

Mission Report

NOAA/NOS/NCCOS/CCMA/Biogeography Team

January 31 – February 10, 2006

Characterization and monitoring of reef fish populations off the coast of La Parguera, Puerto Rico:

A cooperative investigation between NOAA and the
University of Puerto Rico

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National Centers for Coastal Ocean Science
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Silver Spring, MD 20910

April 2006



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Mission Purpose:

This field mission was carried out as part of the Caribbean Coral Reef Ecosystem Monitoring Project led by CCMA's Biogeography Team. The goals and objectives of this project are: (1) to spatially characterize and monitor the distribution, abundance, and size of both reef fishes and macro-invertebrates (conch, lobsters, and sea urchins); (2) to relate this information to in-situ data collected on water quality and associated habitat parameters; (3) to use this information to establish the knowledge base necessary for enacting management decisions in a spatial setting; (4) to establish the efficacy of those management decisions; and (5) to work with the National Coral Reef Monitoring Program to develop data collection standards and easily implemented methodologies for transference to other agencies and to work toward standardizing data collection throughout the US and territories.

In addition to serving the goals and objectives above, the data collected thus far have also been utilized by partner agencies for a number of additional projects including stock assessments (U of Miami; NMFS); examination of ornamental fish populations (PRDNR); delineation of Essential Fish Habitat (Caribbean Fishery Management Council); EcoPath modeling (NMFS); and survey design (UPR).

Operational Accomplishments:

- ◆ Ninety sites were surveyed within the study area (Figure 1), and information on fish distribution, abundance and size (Table 1); benthic habitat composition (Table 2); bleaching; and conch abundance and distribution was collected. The project team consisted of three NOAA scientific divers and one UPR diver. NOAA and UPR dive logs were maintained.
- ◆ One boat was used each day of the mission. During each dive one diver collected data on the fish community while a second diver characterized the habitat and invertebrate community. The third diver remained on the surface. Rotations were made each dive such that each diver made two consecutive dives then sat out one dive, allowing ample surface intervals for each diver.
- ◆ Nitrox (36 %) tanks were used at approximately 70 dive sites. Air tanks were used on a few shallow sites, and snorkel was used for the shallow water mangrove sites.



