

Final Report

CORAL REEF COMMUNITIES FROM NATURAL RESERVES IN PUERTO RICO :
a quantitative baseline assessment for prospective monitoring programs

Volume 2 : Cabo Rojo, La Parguera, Isla Desecheo, Isla de Mona

by :

Jorge (Reni) García-Sais
Roberto L. Castro
Jorge Sabater Clavell
Milton Carlo

Reef Surveys
P. O. Box 3015, Lajas, P. R. 00667

renigar@caribe.net

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PREFACE

A baseline quantitative assessment of coral reef communities in Natural Reserves is one of the priorities of the U. S. Coral Reef Initiative Program (NOAA) for Puerto Rico. This work is intended to serve as the framework of a prospective research program in which the ecological health of these valuable marine ecosystems can be monitored. An expanded and more specialized research program should progressively construct a far more comprehensive characterization of the reef communities than what this initial work provides. It is intended that the better understanding of reef communities and the available scientific data made available through this research can be applied towards management programs designed at the protection of coral reefs and associated fisheries in Puerto Rico and the Caribbean. More likely, this is not going to happen without a bold public awareness program running parallel to the basic scientific effort. Thus, the content of this document is simplified enough as to allow application into public outreach and education programs. This is the second of three volumes providing quantitative baseline characterizations of coral reefs from Natural Reserves in Puerto Rico.

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INTRODUCTION

Coral reefs are natural resources of fundamental importance in Puerto Rico. Reefs protect the coastline from erosion, contribute to the formation of (coralline) sandy beaches, sustain (local) commercial and recreational fisheries, are the main attraction of a rapidly growing recreational diving business and represent, as in many other Caribbean Islands the key coastal feature that supports tourism. Coral reefs promote development and growth of seagrass beds and fringing mangroves, which function as interdependent systems to produce a highly productive and biodiverse marine ecosystem. In recognition of their value and aiming at their protection, the Department of Natural and Environmental Resources (DNER) of the government of Puerto Rico has designated a series of marine areas with coral reefs and associated communities as Natural Reserves.

In support of Natural Reserve designations, DNER has prepared a series of technical documents that provide detailed qualitative surveys of the flora and fauna, as well as characterizations of the physical setting of reserve sites. The island-wide inventory of puertorrican reefs by Goenaga and Cintrón (1979) has been used as a key reference in designation of natural reserves. Its baseline data, with qualitative descriptions of reef geomorphology and comprehensive taxonomic surveys forms part of DNER technical supplements in most cases. Quantitative information of reef community structure, such as the percent cover of reef biota and/or substrate types, densities of organisms, topographic relief (rugosity), as well as archival photographic documentation of reef communities has been lacking from most natural reserves and elsewhere in Puerto Rico.

Puertorrican coral reefs have been subjected to a wide array of man induced and natural stressors operating on local, regional and global scales. Increments of sedimentation associated with deforestation and dredging, turbidity/eutrophication effects from domestic and industrial loading of sewage and other organic materials, overfishing, regional mass mortalities of sea urchins, coral bleaching effects, and mechanical destruction caused by hurricanes, boat anchors, ship groundings and military bombings, have all been mentioned as causes of reef degradation in Puerto Rico (Garcia et al., in press). The increasing scientific and public awareness of these potential stressors of coral reef health has stimulated initiatives for corrective action and protective strategies by both federal and local governmental agencies during the last decade. Some of these include the recent approval of coral reef protection laws, establishment of marine protected (no-take) zones, seasonal closures of fish and shellfish spawning grounds, enforcement of lobster size limits, stringent compliance regulations for marine sewage outfalls, reforestation programs and request of cease bombing operations on the coral reefs of Isla de Vieques.

Natural Reserves have been proposed as high priority sites where initiatives for coral reef protection, such as the "no-take" Marine Protected Areas (MPA) should be established, along with monitoring programs to evaluate their effectiveness as management strategies. This work forms part of the baseline quantitative characterization of coral reef communities from Natural Reserves in Puerto Rico. The Natural Reserve sites included in this survey are: Isla de Mona, Cabo Rojo, La Parguera and Isla Desecheo. This baseline characterization targets one of the main objectives of the U. S. Coral Reef Initiative Program in Puerto Rico, prepared in consultation with the Department of Natural and Environmental Resources of P. R.

METHODS

Field Procedures

Sessile-Benthic Reef Communities

Initial exploratory scans of the area by echosounding runs and towed divers preceded quantitative survey work at reef habitats. This exercise provided a general perspective of reef morphometry and aided in the selection of reef zones to be surveyed. Reef sections of optimal coral growth were selected. Five replicate transects were permanently established at each reef using steel rods as markers. Specific positioning of transects aimed to follow consistency in depth range and structural formation of the reef. Three separate reefs were surveyed from each site, for a total of fifteen transects surveyed per site. A line with a surface buoy was tied from one end of the second transect as a location marker and the position of the buoy was recorded with a DGPS unit.

Quantitative assessments of sessile-benthic reef communities were obtained using a modification of the Chain Transect Method (Porter, 1972). This is a continuous intercept transect technique that provides information of the percent linear cover by sessile biota and other substrate categories, and also allows construction of community profiles by assignment of metric units to each substrate transition. Marsh et al. (1984) discussed the range of biologically significant parameters that can be extracted from chain transect data on coral reef communities. For a review on reef survey methods see UNESCO, 1978; Bouchon, 1981; Ohlhorst et al. 1988; UNEP 1993). Transects were established over the substrate using a 10 meter long fiberglass tape measure tensioned between two rods. Rods provided permanent markings that allow repeated observations of benthic community structure over time. A short linked chain was loosely draped over the reef and the linear area (number of chain links) of the different substrate types (or biota) occurring beneath the chain recorded. Chain links were 1.42 cm long. Steel nails were hammered into available hard substrate (dead coral sections) approximately 0.5 – 1.0 meter apart to provide fixed reference points along the linear transect.

