

REEF ASSESSMENT OF NAVASSA ISLAND (Miller et al.)



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Navassa is a small uninhabited island ~40 miles west of Haiti under jurisdiction of the US Fish and Wildlife Refuge system. Though uninhabited, transient fishers from Haiti are active at Navassa, and overfishing is the primary threat to reef condition. This project has undertaken biennial assessment cruises (2002, 2004, 2006) to document reef status, habitat characterization and mapping, and a description of the Haitian fishery. Given the small area of reef habitat at Navassa, and its isolation from other potential sources of recruitment for reef fauna, rapid decline and questionable resilience are real concerns for the status of Navassa reefs. This project has now provided an adequate baseline to demonstrate the potentially rapid dynamics of reef decline at Navassa (e.g. fishing impacts on reef fish assemblage, coral disease outbreaks and coral bleaching events).

SEFSC has undertaken three reef assessment cruises to Navassa aboard R/V Coral Reef II (Shedd Aquarium). The latest expedition departed Miami on 1 Nov and returned on 20 Nov 2006 with eleven days working on site at Navassa. Primary objectives included reef fish assessment, continued single beam acoustic habitat mapping, benthic community characterization, documentation of coral colony condition, mapping current extent of threatened coral species *Acropora palmata* and tagging individual colonies for future demographic monitoring, and observations on fishing activity and interviews of Haitian fishers.

Notable Accomplishments from the 2006 cruise:

- Reef fish Visual Census (RVC): A total of 150 RVC sample counts was conducted. Full analysis of RVC data is underway and will be reported in an upcoming manuscript.
- A severe disease outbreak was observed during the 2004 Navassa expedition and we were particularly interested in characterizing possible impacts from this event. Instead, we were confronted with a major coral bleaching event and employed rapid colony condition assessments to quantify bleaching extent as well as possible impacts from recent mortality events.
- Observation and documentation of a severe coral bleaching event. Prevalence of bleaching ranged from around 20% (shallower sites) to ~80% of all coral colonies at some deeper sites.
- Temperature records from Apr-Nov 2006 were retrieved from loggers left by Apr 2006 Foster cruise (NCCOS Beaufort) and will be used to interpret the bleaching data.
- Relatively little coral disease was observed (compared to previous observations in 2004), although some white plague - type syndrome was observed, mostly on bleached colonies. Very

few lesions were observed on *Acropora palmata* colonies (see below). Although *A. cervicornis* was extremely rare (a total of 5 small colonies observed in over 250 person dives), one of these clearly displayed tissue sloughing. This colony was sampled for microbial comparison to other *A. cervicornis* disease samples from the Florida Keys 2003 event and screening for known pathogens.

- o Benthic community characterization: Macroalgae, particularly *Lobophora variegata*, is the dominant benthic cover type at most sites. Many of the deep patch reefs along the southwest shelf which previously displayed high live coral cover (20-50% cover in 2004) have suffered substantial coral mortality.
- o 45 rapid assessment dives were accomplished to ground truth a habitat map made from single beam acoustic data acquired in 2004. Additional acoustic transects were acquired with a new (lower) frequency sounder for comparison with the 2004 data.
- o Ten total Haitian fishing vessels were observed and interviewed; average 16 fishers/day present at Navassa during the observed period. None were using nets as had been previously observed (in 2004) and hence, no harvest of turtles or conch was observed. Self-regulation amongst the Haitian fishers is one possible explanation for the apparent reduction in this destructive fishing practice.
- o Tagging of *Acropora palmata* colonies for long-term demographic monitoring was undertaken at 2 sites. The *A. palmata* population continues to be robust and colony condition was excellent with no bleaching and few disease conditions observed. *A. cervicornis* however, remains extremely rare. A total of 5 colonies were observed over hundreds of person-dives, one of which was affected by disease and one by damselfish colonization.
- o Single-beam Acoustic Mapping: In 2004, a single-beam acoustic system was used to map the benthic habitats of the Navassa shelf. This inexpensive method yielded useful results for habitat characterization but specific objectives remained. The acoustic mapping component of the Navassa 2006 expedition had two goals: A) Investigate the potential of using a second frequency (24 kHz) to improve the discrimination of gravel beds and sand veneers, which are not obviously different than sand using only 50 kHz data. B) Acquire additional ground truth in order to quantitatively evaluate the habitat map made with data from the 2004 expedition.
- o Document Fishing Activity: In partnership with FoProBIM, a total of 10 Haitian fishing vessels were documented (including interviews) operating in Navassa waters during the observation period (5-15 Nov), at an average of 4 boats and 16 fishers per day.
- o Turtles: Although there were no hands-on encounters due to the lack of net fishing by Haitians on site during the trip, sea turtles were observed. All turtles observed were the hawksbill turtle, *Eretmochelys imbricata*.

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Products:

- Miller MW, Schwagerl J, McClellan D, Vermeij M, Williams D. 2005. The state of coral reef ecosystems of Navassa Island. Pp-135-149. In J. Waddell (ed.) The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2005. NOAA Technical Memorandum NOS NCCOS 11. NOAA/NCCOS Center for Coastal Monitoring and Assessment's Biogeography Team, Silver Spring, MD. 522 pp.
- McClellan, D.B. and M.W. Miller. 2005. Reef Status and Fisheries of Navassa Island. Proc 56th GCFI:507-510.
- Miller MW et al. (2003) Status of reef resources of Navassa Island: Nov 2002. NOAA Technical Memorandum NMFS-SEFSC-501
- Miller MW, Williams DE. (2006) Coral disease outbreak at Navassa, a remote Caribbean Island. Coral Reefs DOI 10.1007/s00338-006-0165-y.
- Miller MW, Gerstner C. (2002) Coral reefs of an uninhabited Caribbean island: fishes, benthic habitat, and opportunities to discern fishing impact. Biological Conservation 106:37-44.
- Wiener JW. 2005 Oral history and contemporary assessment of Navassa Island fishermen. Report for the US Dept of Commerce, NOAA, National Marine Fisheries Service

RELEVANT LINKS

NOAA Coral Reef Conservation Program

<http://www.coralreef.noaa.gov>

USFWS – Carribbean Islands National Wildlife Refuge

http://library.fws.gov/Refuges/navassa_facts01.pdf

FoProBIM

<http://www.foprovim.org>

Shedd Aquarium

<http://www.sheddaquarium.org/aboutshedd.html>