Mission Report

NOAA/NOS/NCCOS/CCMA/Biogeography Team

September 13 – October 1, 2006

Biogeographic characterization of fish communities within the Flower Garden Banks National Marine Sanctuary:
A collaboration between the Center for Coastal Monitoring and Assessment's Biogeography Team and the National Marine Sanctuary Program's Flower Garden Banks National Marine Sanctuary

NOAA
National Ocean Service
National Centers for Coastal Ocean Science
Center for Coastal Monitoring and Assessment
Biogeography Team
Silver Spring, MD 20910

October 2006

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Mission Purpose:

The intent of this field mission was to initiate efforts: (1) to spatially and quantitatively characterize the benthic fish communities at depths less than 110 feet throughout the Sanctuary, (2) to correlate this information to *in-situ* data collected on associated habitat parameters, (3) to use this information to provide the Flower Garden Banks National Marine Sanctuary (FGBNMS) staff with information on the biogeographic patterns within the Sanctuary critical to decision making.

Monitoring of the biological communities has taken place at FGBNMS since the 1970s. This work has focused primarily on monitoring the benthos with video transects and photostations documenting transitions between coral, algae and sponge communities over time. Until relatively recently, little has been done to monitor or characterize the reef fish community. These data provide an important starting point for characterizing the fish community; however, they are limited in scope of inference to small portions of the Sanctuary coral cap environment and are therefore difficult to utilize in developing population estimates at the scale of the Sanctuary

Operational Accomplishments:

- A total of 73 sites were surveyed within the study area of Flower Garden Banks in the Gulf of Mexico (Figure 1), and information on fish distribution, abundance and size (Table 2), benthic habitat composition (Table 1), coral bleaching, and marine debris was collected. The project team consisted of 10 NOAA Scientific Divers: five divers from CCMA Biogeography Team (BT), three from FGBNMS, one from National Marine Sanctuaries Headquarters, and one from the Florida Keys National Marine Sanctuary (Appendix A).

- Two to three small boats were deployed from the R/V Nancy Foster each day and returned upon completion of dives. One to two teams were assigned to each boat, with two to three divers per team.

- Nitrox (32 %) tanks were used for all dives.

- The maximum depth reached by divers conducting surveys was 110 feet.





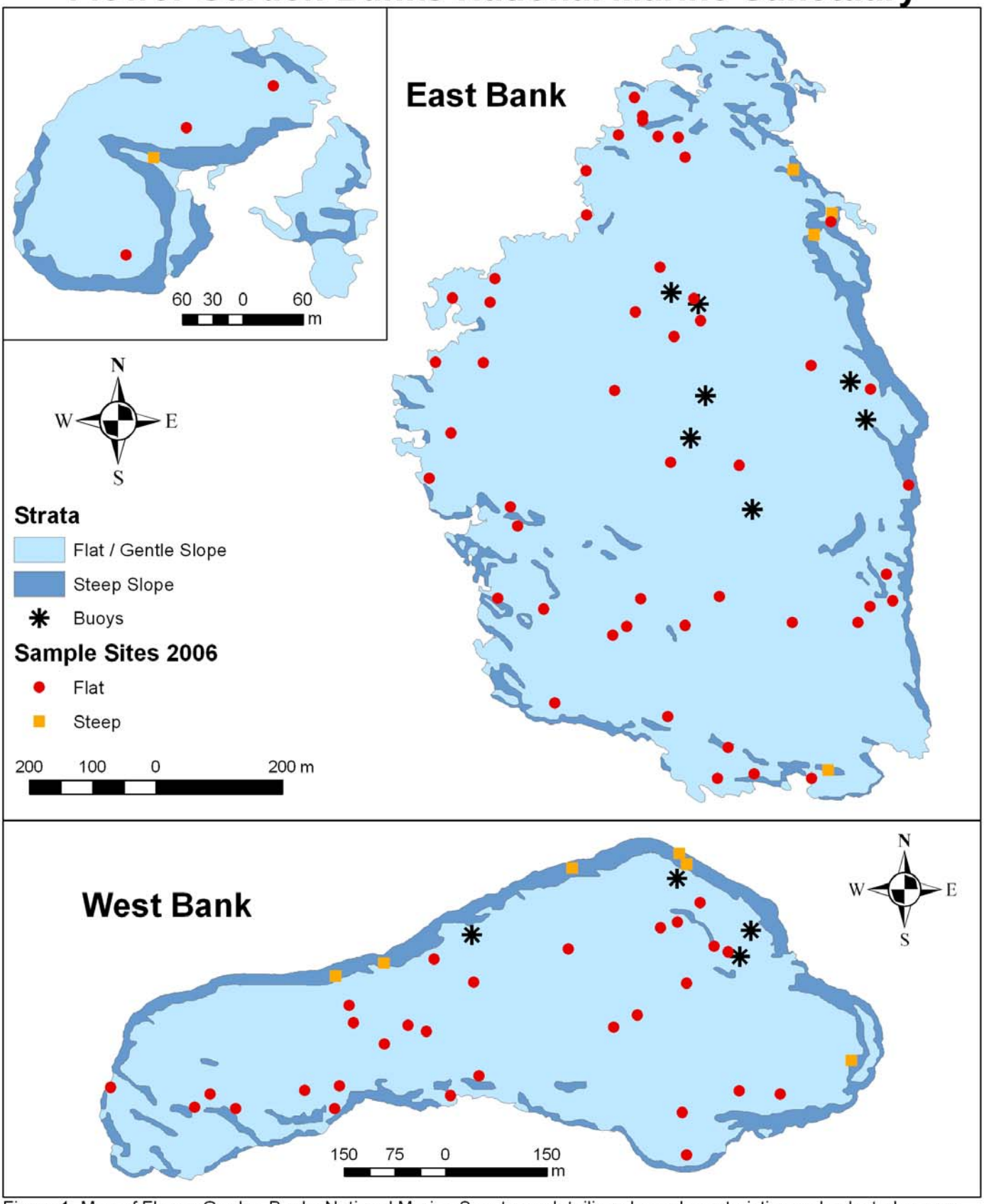
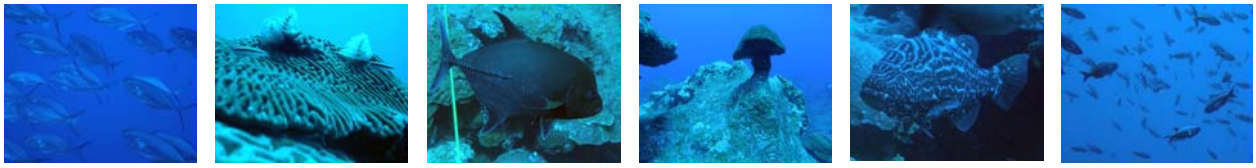



