



## Coral Reef Evaluation & Monitoring Project

### EPA Steering Committee Meeting Presentation Summary July 24<sup>th</sup> 2008

#### Introduction

In 1994, the Florida Keys Coral Reef Evaluation and Monitoring Project (CREMP) was initiated to provide data on status and trends of coral habitat in the Florida Keys. The program is a cooperative effort between the National Oceanic and Atmospheric Administration (NOAA), the U.S. Environmental Protection Agency (USEPA), and the Florida Fish and Wildlife Conservation Commission (FWC). The CREMP was designed to be part of a Water Quality Protection Program (WQPP), which has the goal of monitoring sea grass habitats, coral reefs, hardbottom communities, and water quality in the Florida Keys. The major criteria for monitoring the coral reefs included determining the Sanctuary-wide spatial coverage of the coral communities, repeatedly surveying them, and statistically documenting the status and trends of the coral communities. Spatial stratification includes four habitat types; nearshore hardbottom, offshore shallow and offshore deep, and patch reefs in three regions; Upper, Middle, and Lower Keys. Permanent station markers were installed at forty sites in 1995. Annual sampling began in 1996, and has continued through 2008. Three sites were installed in the Dry Tortugas and sampling began in 1999.

Each site consists of two to four monitoring stations delineated by permanent markers. Stations are approximately 2 x 22 meters and are generally perpendicular to the reef crest. Within each station, field sampling consists of a station species inventory (SSI), video transects (three transects per station) and a clionid sponge survey (Figure 1).

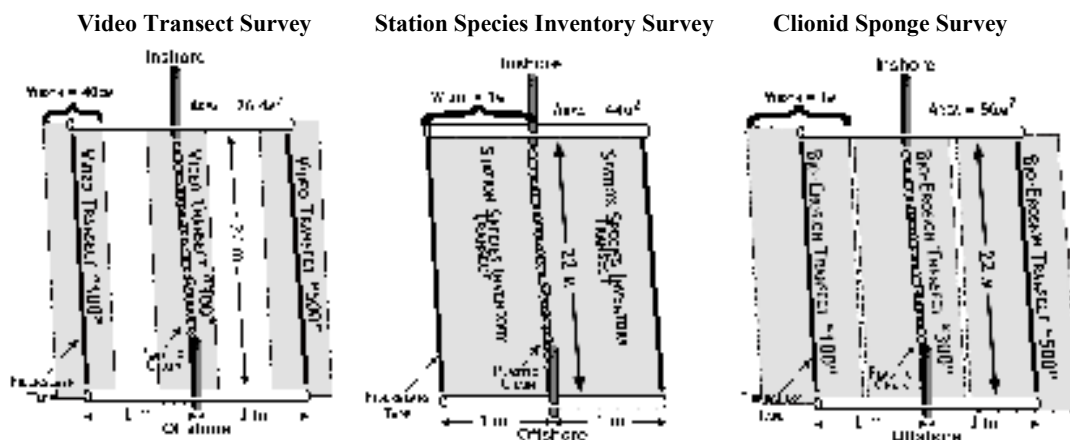
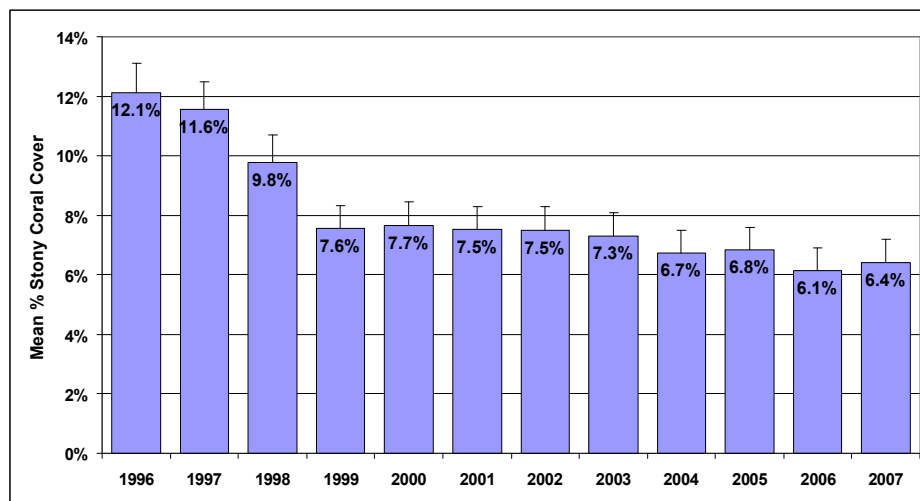


Figure 1: CREMP video transects, station species inventory, and clionid sponge survey station layout.

