

**Coral Reef Benthic Community Responses to Management
in the Fully Protected Marine Zones of the Florida Keys**

**Subagreement #4710-1048-01-C
Between The University of South Florida and Florida Institute of Technology
CRCP Contract #10347-10**

Progress Report: January 27, 2010

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Objectives

This project is the continuation of a long-term study of reef community structure in Fully Protected Zones (FPZs) and reference sites in the Florida Keys National Marine Sanctuary. The study commenced in October 1997 and since then has been continued through funding from various offices of the National Oceanic and Atmospheric Administration.

The goal of the project is to compile video transect data from the summer 2007 sampling period. These data are to be analyzed to estimate percent cover of coral species and key benthic taxa (gorgonians, sponges, and algal functional groups). The significance of patterns of percent cover over time, across depths, and with protection status (FPZ versus reference sites) are to be evaluated by analysis of variance (ANOVA) and multidimensional scaling (MDS).

Progress to Date

During a field expedition conducted May 16th-27th, 2010, we visited all eight of our study sites within the Florida Keys National Marine Sanctuary (FKNMS). Sampling included the six study locations established in 1998—Eastern, Middle, and Western Sambo, Pelican Shoal, Carysfort, and Maitland Reefs—as well as the two additional sites in the Key Largo region—Molasses and Pickles Reefs—first sampled in 2002. At each deep and shallow site, ten to twelve 25-m video transects were collected, depending on available time. All surveys were conducted by two graduate students in Dr. Aronson's lab, Lauren Toth and Jennifer Hobbs, and a volunteer undergraduate assistant.

Researchers worked and lived on the research vessel *Magic*, owned and operated by Dave Ward, for the duration of the trip. Aluminum Nitrox double tanks were obtained on loan from the National Undersea Research Center (NURC) in Key Largo. Air tanks were rented from Dive Key West and Ocean Divers.

The video transects were analyzed by Lauren Toth and an undergraduate research assistant. Percent cover data were collected from random point counts on still images obtained from the video using the program CPCe (Kohler and Gill 2006). Hard corals and macroalgae were identified to the lowest possible taxonomic level. Sponges, gorgonians, zoanthids, and CTB (an aggregate category including crustose coralline algae, fine turf algae and bare substrate) were identified categorically. Percent cover was calculated for each group in each transect, and site averages were then calculated.

Data analysis is ongoing, but some preliminary conclusions can be made. Coral cover has declined significantly since the initiation of the project in 1998 (Fig. 1), primarily due to high mortality in the *Montastraea annularis* species complex. Macroalgal cover is highly variable through time and varies reciprocally with CTB cover. Despite the marked changes in macroalgal cover, algal dynamics do not appear to be related to the decline in coral cover in the FKNMS. The decline in coral cover also appears to be unrelated to protective status. Significant declines in coral cover occur more frequently in the no-take sites, Eastern and Western Sambo, South Carysfort, and Pickles reefs, compared to the unprotected sites (Fig. 2). This trend is likely the result of the higher initial cover at no-take sites relative to reference sites, rather than negative impacts of the no-take reserve on the reef. Data analysis is ongoing and we anticipate submitting a manuscript to *Coral Reefs* later this year based on our findings.

Literature Cited

Kohler, K. E. and S. M. Gill. 2006. Coral Point Count with Excel extensions (CPCe): A Visual Basic program for the determination of coral and substrate coverage using random point count methodology. *Computers and Geosciences* **32**:1259-1269.