Figure 1. Map of Flower Garden Banks National Marine Sanctuary detailing slope characteristics and selected survey points sampled for the September - October 2006 mission.



Summary of Surveys:

Fish

- Fish species abundance, size and distribution were characterized using the belt transect survey method (http://biogeo.nos.noaa.gov/projects/reef_fish/protocols.shtml) at 73 sites. The data are summarized in table 1.

Table 1. Fish abundance, biomass, richness and diversity (all per 100m^2). Data are from the Sept-Oct 2006 mission.

Location	Slope	Number of Surveys	# indiv / 100m^2		Biomass (g) / 100m^2		# species /100m^2		Mean Diversity**	
			Mean	(± SE)	Mean	(± SE)	Mean	(± SE)	Mean	(± SE)
East Bank	Flat	44	323.2	26.48	8269.9	1251.7	25.3	0.52	2.11	0.05
	Steep	5	223.2	36.88	7657.1	2587.8	23.4	2.25	2.32	0.04
	Overall	**49**	**314.7**	**27.36**	**8218.0**	**1364.9**	**25.1**	**0.67**	**2.13**	**0.05**
West Bank	Flat	19	259.2	28.69	18361.4*	4819.9*	26.7	0.99	2.25	0.07
	Steep	5	496.6	184.2	19583.7	14515.1	27.2	2.11	2.08	0.19
	Overall	**24**	**294.0**	**51.48**	**18540.5**	**6240.8**	**26.8**	**1.16**	**2.22**	**0.08**
All FGBNMS	Flat	63	303.9	27.15	11309.4	2326.4	25.7	0.66	2.15	0.06
	Steep	10	344.7	102.3	12957.6	7888.6	25.1	2.19	2.21	0.11
	Overall	**73**	**308.2**	**34.99**	**11481.2**	**2906.2**	**25.7**	**0.82**	**2.16**	**0.06**

*The only recorded manta ray (*Manta birostris*) was removed from the biomass calculations, but included in all other summaries

**Shannon Diversity Index

Habitat

- Benthic composition data were collected at 73 hard bottom sites and summarized in table 2. Detailed methodology can be found at http://biogeo.nos.noaa.gov/projects/reef_fish/protocols.shtml.

Table 2. Average percent cover of habitat locations for 73 hard bottom sites for the September 2006 mission.

