

Coral disease and bleaching impacts on the central and northern Great Barrier Reef— Summer 2008/2009

Summary

In the summer of 2008/09, the Great Barrier Reef was affected by high sea surface temperatures as well as high levels of rainfall and run-off. Following this high stress period, a series of surveys were undertaken to investigate the extent and severity of the stress effects on reefs in the central and northern sections of the Great Barrier Reef Marine Park. The survey results showed evidence of both coral disease and coral bleaching caused by these stressors.

Background

Coral bleaching and coral disease outbreaks pose significant threats to coral reef ecosystems. Internationally 19 per cent of the world's reefs have been severely damaged by bleaching and coral disease, outbreaks have decimated some coral species (eg. in the Caribbean).

Above average sea temperatures and reduced salinity, caused by monsoonal rainfall and runoff, can result in severe impacts to fringing reefs. Coral bleaching and coral disease outbreaks are clear signs of stress on coral reefs. Bleached corals can be more susceptible to infections. Corals that appear to have fully recovered from bleaching can still be affected by diseases many months later.

During the 2008/2009 summer, satellite data showed anomalously high sea surface temperatures in the northern Great Barrier Reef. A number of areas in the central Great Barrier Reef were also subject to lowered salinity due to high levels of rainfall and runoff from the monsoon.

Objectives

This research project aimed to assess the extent and severity of coral bleaching and coral disease outbreaks at 18 reef sites between one and six months after the period of temperature and salinity stress during summer 2008/2009. The survey results and analysis are being used by the Great Barrier Reef Marine Park Authority (GBRMPA) to refine reef health assessment and response plans to predict, plan for and manage similar events in the future.

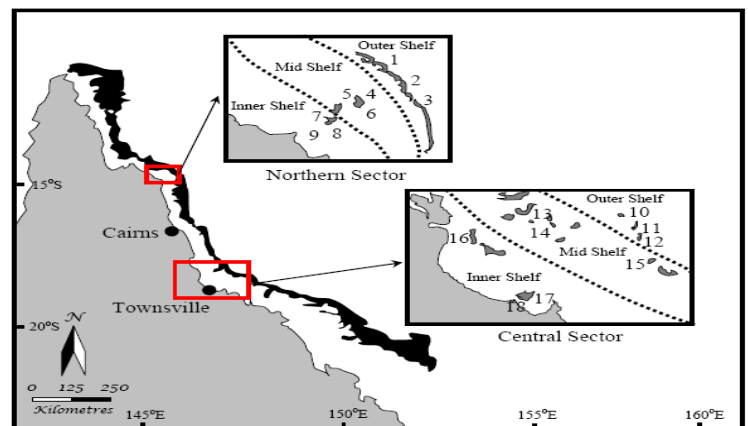


Figure 1: Reefs surveyed for coral bleaching, coral cover and disease prevalence in 2 latitudinal sectors of the Great Barrier Reef. Reefs numbered as follows: (1) Day Reef, (2) Yonge Reef, (3) No Name Reef, (4) Macgillivray Reef, (5) Lizard Island, (6) North Direction Island, (7) Martin Reef, (8) Linnet Reef, (9) Maxwell Reef, (10) Dip Reef, (11) Knife Reef, (12) Fork Reef, (13) Kelso Reef, (14) Little Kelso Reef, (15) Davies Reef, (16) Orpheus Island, (17) Magnetic Island, (18) Middle Reef.

Activities

In 2009, the GBRMPA contracted James Cook University researchers to undertake coral health surveys at 18 reef sites distributed throughout the northern and central sectors of the Marine Park. This included nine reef sites in each of the sectors, which were divided up into inner, mid and outer sections (three reef sites in each). An investigation into the extent and severity of the coral disease outbreak that affected fringing

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reef around Magnetic Island following extensive run-off caused by the 2008/2009 summer monsoon was also included in this study. Distribution of all survey sites can be seen in Figure 1.

Surveys were conducted between January and August 2009. Long-term monitoring sites were re-surveyed and coral mortality and recovery levels investigated. Each site was surveyed numerous times. Within each site, three belt transects of 20m x 2m were examined and coral species and disease prevalence recorded. Water quality samples were also taken to determine salinity levels and temperature.

Following these surveys the researchers reviewed the GBRMPAs coral health monitoring forms (including BleachWatch) and gave input into data collection formats based on their surveying experience. In addition, they completed a literature review of current management actions used by the international community to manage coral disease outbreaks.

Outcomes

Summary of coral health surveys

The 2009 coral health surveys found that coral bleaching in the northern sector was generally moderate with low coral mortality rates. Overall, disease was found in 0 to 3 per cent of colonies, which was consistent with previous years. No Name Reef and Day Reef were exceptions. Coral cover significantly declined at No Name Reef compared to previous surveys. A moderate decrease in coral cover was observed at Day Reef in addition to a higher rate of disease



Figure 2: Healthy coral at a survey site in Nelly Bay, Magnetic Island (November 2008)
Source: E. Howells



Figure 3: Coral with white syndromes in the foreground, and bleached branching coral at the top of the picture in Nelly Bay, Magnetic Island (March 2009) **Source:** E. Howells

than at other sites.

In the central sector, salinity declined dramatically in late February, resulting in marked increases in coral disease and mortality at Nelly Bay and Geoffrey Bay on Magnetic Island (see Figures 2 and 3 for an example of coral health pre and post salinity stress in Nelly Bay). Salinity bleaching also largely impacted Middle Reef. Disease prevalence was comparable to previous years although sampling was possibly conducted outside peak levels at Picnic Bay (Magnetic Island) and Middle Reef sites.

Overall the surveys demonstrated that coral bleaching and disease impacts were localised during the 2009 summer. Salinity was the main cause in the areas where high mortality occurred. Fortunately, only inshore areas of the central Great Barrier Reef were affected.

Literature review

The review highlighted that the most cost effective management action was to reduce the impact of human activities at affected sites, as they can delay coral recovery. It was advised that proactive and reactive mitigation methods be implemented. Raising awareness concerning the links between human stressors and coral recovery times and the importance of global, local and individual efforts to reduce greenhouse gas emissions, and the communication of these initiatives, were also identified as important strategies to mitigate coral bleaching and disease impacts.

Review of survey forms

Based on feedback from reviewers, coral disease observations were added as additional variables in the Reef Health Impact Survey form. Additionally, management responses were integrated into the draft Coral Disease Response Plan 2009—2010.

Future Directions

Continued monitoring was suggested at Day and No Name Reefs to monitor potential long-term impacts of the 2008/2009 summer. The development of predictive tools for coral disease outbreaks is a possible future action.

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