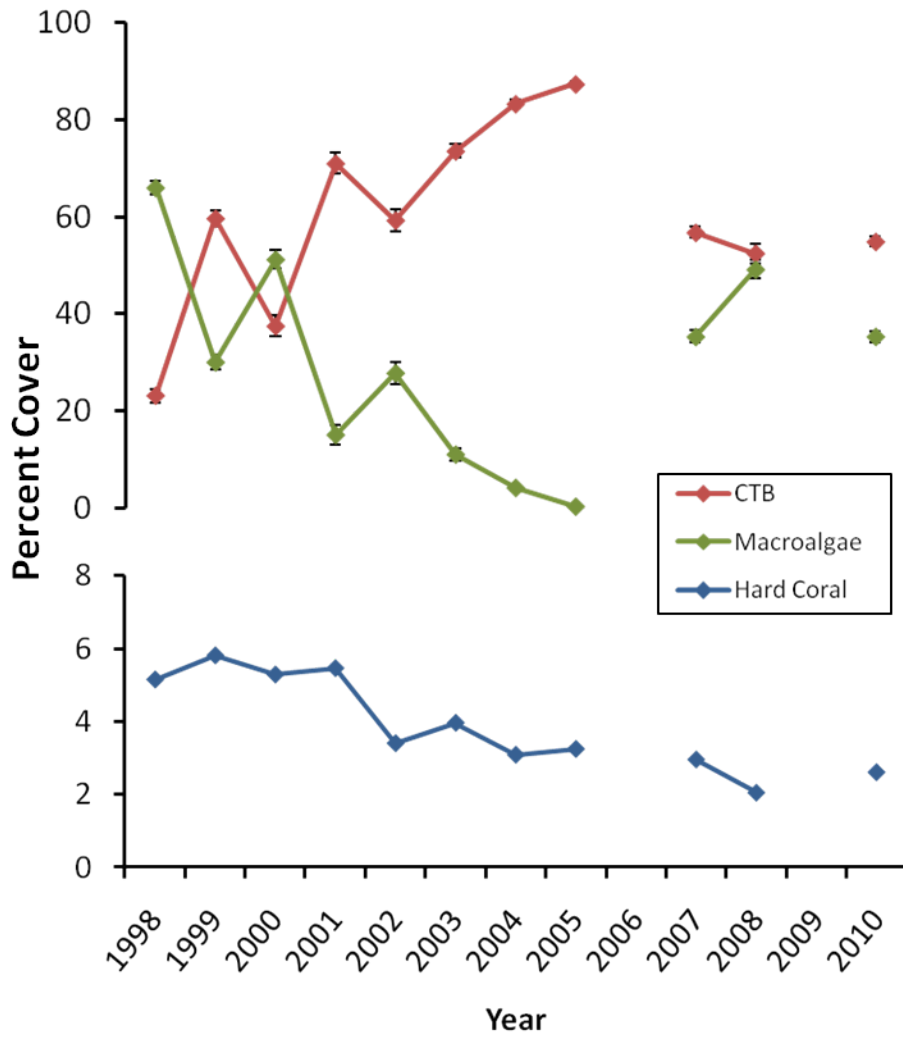


Figure 1. Percent cover of CTB (red), macroalgae (green), and hard coral (blue) over time.

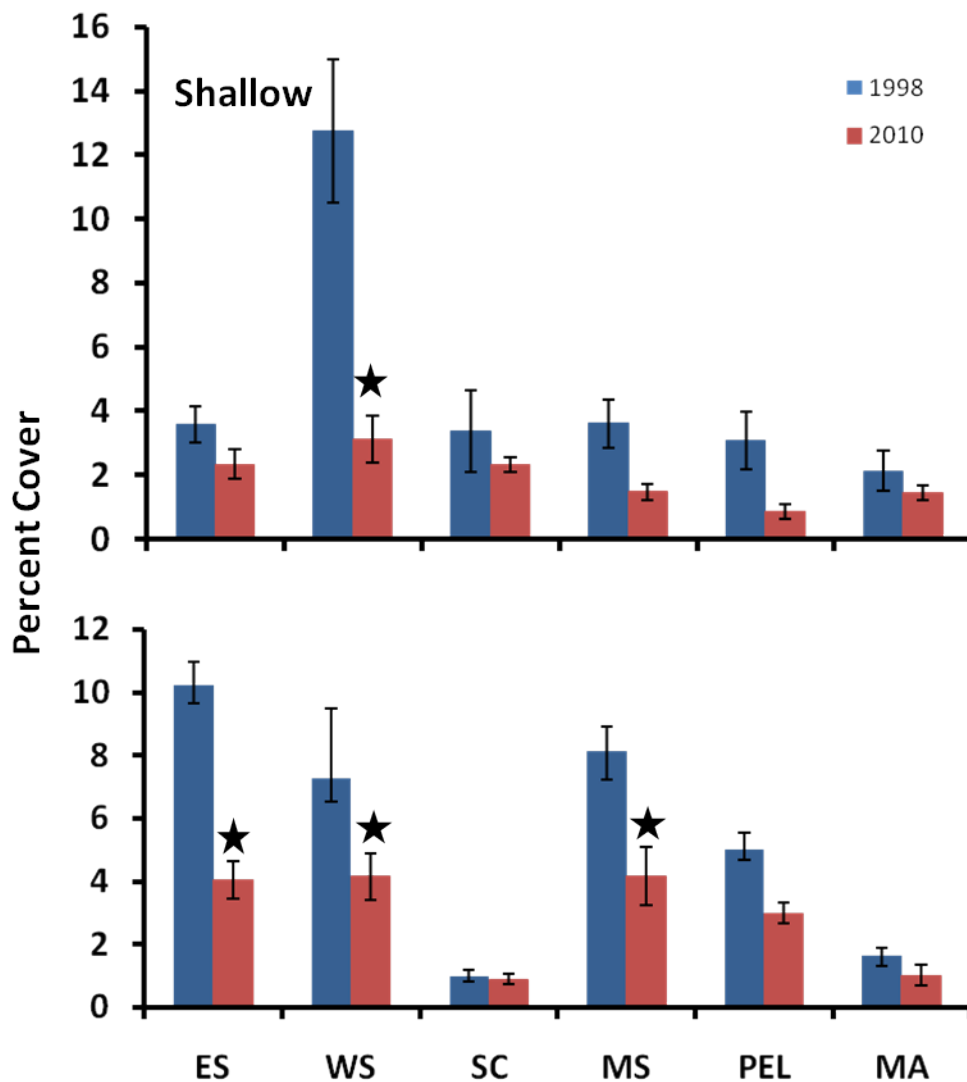


Figure 2. Percent cover of hard corals in 1998 (blue) and 2010 (red). Sites are abbreviated as: ES=Eastern Sambo, WS=Western Sambo, SC=South Carysfort, MS=Middle Sambo, PEL=Pelican Shoal, and MA=Maitland. The first three sites are no-take areas. Stars indicate significant declines between years.