Individual measurements of substrate categories, as recorded from the number of chain links were sorted, added and divided by the total distance (in chain links) on each transect to calculate cumulative percentages of linear cover by each category. Substrate categories represented by sessile-benthic organisms were recorded as growth forms using abbreviations, or codes (e.g. ENCCOR - encrusting coral), and identified to the lowest possible taxon (e.g. *Diploria strigosa*). This form of data reporting is compatible with CARICOMP (1994) and UNEP (1993) formats. Coral taxonomy followed the most recent revision by Veron (2000). Definitions to the codes used in reporting the different substrate categories are presented as Appendix A. Soft corals, with the exception of encrusting forms (e.g. *Erythropodium caribaeorum*), were counted as number of colonies present whenever any of their branches intersected the transect line. Soft corals have a small basal area relative to their colony size and therefore, are not well represented by their linear cover on the bottom.

The vertical relief of the reef, or rugosity, was calculated by subtracting 10 meters from the total length (links) recorded with the chain at the 10 meter marker of the reference tape. Underwater videos of each transect at each reef site were taken using a SONY TR 700 on HI-8 format and a Amphibico-Buddy System housing. Each video transect was identified by a counter readout on each tape. All original transect data was recorded on plastic paper (polypaper) and kept on file. Records of depth, transect number, date, and station identification appear on all transect data forms.

(B) Motile Megabenthic Invertebrates and Fishes

Motile megabenthic (larger than 1 cm) invertebrates (lobsters, crabs, echinoids, molluscs, etc.) and diurnal, non-cryptic fishes associated with reefs habitats were surveyed using the belt-transect technique. Transects were 10 meters long by 3 meters wide (surface area = 30 m²). We identified and enumerated fishes and megabenthic invertebrates present within 1.5 meters along each side of the linear transects used for the reef benthic community surveys. This method provides the basis for analysis of relationships between reef substrate variables, such as sessile biological components (e.g. live coral cover) and ichthyofaunal/megabenthic invertebrates taxonomic composition, diversity, and abundance (Fowler, 1987). A total of five (5) belt-transects were surveyed at each reef station (total area = 150 m²). Abundance data on motile megabenthic invertebrates and fishes was reported as number of individuals per 30 m² (belt-transect area). Fishes and megabenthic invertebrates observed outside belt-transect survey areas were recorded and included as supplemental taxonomic information from each station. Panoramic videos from all stations were filmed to provide a qualitative assessment of the reef biota.

Baseline Characterization of Coral Reef Sites

Bahía de Boqueron Natural Reserve

1.0 General Description

The Boqueron Natural Reserve started as a wildlife refuge in 1980 for protection of migratory bird habitats and was expanded to include marine habitats in 1998. The Reserve is located in the southwest corner of the island of Puerto Rico. It includes a variety of marine ecosystems, such as coastal lagoons (Laguna Rincon and Laguna Guaniquilla), fringing mangrove inlets, seagrass beds, sandy and rocky beaches, soft bottom habitats and coral reefs. The insular shelf of Cabo Rojo is the most extensive in Puerto Rico, reaching out almost 10 nautical miles.

Coral reef community surveys were performed at Bajo Gallardo on the outer shelf, at Bajo Resuellos on the middle shelf, and at Arrecife El Palo on the entrance of Boqueron Bay in the inner shelf. Location of survey sites within the Boqueron Natural Reserve is shown in Figure 1. Bajo Gallardo is a submerged patch reef found approximately six nautical miles off Pta. Melones, south off Bahia Boqueron. Georeferences and depths of reef survey sites are presented in Table 1. Bajo Resuellos is another patch reef emerging from a hard ground platform located at about one nautical mile off Pta. Melones. Arrecife El Palo is an emergent fringing reef established on the southwest corner of Boqueron Bay.

Table 1. GEOGRAPHICAL COORDINATES AND DEPTHS OF REEF STUDIES AT THE BOQUERON NATURAL RESERVE

Reef Name	Survey Date	Depth (m)	Latitude	Longitude
Bajo Gallardo	17-May-00	10.9	18° 00.299' N	067° 19.785' W
Bajo Resuellos	15-May-00	8.2	17° 59.470' N	067° 13.987' W
Arrecife El Palo	17-May-00	3.0	18° 00.034' N	067° 12.670' W

1.1 Bajo Gallardo Reef – Boqueron

1.1.1 Physical Description of Bajo Gallardo Reef

Bajo Gallardo is one of the more distant reefs from the southwest shoreline, located at approximately seven nautical miles due west off Pta. Melones, Cabo Rojo. The reef formation is a cluster of submerged patch reefs of variable dimensions sitting in an irregular hard-ground platform at a depth of about 13 meters. The shallower reef sections rise to less than two meters from the surface. Sandy-silt sediments surround the patch reefs at the base. Our survey was performed on top of low relief patch reefs at a depth of 10 + 1 meters.

1.1.2 Sessile-Benthic Reef Community

A dense algal turf of red coralline algae (*Amphiroa* sp., *Jania* sp.) intermixed with clusters of brown fleshy and calcareous macroalgae (mostly *Dictyota* sp. and *Halimeda* sp., respectively) was the dominant biological assemblage at Gallardo Reef with a combined linear cover of approximately 52% (Table 2). Abiotic substrates, particularly coral rubble and reef overhangs, were also prominent with a combined linear cover of 24 %. The reef (hard bottom) structure was discontinuous in many sections and coarse sediments, including coral rubble and sand, were deposited in between the hard bottom sections. The mean substrate rugosity was fairly high, with a mean of 4.37 meters (range : 3.32 – 6.20 m). The “mushroom type” growth of Boulder Star Coral, *Montastrea annularis*, with high promontories at the base of the colony and laminar extensions on the sides was an important factor influencing linear cover by reef overhangs and contributing to the overall substrate rugosity. Live stony corals presented a mean linear cover of 20.9 % (range : 17.7 – 26.3 %). Soft corals (gorgonians) were common, but not highly abundant at Gallardo Reef. The mean number of colonies intersected by linear transects was 12 (range : 10 – 14 colonies/transect). The encrusting gorgonian, *Erythropodium caribaeorum* was present at all transects with a mean cover of 1.4 %. Colonial zoanthids (*Palythoa* sp.) and sponges were present but not very prominent in the linear transects surveyed at Gallardo Reef. Reef benthic community profiles are presented in Appendix 1.1-1.5.