Results presented in this summary are reported Sanctuary-wide for the regions defined as Upper Keys (north Key Largo to Conch Reef), Middle Keys (Alligator Reef to Moser Channel), Lower Keys (Looe Key to Smith Shoal), and the Tortugas (Dry Tortugas to Tortugas Banks). Prior to sampling in 2001 statistical analysis of CREMP data indicated that sampling effort could be reduced without affecting statistical analyses. The results presented here include data from 103 stations at 36 sites sampled from 1996 to 2007. A complete statistical appraisal has been completed on the data through 2006.

### **Results Summary**

Between 1996 and 2007, stony coral cover declined from 12.1% to 6.4% Sanctuary-wide (Figure 2). During this period stony coral cover reached its lowest level in 2006 (6.1%) and slightly increased in 2007 to 6.4%. Several time periods account for the largest declines in coral cover. The greatest decline occurred between 1996 and 1999 and resulted in a 4.5% reduction in stony coral cover. Between 1999 and 2003 stony coral cover remained relatively stable at 7.5%, however significant declines were observed between 2003 and 2004 and again between 2005 and 2006. These successive losses in stony coral cover resulted in an overall decline from 1999 to 2006.



**Figure 2: Mean percent stony coral cover Sanctuary-wide at CREMP sites.**

Across all habitat types, a significant decline in coral cover occurred between 1996 and 2006 (Figure 3). Removing the effect of the decline in stony coral cover between 1996 and 1999, the loss of stony coral cover at the offshore shallow, offshore deep and hardbottom sites is still significant between 1999 and 2006 ( $p < 0.01$ ). However, the decline of stony coral cover at patch reefs during the same period was not as significant ( $p = 0.06$ ). During this time, 59% of patch reefs stations have demonstrated no change or a gain in coral cover.

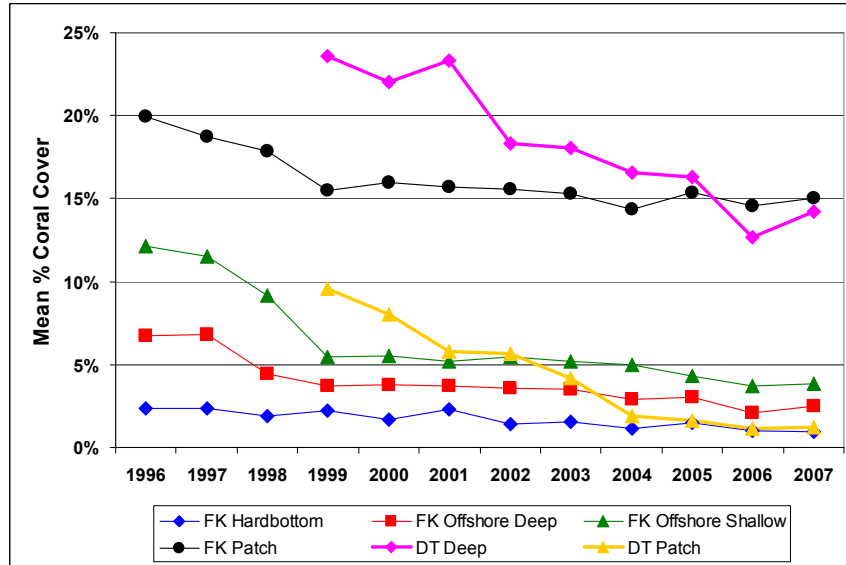


Figure 3: Mean percent stony coral cover by habitat type at CREMP sites.

The five coral species with the greatest mean percent cover Sanctuary-wide since 1996 are *Montastrea annularis*, *Montastrea cavernosa*, *Siderastrea siderea*, *Porites astreoides* and *Colpophyllia natans* (Figure 4). Each of these species provide >0.5% stony coral cover Sanctuary-wide. In many cases, the overall decline of stony coral cover throughout the Sanctuary is largely due to the decreased cover of *M. annularis*. Coral cover for the other 4 species has remained consistent since 1996 (Figure 4). Since 1999, the greatest decline of *M. annularis* cover within the Sanctuary has occurred in the Lower Keys region (Figure 5). The decline in this region has resulted in a ~40% loss of *M. annularis* cover. In contrast, no significant change in cover of *M. annularis* has been documented for the Upper Keys region between 1999 and 2007. *Montastrea annularis* cover in this region was 4.6% in 1999 and 4.4% in 2007.

