviewed:

Crabbe, M.J.C., Karaviotis, S. and Smith, D.J. (2004) Monitoring growth of hard corals as performance indicators for coral reefs. *Journal of Biological Education* **38**, 113-117.

Crabbe, M.J.C., Karaviotis, S. and Smith, D.J. (2004) Preliminary comparison of three coral reef sites in the Wakatobi Marine National Park (S.E. Sulawesi, Indonesia): Estimated recruitment dates compared with Discovery Bay, Jamaica. *Bulletin of Marine Science* **74**, 469-476.

Further papers are in press in *Coral Reefs*.

Meeting abstracts:

Carlin, J.P. and Crabbe, M.J.C. (2004) Zooxanthellae clade DNA analysis from corals in the Wakatobi Marine National Park, S.E. Sulawesi, Indonesia, and Discovery Bay, Jamaica. *Abstracts of the 5th. Reef Conservation UK meeting*, 3.

Crabbe, M.J.C. (2004) Storm and Stress: modelling strategies for recruitment and survival of corals in Discovery Bay, Jamaica, and in the Wakatobi Marine Park, S.E. Sulawesi, Indonesia. *Abstracts of the 10th International Coral Reef Symposium*, 194.

- Management plans and reports (in progress or completed)

  A grant application for work on spatio-temporal analysis has just been submitted to the Natural Environment Research Council.

  A further grant application, jointly with Earthwatch, is planned for submission to the Darwin Foundation.

- Presentations (given or planned)

  A major public lecture entitled: Coral Reefs; climate change and sustainability to be given by Prof. Crabbe in Reading, UK, on Dec. 7th 2004. It will be chaired by Dr. Roger Mitchell, Chief Scientist at Earthwatch (Europe).

- Popular articles or films (in progress or completed)

  An article on the project, with photographs provided by Prof. Crabbe, is being written by journalist Charlotte Boan, of Dive Magazine. Charlotte was a media volunteer in Team 2 in the summer. The article should appear in early 2005.

  An article on the project appeared in the magazine of the Royal Automobile Club, London, in 2004.

- Books, chapters, illustrations

Numerous u/w photos have been used by volunteers in presentations about their work on the project to groups in their home towns.