TABLE 2. PERCENT LINEAR COVER BY SESSILE-BENTHIC CATEGORIES AT GALLARDO REEF, BOQUERON RESERVE, CABO ROJO. MAY, 2000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (meters)	3.32	5.03	6.20	3.97	3.35	4.37
SUBSTRATE CATEGORY						
TURF ALGAE	5.63	51.33	16.97	34.57	32.81	28.26
FLESHY ALGAE	16.38	14.20	7.96	41.45	38.65	23.73
LIVE CORAL	17.66	17.87	26.28	23.19	19.48	20.90
CORAL RUBBLE	43.58	1.20	21.22			13.20
REEF OVERHANG	11.72	13.40	25.66		4.64	11.08
ENCRUSTING GORGONIAN	2.63	0.80	0.37	0.79	2.40	1.40
SAND	2.40		1.54			0.79
ZOANTHIDS					2.02	0.40
SPONGES		1.20				0.24
GORGONIANS (# colonies)	11	13	14	10	13	12

A total of 22 scleractinian corals and two hydrocorals (*Millepora* spp). were identified during our snapshot survey at Gallardo Reef (Table 3). *Montastrea annularis* was the dominant coral with a mean linear cover of 15.3 % (range : 10.7 – 23.4 %), representing 73 % of the total cover by stony corals in the linear transect survey. Along with Star Coral (*M. annularis*), the Lettuce Coral, *Agaricia agaricites* was present in all five transects. Finger Coral, *Porites porites* and Mustard Hill Coral, *P. astreoides*, were present in four of the five transects surveyed and formed part of the main assemblage of stony corals at Gallardo Reef.

TABLE 3. TAXONOMIC COMPOSITION AND LINEAR COVER OF STONY CORALS AT BAJO GALLARDO, BOQUERON NATURAL RESERVE, CABO ROJO. MAY 2,000

CORAL SPECIES	TRANSECT					MEAN
	1	2	3	4	5	
<i>Montastrea annularis</i>	11.04	10.67	23.39	19.59	11.95	15.33
<i>Agaricia agaricites</i>	0.83	2.6	1.3	2.26	1.12	1.62
<i>Porites porites</i>	1.88	2.07		0.94	2.32	1.44
<i>Porites astreoides</i>	1.8	0.28	1.42		1.87	1.07
<i>Millepora alcicornis</i>		0.94			1.06	0.40
<i>Meandrina meandrites</i>	1.16	0.56				0.34
<i>Diploria strigosa</i>					1.16	0.23
<i>Siderastrea siderea</i>	0.42	0.28				0.14
<i>Diploria labyrinthiformis</i>	0.53					0.11
<i>Leptoseris cucullata</i>		0.47				0.09
<i>Mycetophyllia ferox</i>				0.4		0.08
<i>Agaricia fragilis</i>			0.17			0.03

Outside Transects :

Acropora cervicornis
Stephanocoenia michilini
Dichocoenia stokesii
Mycetophyllia danaana
Dendrogyra cylindrus
Millepora squarrosa
Porites furcata
Eusmilia fastigiata
Isophyllia rigida
Mycetophyllia lamarkiana
Colpophyllia natans
Montastrea cavernosa

1.1.3 Fishes and Motile-Megabenthic Invertebrates

The taxonomic composition and abundance of fishes within belt-transects at Gallardo Reef are presented in Table 4. A total of 49 species were identified, including 13 species detected outside belt-transect areas. The mean number of species per transect was 17 (range : 13 – 20) and the mean density of fishes was 46.6 Individuals/30 m² (range : 36 – 57 Individuals/30 m²). Seven species represented approximately 68 % of the total individuals within transect areas. The main fish assemblage included the Striped and Stoplight parrotfishes (*Scarus iserti*, *Sparisoma viride*),

the Blue-head and Yellow-head Wrasses (*Thalassoma bifasciatum* and *Halichoeres garnoti*) and three damselfishes (Bicolor, Yellowtail and Blue Chromis). With a total of nine species present, the parrotfish family (Scaridae) was the most specious taxonomic group, and combined with doctorfishes (Acanthuridae) and “farmer damselfishes” (e.g. *Stegastes dorsopunicans* - Pomacentridae) constituted the principal herbivorous fish assemblage. The combined abundance of herbivores represented approximately 42% of the total individuals within belt-transect areas. Opportunistic carnivores which feed on small benthic invertebrates, such as wrasses (Labridae), puffers (Tetraodontidae), gobies (Gobiidae) and hamlets (*Hypoplectrus* spp.- Serranidae) were prominent at this reef with nine species representing about 30% of the total individuals. The zooplanktivorous fish assemblage, integrated by the Blue and (*Chromis cyanea*, *C. multilineata*), Bicolor damselfish (*Stegastes partitus*) and the Creole Wrasse (*Clepticus parrae*) accounted for approximately 28 % of the total individuals. Also present outside transect areas in large shoals was the Mackerel Scad, *Decapterus macarellus*. With the exception of the Bicolor Damselfish which feeds close to the substrate, the other aforementioned zooplanktivores are mostly pelagic, and thus available as important forage species for larger pelagic predators, such as the Great Barracuda and the Bar Jack, both present at Gallardo Reef during our survey. Predators of larger reef invertebrates and small demersal fishes included a small assemblage of grunts, groupers (e.g. Coney, Red Hind) and Spanish Hogfish, mostly observed outside transect areas.

One Spiny Lobster, *Panulirus argus* was observed within belt-transect areas at Gallardo Reef (Table 5).