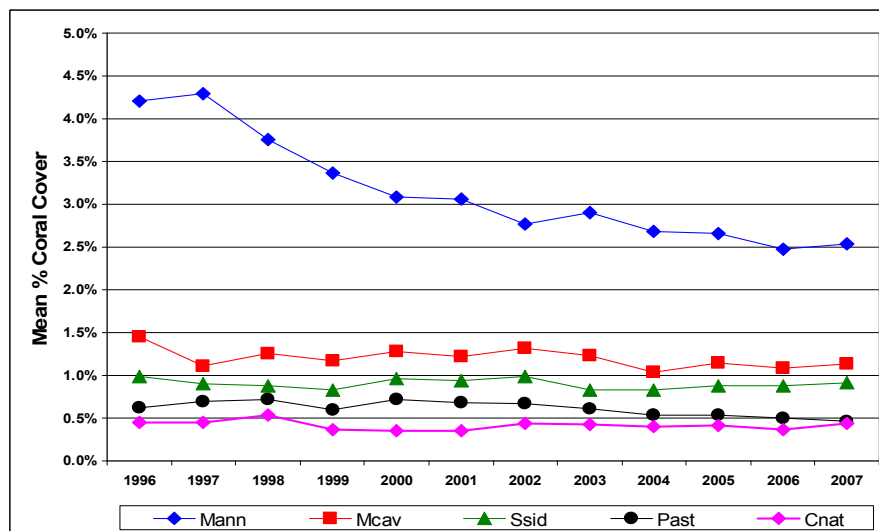


Figure 4: Mean percent stony coral cover Sanctuary-wide of the 5 most common species.

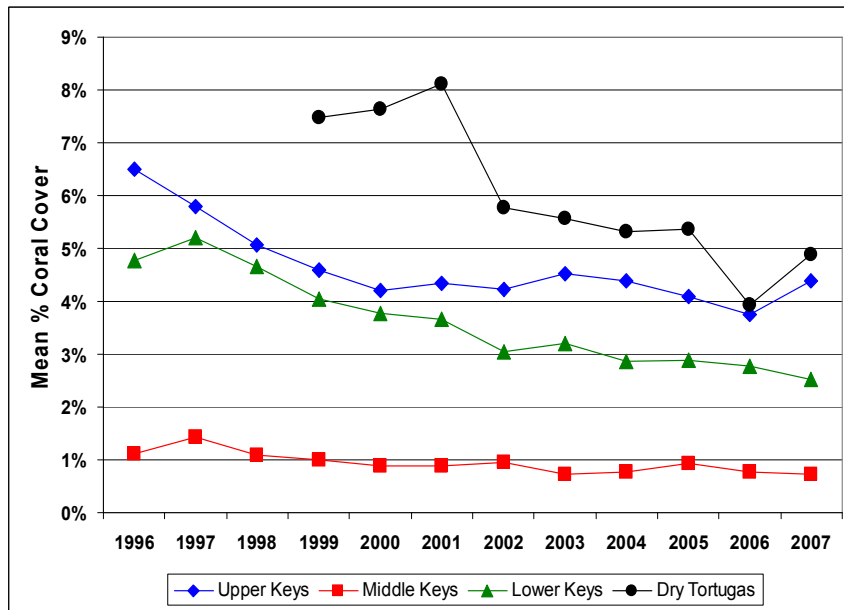


Figure 5: Mean percent stony coral cover for *M. annularis* Sanctuary-wide at CREMP sites.

Species richness has continued to decline Sanctuary-wide (Figure 6). Between 1996 and 2001 the mean number of species lost at each station averaged 1.6 species. When reevaluated for the period of 1996 through 2007, the mean number of species lost rose to 3.0 species per station. Of the 103 stations inventoried, 76% have had a decrease in species richness. This is due to a significant decline in the presence of 13 of the 46 species reported for the Sanctuary from 1996 to 2007.

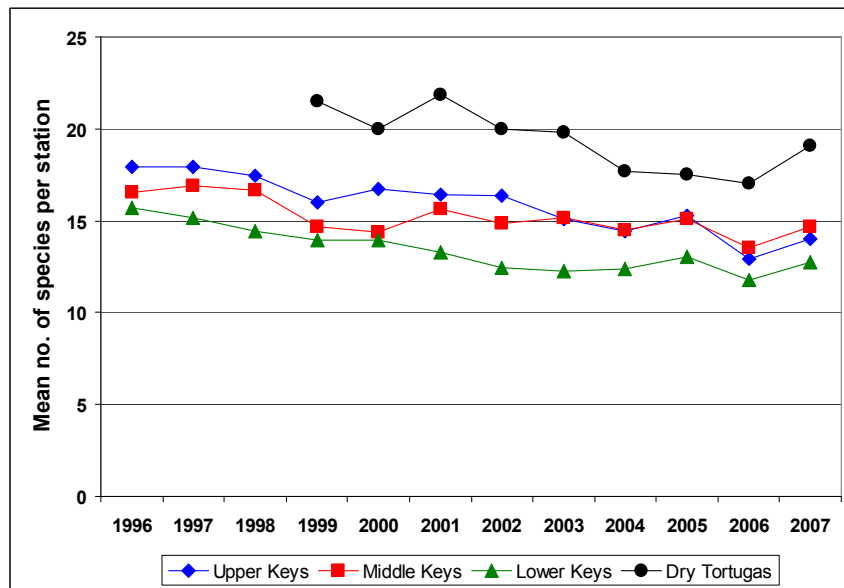


Figure 6: Mean species richness per station Sanctuary-wide and for the Dry Tortugas