Location	Slope	Number of Surveys	% Corals / 100m^2		% Macroalgae / 100m^2		%Sponges /100m^2	
			Mean	(± SE)	Mean	(± SE)	Mean	(± SE)
East Bank	Flat	44	55.21	3.38	25.88	2.85	0.69	0.20
	Steep	5	34.27	9.43	40.51	11.08	0.57	0.42
	Overall	**49**	**53.44**	**3.89**	**27.12**	**3.55**	**0.68**	**0.22**
West Bank	Flat	19	61.30	4.33	24.92	3.65	0.44	0.14
	Steep	5	51.07	12.57	38.98	14.96	1.55	0.90
	Overall	**24**	**59.80**	**5.54**	**26.98**	**5.31**	**0.60**	**0.25**
All FGBNMS	Flat	63	57.04	3.67	25.59	3.09	0.61	0.18
	Steep	10	41.74	10.82	39.83	12.80	1.00	0.64
	Overall	**73**	**55.45**	**4.41**	**27.08**	**4.10**	**0.65**	**0.23**

Marine Debris

- The marine debris observed within transects are summarized in table 3.

Table 3. The type and area of debris, area affected by the debris, and what the debris was colonized by during the September-October 20006 mission.

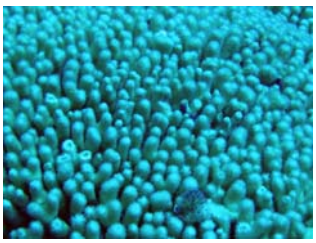
Debris Type	Debris Area (cm^2)	Colonized By	Area Affected (cm^2)
Anchor	75	Macroalgae	75
Anchor (old)	180	Coral encrusted	180
Anchor (old)	700	*Millepora alcicornis*	700
Anchor line	50	Algae and corals	50
Anchor rope	1000	Large reef and Macroalgae	1000
1" Fishing line	366	Hard corals, calc. algae and macroalgae	366
Fishing line	10	*Millepora* spp.	10
Fishing line	150	Crustose coralline algae	150
Fishing lure w/ monofilament	40	---	40
Plastic coated cable	50	Turf algae	40
Rope	400	Turf algae	1000

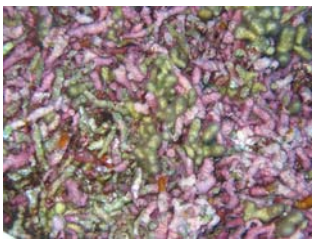
Events of Note:

- Two federally listed species were recorded. The first ever sighting at FGBNMS of a Nassau grouper (*Epinephelus striatus*) was seen for the first time at FGBNMS during one of the dives, and second of a goliath grouper (*Epinephelus itajara*) occurred during this mission.

- 232 grouper individuals (*Epinephelus* spp., *Cephalopholis* spp. and *Mycteroperca* spp.) were recorded at 66 of the 73 sites surveyed. Furthermore, snapper (*Lutjanus* sp.) were recorded at 28 sites with a total of 91 individuals recorded, including large aggregations of dog snapper (*Lutjanus jocu*).

- A large number of juvenile fish were observed among the fields of *Madracis* coral. It is possible that the structure of the *Madracis* coral is being utilized the same way juvenile fish use seagrass and mangroves for shelter and protection in shallow water coral reef ecosystems.





- Moderate bleaching was occurring throughout the Sanctuary. Corals were not totally bleached but exhibited pale or mottled discolorations.

Logistics of Note:

- Six days of diving were planned, however, only four days were spent diving due to inclement weather. Nevertheless, those four days had great diving conditions

- Due to depth and time constraints and different geographical location, some data collection modifications from the Caribbean benthic composition field methodology (http://ccma.nos.noaa.gov/ecosystems/coralreef/reef_fish/protocols.html) were made:

    - o Benthic composition structure identification consisted of four structures: head corals, plate corals, *Madracis*-dominated, and sand. These structures were selected by the FGBNMS staff based on benthic habitat map criteria.
    - o Bleached coral data – If any bleaching occurred on a coral, the whole colony was recorded as bleached.
    - o Data were collected from four quadrats.
    - o Algae were divided into three categories: macro algae, turf algae, and crustose coralline algae
    - o Sea fans, plumes, rods, whips and encrusting gorgonians were grouped and collected as one value.
    - o Marine debris information was collected within the transects. The type of data collected included type and area of debris, area affected by debris and what the debris was colonized by.

Appendix A

Project diving team:

Chris Caldow (NCCOS/CCMA BT)
Randy Clark (NCCOS/CCMA BT)
Kim Foley (NCCOS/CCMA BT)
Steve Gittings (NMSP/HQ)
Emma Hickerson (NMSP/FGBNMS)
Lauri MacLaughlin (NMSP/FKNMS)
Charles Menza (NCCOS/CCMA BT)
George Schmal (NMSP/FGBNMS)
Doug Weaver (NMSP/FGBNMS)
Kimberly Woody (NCCOS/CCMA BT)