TABLE 4. TAXONOMIC COMPOSITION AND ABUNDANCE OF FISHES AT GALLARDO REEF, BOQUERON NATURAL RESERVE, CABO ROJO. MAY 2000

DEPTH: 10.9 m

FISH SPECIES	COMMON NAME	TRANSECTS					MEAN
		1	2	3	4	5	
		(individuals/30 m ²)					
<i>Scarus iserti</i>	Striped Parrotfish	8	7	14	2	6	7.4
<i>Chromis cyanea</i>	Blue Chromis	13	4	5	11	0	6.6
<i>Thalassoma bifasciatum</i>	Blue-head Wrasse	5	2	11	10	5	6.6
<i>Stegastes partitus</i>	Bicolor Damselfish	3	0	3	10	5	4.2
<i>Halichoeres garnoti</i>	Yellowhead Wrasse	3	1	0	1	8	2.6
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish	1	1	2	4	3	2.2
<i>Sparisoma viride</i>	Stoplight Parrotfish	2	2	3	4	0	2.2
<i>Clepticus parrae</i>	Creole Wrasse	0	0	8	0	0	1.6
<i>Stegastes dorsopunicans</i>	Dusky Damselfish	1	2	2	3	0	1.6
<i>Sparisoma aurofrenatum</i>	Red-band Parrotfish	2	2	0	1	2	1.4
<i>Acanthurus coeruleus</i>	Blue Tang	1	3	0	1	1	1.2
<i>Chromis multilineata</i>	Brown Chromis	1	0	2	1	0	0.8
<i>Holocentrus rufus</i>	Squirrelfish	1	1	1	0	1	0.8
<i>Scarus vetula</i>	Queen Parrotfish	0	1	1	1	1	0.8
<i>Gramma loreto</i>	Royal Gramma	1	0	1	0	1	0.6
<i>Hypoplectrus nigricans</i>	Black Hamlet	0	1	0	1	1	0.6
<i>Petrometopon cruentatus</i>	Graysbe	2	1	0	0	0	0.6
<i>Canthigaster rostrata</i>	Sharpnose Puffer	1	1	0	0	0	0.4

Table 4. Continued

<i>Chaetodon capistratus</i>	Four-eye Butterflyfish	0	2	0	0	0	0.4
<i>Gobiosoma evelynae</i>	Sharknose Goby	1	1	0	0	0	0.4
<i>Serranus tigrinus</i>	Harlequin Bass	1	0	0	1	0	0.4
<i>Sparisoma radians</i>	Bucktooth Parrotfish	0	2	0	0	0	0.4
<i>Cantherhines pullus</i>	Tail-light Filefish	0	0	0	0	1	0.2
<i>Carangoides ruber</i>	Black-bar Jack	1	0	0	0	0	0.2
<i>Haemulon sciurus</i>	Bluestripped Grunt	0	0	0	1	0	0.2
<i>Holacanthus tricolor</i>	Rock Beauty	1	0	0	0	0	0.2
<i>Hypoplectrus guttavarius</i>	Shy Hamlet	0	0	1	0	0	0.2
<i>Hypoplectrus puella</i>	Barred Hamlet	0	1	0	0	0	0.2
<i>Hypoplectrus unicolor</i>	Butter Hamlet	0	0	0	1	0	0.2
<i>Kyphosus sp.</i>	Bermuda Chub	0	0	1	0	0	0.2
<i>Lactophrys triqueter</i>	Smooth Trunkfish	0	0	1	0	0	0.2
<i>Scarus coelestinus</i>	Midnight Parrotfish	0	0	1	0	0	0.2
<i>Scarus taeniopterus</i>	Princess Parrotfish	0	1	0	0	0	0.2
<i>Sparisoma chrysopteron</i>	Redtail Parrotfish	0	1	0	0	0	0.2
<i>Sparisoma rubripinne</i>	Yellowtail Parrotfish	0	0	0	0	1	0.2
<i>Stegastes planifrons</i>	Yellow Damselfish	1	0	0	0	0	0.2
	TOTAL INDIVIDUALS	50	37	57	53	36	46.6
	TOTAL SPECIES	20	20	16	16	13	17
Outside transects:							
<i>Acanthurus chirurgus</i>	Doctorfish						
<i>Bodianus rufus</i>	Spanish Hogfish						
<i>Cephalopholis fulva</i>	Coney						
<i>Chaetodon striatus</i>	Banded Butterflyfish						
<i>Decapterus sp.</i>	Shad						
<i>Epinephelus guttatus</i>	Red Hind						
<i>Haemulon carbonarium</i>	Spanish Grunt						
<i>Halichoeres radiatus</i>	Puddinwife						
<i>Malacantus plumieri</i>	Sand Tilefish						
<i>Melichthys niger</i>	Black Durgon						
<i>Mulloides martinicus</i>	Yellowtail Goatfish						
<i>Pomacanthus arcuatus</i>	Gray Angelfish						
<i>Sphyræna barracuda</i>	Great Barracuda						

TABLE 5. TAXONOMIC COMPOSITION AND ABUNDANCE OF MOTILE MEGABENTHIC INVERTEBRATES AT GALLARDO REEF, BOQUERON NATURAL RESERVE, CABO ROJO. MAY 2000

SPECIES	COMMON NAME	TRANSECTS					MEAN ABUNDANCE (IND/30 m ²)
		1	2	3	4	5	
<i>Panulirus guttatus</i>	Rock lobster			1			0.2
TOTALS		0	0	1	0	0	0.2

1.1.4 Photo Album – Gallardo Reef, Boqueron

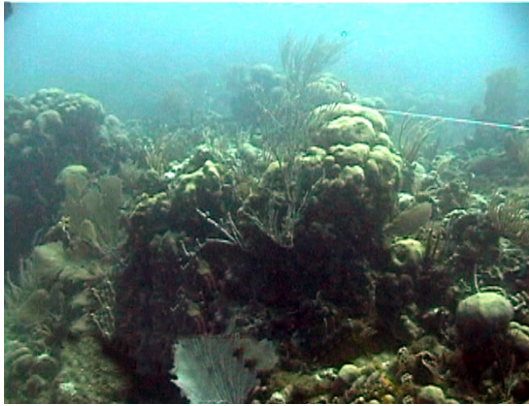


Plate 1. Massive, isolated colonies of Boulder Star Coral, *Montastrea annularis* were the most prominent physical feature of Gallardos Reef.



Plate 4. Mostly interspersed within the reef, colonies of *Montastrea annularis* were typically found as large, vertically projected structures reaching heights of up to six feet.

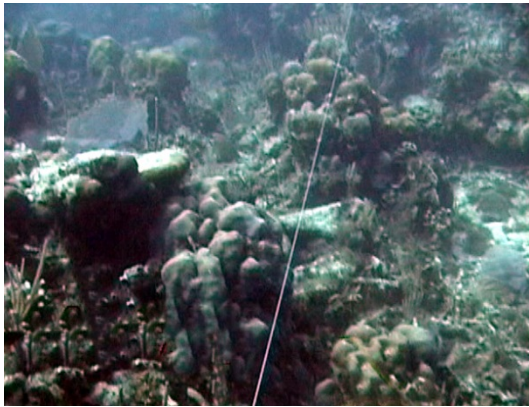


Plate 2. Among the 12 stony coral species intercepted by linear transects, *Montastrea annularis* was the dominant taxa with a mean linear cover of 15.3 %.