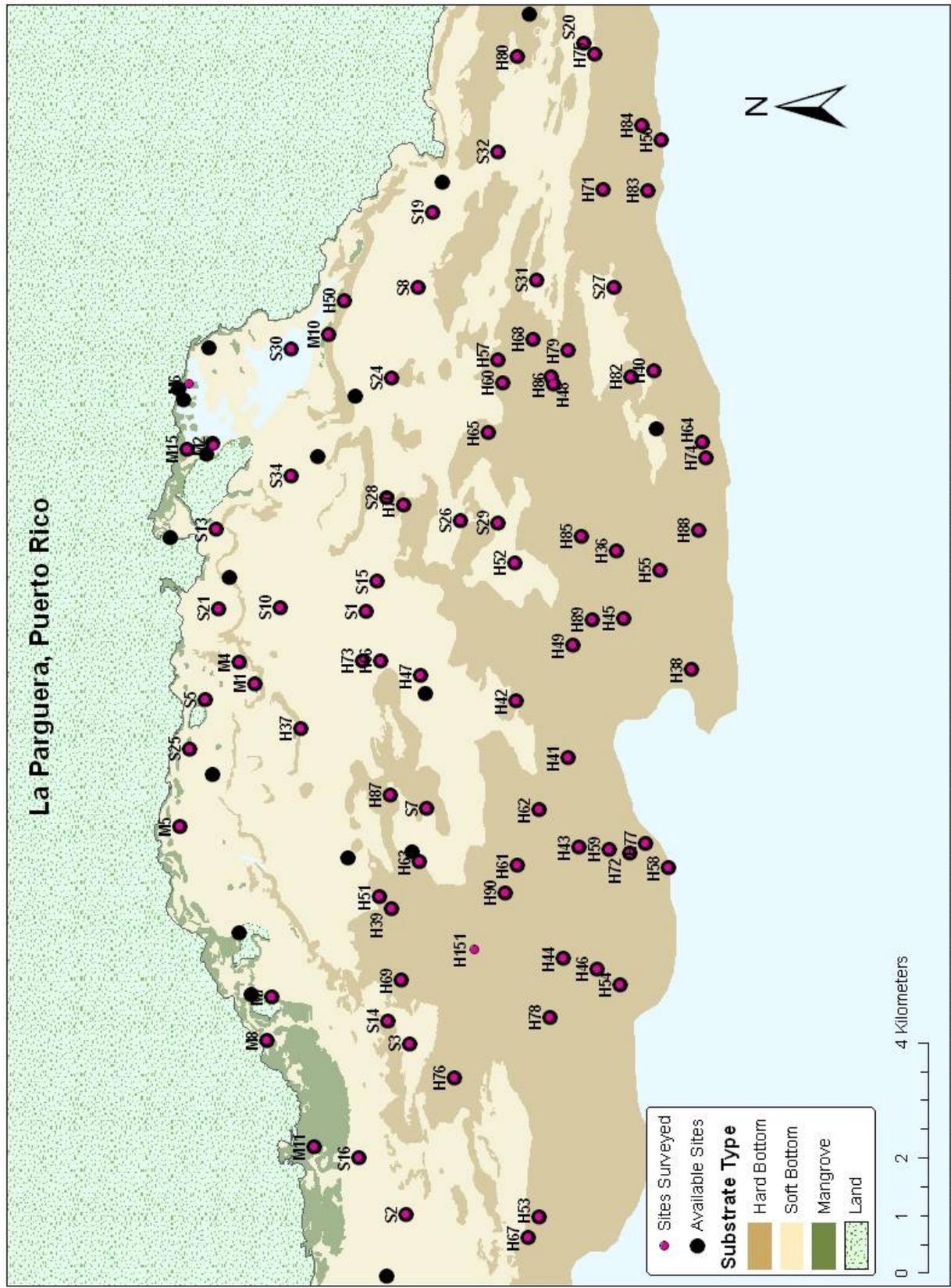


Figure 1. Map of La Parguera, Puerto Rico detailing habitat characteristics and selected survey points for January - February 2006 mission.

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 all sites. The data are summarized in Table 1. **Note:** Data from Clupeidae species (Jenkinsia sp, etc.) were removed from all surveys. The data in Table 1 reflects the absence of those species except the Diversity values.

Table 1. Fish abundance, richness and biomass (all per 100m²). Data are from the January-February 2006 mission.

Habitat Type	# of Surveys	# Indiv / 100m ²		# Species / 100m ²		Biomass* / 100m ²		Mean Diversity**	
		Mean	(± SE)	Mean	(± SE)	Mean	(± SE)	Mean	(± SE)
Hard	46	98.43	9.56	17.93	0.81	3191.3	440.8	2.28	0.05
Soft	33	51.79	28.21	4.03	0.46	874.2	706.2	0.87	0.11
Mangrove	10	76.60	15.93	8.90	1.58	1698.2	603.1	1.05	0.23

*Biomass values were calculated using $W = \sum L^3$; each individual species has an \forall and \exists parameter. \forall and \exists values were obtained by FishBase.

**Shannon Diversity Index



Masked/Glass goby
(*Coryphopterus personatus/hyalinus*)



Tomtate (*Haemulon aurolineatum*)



Longspine Squirrelfish
(*Holocentrus rufus*)

Habitat

- ◆ Habitat characterization data were collected at all sites. Detailed methodology can be found at http://biogeo.nos.noaa.gov/projects/reef_fish/protocols.shtml. Hardbottom habitat data is summarized in Table 2.
- ◆ Thirty-seven of 51 sites (72%) where coral was recorded showed evidence of bleaching.

Table 2. Average percent cover of habitat types for 47 hardbottom sites for January-February 2006 mission.

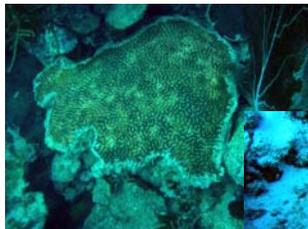
Number of Surveys	%Turf / 100m ²		% Algae / 100m ²		%Coral / 100m ²		% Gorgonians / 100m ²		% Sponges / 100m ²	
	Mean	(± SE)	Mean	(± SE)	Mean	(± SE)	Mean	(± SE)	Mean	(± SE)
46	29.64	3.55	12.14	2.66	2.73	0.52	3.94	0.71	1.82	0.25

Conch

- ◆ A total of eight conch, *Strombus gigas*, were observed during soft-site transects (n= 43) on this mission. Of the eight conch observed, six were recorded as immature and two mature.



Events of Note:



- ◆ During this mission, divers noted some of the impacts from the recent bleaching event that occurred from September – December 2005.

- ◆ As divers were preparing for a dive, a humpback whale was seen from the boat slapping the water with its flipper off in the distance, an action known as “flippering”.

- ◆ A few of the days on the boat during the mission, divers were visited by pods of dolphins.

- ◆ During one of the dives, a nassau grouper (*Epinephelus striatus*) approximately 25-30 cm was recorded along a transect.

- ◆ The flying gurnard (*Dactylopterus volitans*) and the nassau grouper (*E. striatus*), were recorded for the first time in Puerto Rico during this mission.



Flying gurnard (*D. volitans*)



Nassau grouper (*E. striatus*)

Logistics of Note:

- ◆ Ten mangrove sites were added to this mission from the prior sampling period. The purpose of the increase was to collect additional data to describe species habitat utilization patterns.
- ◆ During this mission, NOAA Biogeography Team members discussed the Coral Reef Ecosystem Studies (CRES) project and website/database products with UPR faculty.
- ◆ The Biogeography Team met with Graciela Garcia Moliner of the Caribbean Fishery Management Counsel to update on status of Caribbean mapping and monitoring efforts.
- ◆ One UPR boat was used for half a day to sample shallow water mangrove sites.

