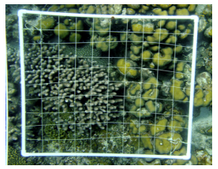
Coral Monitoring Captures 2005 U.S. Virgin Islands Bleaching and Disease Mortality Event

South Florida/ Caribbean Network Inventory & Monitoring Program

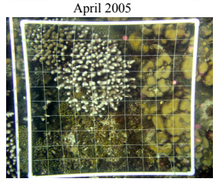
Summary

In 2005, the National Park Service South Florida/ Caribbean Network (SFCN) of the Inventory and Monitoring (I&M) Program responded to one of the most devastating coral bleaching events on record in the Caribbean. SFCN scientists working in the US Virgin Islands noticed record-breaking water temperatures at reef depth in April 2005 and began observing some early coral species bleaching in July 2005. As a consequence, SFCN scientists increased their coral monitoring frequency during and after the bleaching event to capture the impacts on coral cover and disease. Diseased coral mortality combined with the bleaching of 75-90% of live coral resulted in a dramatic loss of live coral cover (23-48% of pre-bleaching levels).

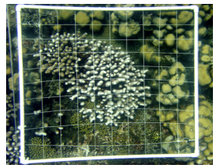
Figure 1. *Porites porites* cluster at Tektite Reef, showing differential bleaching



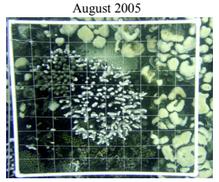
April 2005



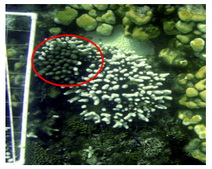
July 2005- Bleaching Begins



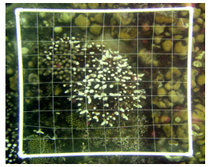
August 2005



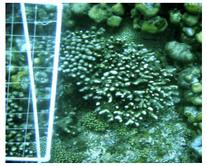
September 2005- Max Bleaching Evident



October 2005- Differential Bleaching



November 2005



December 2005- Recovery from Bleaching

Buck Island Reef National Monument

Warm water temperatures and bleaching

- **SFCN scientists working in the US Virgin Islands noticed record-breaking water temperatures at reef depth in April through September 2005 when compared with mean monthly temperatures from 1990-2004. Signs of some early coral species bleaching were observed in July 2005 (Figures 1 & 2).**
- **Peak water temperature at reef depth occurred in September 2005 and was 1.3°C above 14 year average (Figure 3). High water temperatures began dropping in October but remained higher than normal until mid-November.**
- **Between 75-90% of live corals bleached (Figures 3-6).**
- **Signs of recovery began occurring in November 2005 (Figures 1 & 2).**

Disease outbreaks after bleaching

- **A sharp outbreak in amounts of coral disease occurred *after* the corals had begun to recover from the bleaching event (Figures 2-6).**
- **For 26 giant brain coral colonies (*Colpophyllia natans*) monitored from April 2005 to January 2006, 82% of all mortality was attributed to White Plague disease (Table 1).**
- **Our results suggest that the magnitude and severity of coral bleaching increased vulnerability to coral disease.**

Episodic Monitoring Data

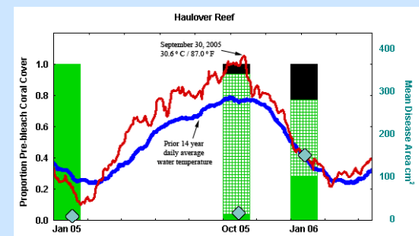


Figure 3. Trends in coral composition at Haulover Reef from January 2005 to January 2006.

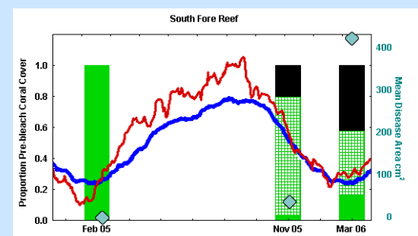


Figure 4. Trends in coral composition at South Fore Reef from February 2005 to March 2006.