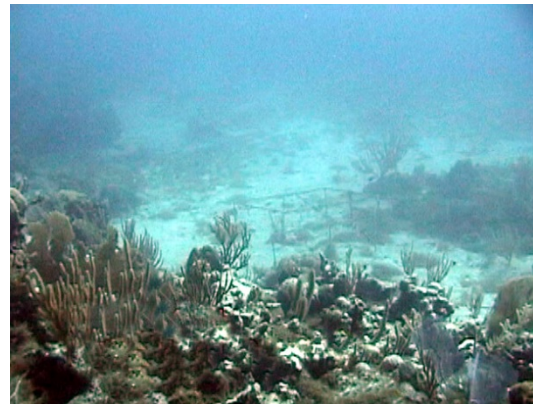


Plate 5. Gallardo Reef is formed by a series of patch reef promontories separated by coralline sands deposited over a hard ground platform.

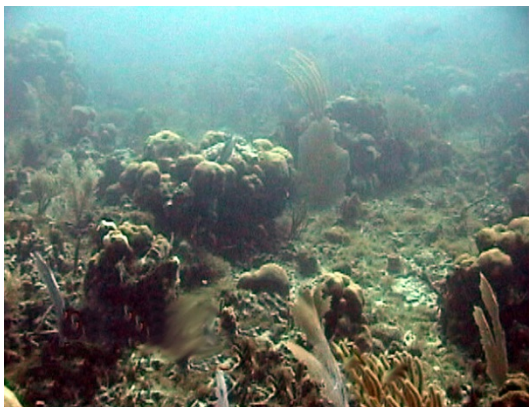


Plate 3. Soft corals were present in rather low densities at Gallardo Reef with a mean of 12 colonies intercepted per transect.

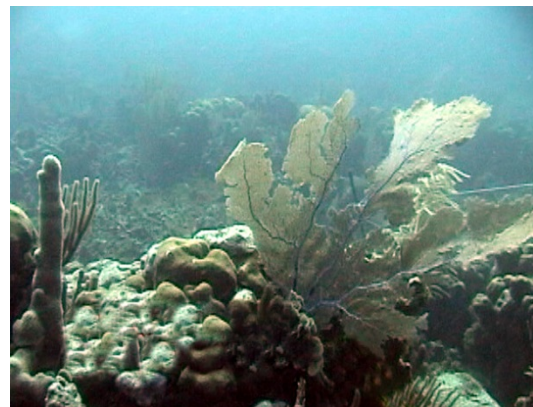


Plate 6. Sea Fans (*Gorgonia* spp) were the most common type of soft coral. Many

colonies were observed growing associated with stony coral colonies.

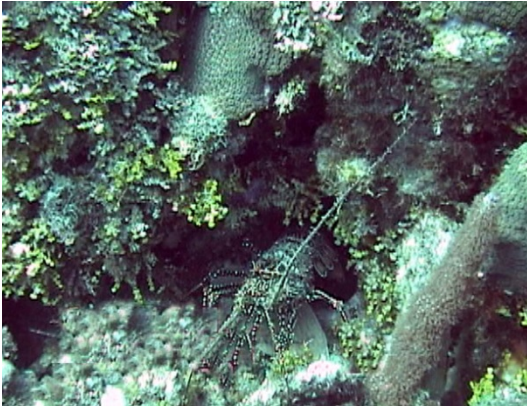


Plate 7. Fleshy brown (*Dictyota* sp.) and calcareous (*Halimeda* sp.) macroalgae combined for a 23.7 % of surface cover at Gallardo Reef. One Spotted Spiny Lobster, *Panulirus guttatus* was observed outside belt-transect areas.

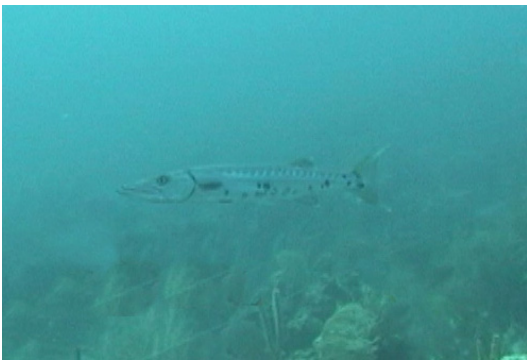


Plate 8. One of the reef top predators, the Great Barracuda (*Sphyraena barracuda*) was observed foraging on a school of Mackerel Scads (*Decapterus macarellus*).

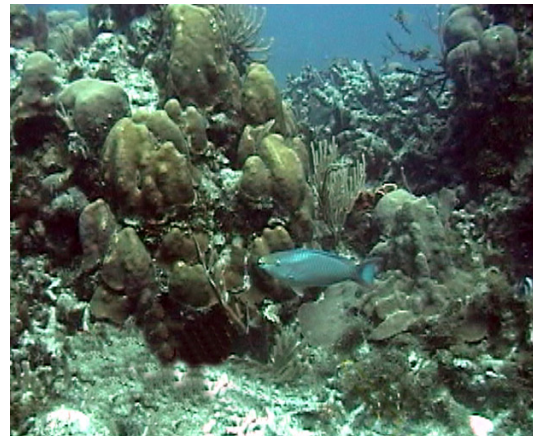


Plate 9. A total of 48 species of fish were identified from Gallardo Reef. Represented by nine species, Parrotfishes (Scaridae) were the most specious taxonomic group and combined with Doctorfishes (Acanthuridae) and “farmer” Damselfishes (Pomacentridae) constituted the main herbivorous fish assemblage.

1.2 Resuellos Reef – Boqueron

1.2.2 Physical Description of Resuellos Reef

Resuellos Reef is a hard-ground promontory located at about one nautical mile due west from Pta. Melones, Cabo Rojo. The reef emerges from a mostly flat platform covered by sandy-silt sediments at a depth of 12 meters to about 2 meters from the surface, where breakers form during events of heavy wave action. Stony and soft corals (gorgonians) provide substantial topographic relief to the reef, particularly on the slopes. The top section of the reef is a hard-ground platform with scattered stony coral colonies and dense growth of gorgonians. Very large colonies of Elkhorn Coral, *Acropora palmata* were observed within this upper reef section in an advanced stage of degradation (e.g. mostly overgrown by turf algae). Some were still standing, while others were overturned and rested broken on the reef bottom. Our survey was performed on the reef slope, close to the base of the reef. Transects were installed following the 8.0 +1 meter depth contour along the reef slope.

