CCMI Project Overview

Status: Completed June 2015 (has potential for expansion)

Enhancing Capacity for Coral Reef Resilience Management

This is a project led by staff from the Central Caribbean Marine Institute and is a collaborative effort with staff from the Department of Environment of the Cayman Islands Government.

Background: The fate of coral reefs under climate change will depend on: 1) vulnerability, which is a function of the frequency of disturbances that damage reefs and resilience to these disturbances, and 2) management of human-related activities that damage or stress coral reef organisms. Management can support the natural resilience of reef systems but resources are always limited meaning managers have to choose from among various actions and target locations. This project sought to use a vulnerability assessment framework to aid in making these common management decisions to support the resilience of reefs in the Cayman Islands.

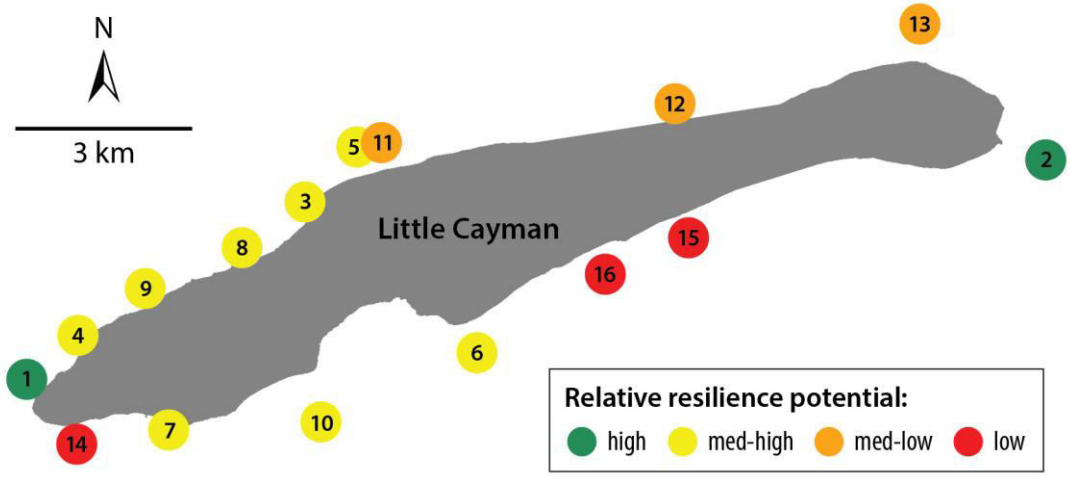
Martha's Finyard in western Little Cayman; a reef with high relative resilience potential (see p. 2)

Objectives: The project's four objectives were to:

1) Assess historic and projected future exposure to bleaching-level thermal stress in the Cayman Islands;
2) Assess and compare resilience potential among reefs near Little Cayman Island;
3) Aid managers in targeting actions to support resilience via a vulnerability-based decision-support framework;
4) Share project results with managers from DoE, through education programs at CCMI, and with tourists.

Results and outcomes: Our progress towards meeting each of the objectives is described below.

1) Satellite data archives for sea surface temperature from 1985-2012 indicate that, of the three islands, Little Cayman had: greater warm season temperature variability, so may be better acclimated to the higher-than-normal temperatures that cause coral bleaching, a lower average frequency of thermal stress events severe enough to cause bleaching, and lower rates of increase in annual and warm season temperatures. Climate model projections of future conditions suggest that the reefs of Little Cayman and Cayman Brac may have lower or later exposure to bleaching conditions than the reefs near Grand Cayman.
2) Resilience potential varied greatly around Little Cayman based on comparing resilience scores calculated by measuring and assessing resilience indicators (e.g., recruitment and herbivore biomass). Martha's Finyard in the west and Point of Sand in the east were assessed as having the highest relative resilience. Our statistical analyses indicate that of the resilience indicators used, these most greatly influenced the resilience rankings: macroalgae cover, bleaching resistance, coral recruitment and herbivore biomass.



1 - Martha's Finyard
2 - Point of Sand
3 - Meadows
4 - Jigsaw Puzzle
5 - CREWS
6 - Lucas' Ledges
7 - Grundy's Garden
8 - Mixing Bowl
9 - Joy's Joy
10 - Lappy's Leap
11 - Snapshot
12 - Sailfin
13 - Old Barge
14 - West Point
15 - Hardpan
16 - Coral City

Results of the ecological resilience assessment undertaken in early 2015. Resilience potential is an an average score for 7 resilience indicators that we assessed and measured: macroalgae cover, coral diversity and coral cover, bleaching resistance, coral recruitment, temperature variability and herbivore biomass. Martha's Finyard (see p. 1) and Point of Sand have the highest relative resilience and are outside established Marine Parks so are conservation priorities.

3) We set criteria to examine our data for the resilience indicators and our final resilience scores to identify targets for various management actions. We identified high resilience sites currently outside of marine parks that represent conservation priorities. We also identified sites that are targets for bleaching monitoring and supporting recovery as well as locations where conditions are optimal for reef restoration and coral translocation.

4) We shared project results with managers from DoE during a collaborative workshop and discussed undertaking ecological resilience assessments in Cayman Brac and Grand Cayman (see next steps). The project results are informing and helping defend current management plans to revise the MPA network around Little Cayman. We have also built climate change and reef resilience into our education curriculum and are including an overview of this project within our weekly Reef Lecture Series for tourists and community members.

Key Next Step: Raise funds through donors or grant support to develop guidance that can be used throughout the Caribbean to aid managers in undertaking ecological resilience assessments of coral reefs and use the results to make management decisions. This new effort is expected to be highly collaborative with Australia's Great Barrier Reef Marine Park Authority, the NOAA Coral Reef Conservation Program, and the United Nations Environment Program.

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For more information about this project, please email: info@reefresearch.org