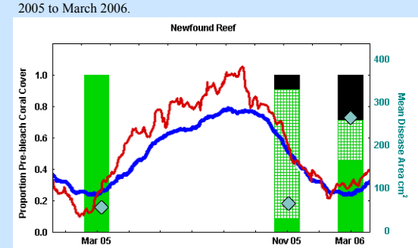


Figure 5. Trends in coral composition at Newfound Reef from March 2005 to March 2006.

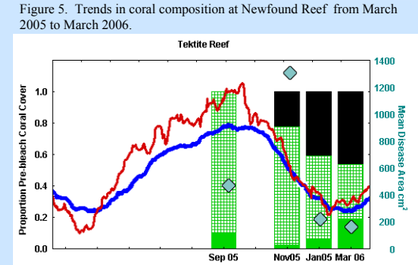
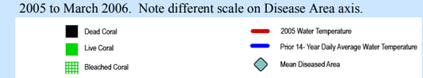


Figure 6. Trends in coral composition at Tektite Reef from September 2005 to March 2006. Note different scale on Disease Area axis.



Virgin Islands National Park

Combined outcome on live coral cover

- **Preliminary results show a dramatic and significant loss of live coral cover (23-48% of pre-bleaching levels) at four study sites.**
- **Only 18% of giant brain coral colony mortality was due to coral bleaching alone with the remaining mortality from disease (Table 1).**
- **It appears that slow-growing, long-lived brain and star corals (*Colpophyllia* and *Montastraea* spp.), which are primary reef-building corals and the dominant species of Virgin Island reefs, were affected most severely by the combination of bleaching and disease.**

Bleaching, Disease, and Mortality at Tektite Reef, St. John

Giant Brain Coral Colony

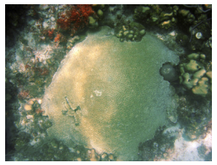
Bleached Status	# Colonies	Bleach Mortality	Disease Mortality	Combined Mortality
None	0	0	0	0
Minor (< 30 %)	1	0	0	0
Majority (> 30 < 90 %)	8	0	3	3
Complete (100 %)	17	2	6	8
Total	26	2	9	11

Table 1. *Colpophyllia natans* cover at Tektite Reef. Status determined and followed using photographic time series of colonies from April 2005 to January 2006. The majority of the colonies (92 %) were small (< 1500 cm²). Mortality at this site was 42% and 82% of overall mortality could be attributed to White Plague disease.

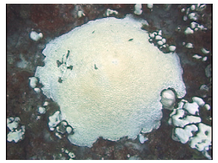
Program Overview

SFCN scientists of the I&M Program have been monitoring coral reefs in the U.S. Virgin Islands National Parks since 1999. Video coral reef monitoring, in conjunction with U.S. Geological Survey (USGS) coral disease monitoring, has allowed the quantification of coral bleaching and mortality caused by coral disease. For information please contact our South Florida office at 305-252-0347, our Caribbean office at 340-693-895 x227, or visit us at:http://www1.nature.nps.gov/im/units/sfcn/index.htm

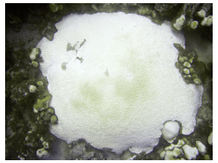
Figure 2. *Colpophyllia natans* colony at Tektite Reef showing bleaching followed by Coral disease outbreak



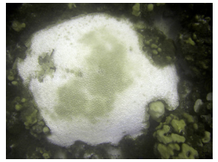
August 2005



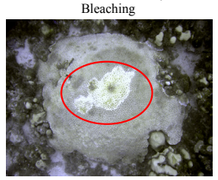
September 2005- Max Bleaching



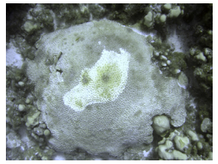
October 2005



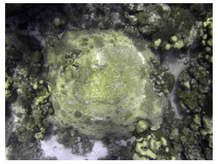
November 2005- Recovery from Bleaching



December 2005- Disease Event Circled



January 2006



February 2006- Dead from White Plague Disease