1.2.3 Sessile-Benthic Reef Community

The lush growth of soft corals was the most prominent feature of the sessile-benthic community at Resuellos Reef. The encrusting gorgonian, *Erythropodium caribaeorum* was present in all five transects surveyed with a mean linear cover of 16 % (range : 12.9 – 19.2 %). Stony corals, with encrusting, laminar and massive colonies added another 18.2 % of mean linear cover on the reef. Reef overhangs, largely associated with massive and laminar coral growth accounted for an additional 13 % of linear cover. Thus, the combined linear cover by soft and stony corals at Resuellos Reef was about 47 %, which surpassed the mean cover by algal turf of 39.4 % (Table 6). Sponges were also prominent components of the sessile-benthic community with a mean linear cover of 7 %. They were present as erect and encrusting colonies. The latter mostly of small size and growing intermixed in the algal turf. The colonial zoanthid, *Palythoa sp.* was present in four out of five transects surveyed. It occurred as small patches overgrowing dead coral sections in the reef. Reef benthic community profiles are presented in Appendix 1.6-1.10.

A total of 20 species of stony corals, 13 of which were intersected by our linear transects were identified from Resuellos Reef (Table 7). Boulder Star Coral, *Montastrea annularis* and Boulder Brain Coral, *Colpophyllia natans* were the dominant coral species in terms of linear cover with means of 6.8 and 5.9 %, respectively. Their combined linear cover represented approximately 70 % of the total cover by stony corals on this reef. Boulder Star Coral and Great Star Coral (*Montastrea cavernosa*) were the only coral species intersected at all five transects surveyed. Boulder Brain Coral was present in only three transects but included large, massive colonies that accounted for a relatively high linear cover. Mustard Hill Coral, *Porites astreoides* and Massive Starlet Coral, *Siderastrea siderea* were present in four out of the five transects surveyed and thereby represent, in addition to the aforementioned species, prominent taxonomic components of the scleractinian coral assemblage at Resuellos Reef. The hydrocoral, *Millepora alcicornis* was also very common in the reef.

TABLE 6. PERCENT LINEAR COVER BY SESSILE-BENTHIC CATEGORIES AT RESUELLOS REEF, BOQUERON NATURAL RESERVE, CABO ROJO. MAY, 2000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	2.32	5.24	3.37	7.01	1.75	3.94
SUBSTRATE CATEGORY						
TURF ALGAE	35.88	43.36	34.03	35.43	48.17	39.37
STONY CORAL	30.76	9.11	21.84	23.34	6.21	18.25
ENCRUSTING GORGONIAN	12.91	13.57	17.35	19.22	16.77	15.96
REEF OVERHANG	7.06	25.84	13.69	6.29	12.26	13.03
SPONGE	5.28	7.21	6.66	9.94	5.79	6.98
HOLE	3.08		5.98	0.82	2.89	2.55
SAND				3.31	7.23	2.11
ZOANTHIDS	1.87		0.45	1.65	0.68	0.93
CORAL RUBBLE	2.84					0.57
MUD		0.91				0.18
ALGAE	0.32					0.06
GORGONIANS (# colonies)	n/d	n/d	n/d	n/d	n/d	n/d

TABLE 7. TAXONOMIC COMPOSITION AND LINEAR COVER OF STONY CORALS AT BAJO RESUELLOS, BOQUERON NATURAL RESERVE, CABO ROJO. MAY 2,000

CORAL SPECIES	TRANSECT					MEAN
	1	2	3	4	5	
<i>Montastrea annularis</i>	10.86	4.34	3.96	10.53	4.07	6.75
<i>Colpophyllia natans</i>	10.33		15.34	3.65		5.86
<i>Porites astreoides</i>	5.5	0.66	0.97	2.07		1.84
<i>Siderastrea siderea</i>	2.83	2.63	0.63		0.47	1.31
<i>Montastrea cavernosa</i>	0.8	1.12	0.52	0.83	1.67	0.99
<i>Meandrina meandrites</i>				2.47		0.49
<i>Siderastrea radians</i>				1.48		0.30
<i>Leptoseris cucullata</i>		0.37		0.51		0.18
<i>Millepora alcicornis</i>			0.42	0.41		0.17
<i>Diploria strigosa</i>				0.82		0.16
<i>Mycetophyllia lamarckiana</i>	0.44					0.09
<i>Agaricia agaricites</i>				0.33		0.07
<i>Mussa sp.</i>				0.24		0.05

Table 7. Continued

Outside Transects :

Diploria labyrinthiformis

Diploria clivosa

Mussa sp.

Isophyllia rigida

Mycetophyllia aliciae

Eusmilia fastigiata

Scolymia cubensis

1.2.4 Fishes and Motile Megabenthic Invertebrates

A total of 44 fish species were identified during our visual surveys at Resuellos Reef, 32 of which were present within belt-transect areas (Table 8). The mean number of species per transect was 15 (range 13 – 17), and the mean density of fishes was 28 Individuals/30 m² (range : 20 - 35 Individuals/30 m²). Six species represented approximately 52 % of the total individuals within transect areas. The numerically dominant fish assemblage included the Bluehead Wrasse (*Thalassoma bifasciatum*), the Striped Parrotfish (*Scarus iserti*), the Yellow-eye and Dusky Damselﬁshes (*Stegastes planifrons*, *S. dorsopunicans*), the Masked Goby (*Coryphopterus personatus*) and the Royal Gramma (*Gramma loreto*). Damselﬁshes (Pomacentridae) and parrotfishes (Scaridae) were the most speciose fish families with five species each. Herbivorous taxa included parrotfishes, doctorfishes (Acanthuridae) and “farmer damselﬁshes” (e.g. *Stegastes dorsopunicans*, *S. planifrons* - Pomacentridae). The combined herbivorous assemblage represented approximately 50 % of the total individuals within belt-transect areas. Opportunistic carnivores which feed on small benthic invertebrates, such as wrasses (Labridae), puffers (Tetraodontidae), gobies (Gobiidae), hamlets (*Hypoplectrus* spp.- Serranidae), squirrelfishes (Holocentridae) and goatfishes (Mullidae) represented about 49 % of the total individuals. The zooplanktivorous fish assemblage recorded within transect areas included the Masked Goby, the Blue Chromis (*Chromis cyanea*) and the Bicolor Damselﬁsh (*Stegastes partitus*). Also a zooplankton feeder, the Creole Wrasse (*Clepticus parrae*) was present in large schools outside transect areas. Predators of larger reef invertebrates and small demersal fishes included several species of grunts (Haemulidae), snappers (Lutjanidae), groupers (Serranidae) and hogfishes (Labridae). Within this group, several species of high commercial value included the Red Hind and Nassau groupers (*Epinephelus guttatus*, *E. striatus*), the Dog, Mahogany, Schoolmaster and Yellowtail snappers (*Lutjanus jocu*, *L. mahogany*, *L. apodus* and *Ocyurus chrysurus*) and the Hogfish (*Lachnolaimus maximus*). Pelagic predators, such as the Great Barracuda and the Bar Jack were also present at Resuellos Reef during our survey.

One Spiny Lobster, *Panulirus argus* was observed within belt-transect areas at Resuellos Reef (Table 9).

TABLE 8. TAXONOMIC COMPOSITION AND ABUNDANCE OF FISHES AT RESUELLOS REEF, BOQUERON NATURAL RESERVE, CABO ROJO. MAY 2000

DEPTH: 8.2 m

<i>FISH SPECIES</i>	COMMON NAME	TRANSECTS					MEAN
		1	2	3	4	5	
		(individuals/30 m ²)					
<i>Thalassoma bifasciatum</i>	Blue-head Wrasse	7	0	8	0	6	4.2
<i>Stegastes planifrons</i>	Yellow Damselfish	3	4	1	2	4	2.8
<i>Gramma loreto</i>	Royal Gramma	3	0	5	0	3	2.2
<i>Sparisoma aurofrenatum</i>	Red-band Parrotfish	0	3	4	2	1	2.0
<i>Scarus iserti</i>	Striped Parrotfish	0	0	0	3	6	1.8
<i>Coryphopterus personatus</i>	Masked Goby	0	0	0	6	2	1.6
<i>Stegastes dorsopunicans</i>	Dusky Damselfish	4	2	1	0	0	1.4
<i>Chaetodon capistratus</i>	Four-eye Butterflyfish	1	1	2	0	1	1.0
<i>Haemulon flavolineatum</i>	French Grunt	0	1	3	0	1	1.0
<i>Hypoplectrus puella</i>	Barred Hamlet	1	0	3	1	0	1.0
<i>Sparisoma viride</i>	Stoplight Parrotfish	0	2	1	2	0	1.0
<i>Acanthurus coeruleus</i>	Blue Tang	2	1	0	1	0	0.8
<i>Haemulon aurolineatum</i>	Tomtate	0	0	2	2	0	0.8
<i>Canthigaster rostrata</i>	Sharpnose Puffer	0	2	1	0	0	0.6
<i>Lutjanus apodus</i>	Schoolmaster Snapper	1	0	0	0	2	0.6
<i>Stegastes partitus</i>	Bicolor Damselfish	1	0	2	0	0	0.6
<i>Acanthurus chirurgus</i>	Doctorfish	1	0	0	0	1	0.4
<i>Aulostomus maculatus</i>	Trumpetfish	1	0	0	1	0	0.4
<i>Gobiosoma evelynae</i>	Sharknose Goby	0	0	1	1	0	0.4
<i>Holocentrus rufus</i>	Squirrelfish	0	0	0	1	1	0.4
<i>Pomacanthus arcuatus</i>	Gray Angelfish	1	0	0	1	0	0.4
<i>Scarus taeniopterus</i>	Princess Parrotfish	0	1	0	0	1	0.4
<i>Scarus vetula</i>	Queen Parrotfish	0	1	1	0	0	0.4
<i>Bodianus rufus</i>	Spanish Hogfish	1	0	0	0	0	0.2
<i>Chromis cyanea</i>	Blue Chromis	0	0	0	0	1	0.2
<i>Haemulon sp.</i>	Grunt	0	1	0	0	0	0.2
<i>Holacanthus tricolor</i>	Rock Beauty	1	0	0	0	0	0.2
<i>Hypoplectrus guttavarius</i>	Shy Hamlet	0	0	0	1	0	0.2
<i>Lachnolaimus maximus</i>	Hogfish	1	0	0	0	0	0.2
<i>Mulloides martinicus</i>	Yellowtail Goatfish	1	0	0	0	0	0.2
<i>Myripristis jacobus</i>	Black-bar Souldierfish	0	1	0	0	0	0.2
<i>Petrometopon cruentatus</i>	Graysbe	1	0	0	0	0	0.2
	TOTAL INDIVIDUALS	31	20	35	24	30	24
	TOTAL SPECIES	17	13	14	13	17	15
Outside transects:							
<i>Acanthostracion quadricornis</i>	Scrawled Cowfish						
<i>Acanthurus bahianus</i>	Ocean Surgeon						

Table 8. Continued

<i>Carangoides ruber</i>	Black-bar Jack
<i>Chaetodon striatus</i>	Banded Butterflyfish
<i>Chromis multilineata</i>	Brown Chromis
<i>Clepticus parrae</i>	Creole Wrasse
<i>Epinephelus guttatus</i>	Red Hind
<i>Epinephelus striatus</i>	Nassau Grouper
<i>Haemulon macrostomum</i>	Spanish Grunt
<i>Haemulon plumieri</i>	White Grunt
<i>Holacanthus ciliaris</i>	Queen Angelfish
<i>Hypoplectrus unicolor</i>	Butter Hamlet
<i>Lactophrys triqueter</i>	Smooth Trunkfish
<i>Lutjanus jocu</i>	Dog Snapper
<i>Lutjanus mahogany</i>	Mahogany Snapper
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish
<i>Ocyurus chrysurus</i>	Yellowtail Snapper
<i>Odontoscion dentex</i>	Reef Croaker
<i>Pomacanthus paru</i>	French Angelfish
<i>Scarus coelestinus</i>	Midnight Parrotfish
<i>Sparisoma radians</i>	Bucktooth Parrotfish
<i>Sphyrnaena barracuda</i>	Great Barracuda

TABLE 9. TAXONOMIC COMPOSITION AND ABUNDANCE OF MEGA-BENTHIC INVERTEBRATES AT RESUELLOS REEF, BOQUERON NATURAL RESERVE, CABO ROJO. MAY, 2000

Depth: 8.2 m	SPECIES	COMMON NAME	TRANSECTS					MEAN ABUNDANCE (IND/30 m ²)
			1	2	3	4	5	
	<i>Panulirus argus</i>	Spiny lobster				1		0.2
		TOTALS	0	0	0	1	0	0.2

1.2.4 Photo Album – Resuellos Reef, Boqueron

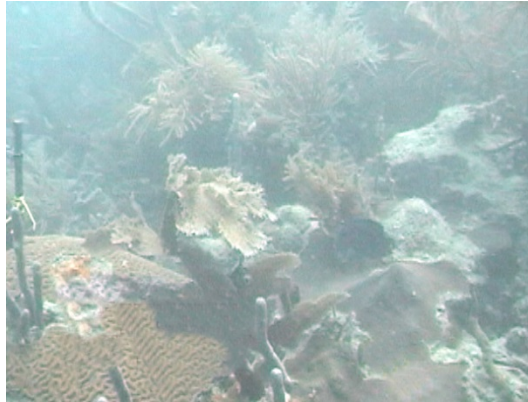


Plate 1. With a mean cover of 18.2 %, stony corals were the most prominent sessile-benthic invertebrate at Resuellos Reef. Massive, encrusting and laminar colonies were present at the reef slope.



Plate 2



Plates 2- 3. Soft corals at Resuellos Reef.

1.3 El Palo Reef – Boqueron

1.3.1 Physical Description of El Palo Reef

El Palo Reef is a small fringing reef located due north of Punta Melones, at the entrance of Boqueron Bay. The reef rises to the surface forming a reef flat and has an irregular and abrupt fore-reef slope that drops down to a silty-sand bottom at a depth of 6 meters. Seagrass beds, mostly Turtle Grass, *Thalassia testudinum*, grow to the east and at the base of the reef. The best coral development was found at depths between 3 – 5 meters. Our line transects were positioned perpendicular to the shoreline, running down the slope and encompassing the 3 – 5 meter depth range.

1.3.2 Sessile-Benthic Reef Community

A dense algal turf intermixed with clusters of calcareous macroalgae (mostly *Halimeda discoidea*) was the dominant biological assemblage at El Palo Reef with a combined linear cover of approximately 58% (Table 10). The algal turf was found overgrowing many dead massive coral colonies, some of which were of very large sizes. Soft coral (gorgonian) colonies were abundant (mean = 28 colonies/transect) and of variable sizes, including very large ones. The encrusting gorgonian, *Erythropodium caribaeorum* was present at all transects with a mean linear cover of 5.3 % (range : 3.0 – 9.3 %). Abiotic substrates, particularly reef overhangs, were prominent at this reef and presented a combined linear cover of roughly 19 %. Most of the linear cover by reef overhangs was associated to dead and live massive coral colonies that produced ledges underneath the colonies. Also, the reef structure was discontinuous in many sections and unconsolidated sediments, including coral rubble, sand and silt were deposited in between the hard bottom sections. The mean substrate rugosity was fairly high, with a mean of 5.46 meters (range : 4.32 – 6.70 m). Substrate rugosity was influenced by the presence of large (mostly dead), massive coral colonies. Live stony corals ranked third in terms of linear cover with a mean of 11.4 % (range : 7.0 – 16.9 %). Massive, boulder types and encrusting growth prevailed among stony coral colonies. Sponges were present in all five transects surveyed and presented a mean linear cover of 5.3 % (range : 0.6 – 13.5 %). Colonial zoanthids (*Palythoa sp.*) were present, but not very prominent in the linear transects surveyed at El Palo Reef. Reef benthic community profiles are presented in Appendix 1.11-1.15.

TABLE 10. PERCENT LINEAR COVER BY SESSILE-BENTHIC CATEGORIES AT EL PALO REEF, BOQUERON NATURAL RESERVE, CABO ROJO. MAY, 2000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	4.80	5.11	6.70	4.32	6.35	5.46
SUBSTRATE CATEGORY						
TURF ALGAE	57.45	51.74	48.08	77.02	52.53	57.36
REEF OVERHANG	20.26	20.97	32.46	3.21	11.56	17.69
STONY CORAL	11.34	12.84	7.01	8.87	16.88	11.39
SPONGE	4.46	3.17	0.60	4.82	13.46	5.30
ENCRUSTING GORGONIAN	3.85	9.33	4.37	5.80	3.00	5.27
CORAL RUBBLE		1.39	3.53			0.98
HOLE	0.41		2.93			0.67
FLESHY ALGAE	0.54	0.56			1.71	0.56

Table 10. Continued

SILT	1.69					0.34
ZOANTHIDS			1.02	0.28		0.26
SAND					0.86	0.17
GORGONIANS (# colonies)	22	30	36	32	21	28

A total of 17 scleractinian corals and one hydrocoral (*Millepora alcicornis*). were identified during our snapshot survey at El Palo Reef (Table 11). Mustard Hill Coral, *Porites astreoides*, and Star Coral, *Montastrea annularis* were the dominant coral species in terms of linear cover with means of 2.4 % and 2.2 %, respectively. Colonies of these two species were intersected by all five transects surveyed. *Porites astreoides* occurred mostly as encrusting and small mound-shaped colonies. Live coral sections of *Montastrea annularis* were observed to be the remains of large, massive colonies, now mostly dead and overgrown by turf algae. Some very large colonies of the Boulder Brain Coral (*Colpophyllia natans*) were still alive, but others were observed to be in advanced stages of degradation (overgrown by turf algae and other encrusting biota). Great Star Coral (*Montastrea cavernosa*) and Massive Starlet Coral, (*Siderastrea siderea*) were present in four out of the five transects surveyed and represent, along with the Star Coral and Mustard Hill Coral, the main taxonomic assemblage of stony corals at El Palo Reef. Encrusting and mound-shaped colonies of Great Star Coral, as well as gorgonians, appeared to be less affected by the stress factors that have been degrading the ecological health of most scleractinian corals at this reef.

TABLE 11. TAXONOMIC COMPOSITION AND LINEAR COVER OF STONY CORALS AT EL PALO REEF, BOQUERON NATURAL RESERVE, CABO ROJO. MAY 2,000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	4.8	5.11	6.7	4.32	6.35	5.46
CORAL SPECIES						
<i>Porites astreoides</i>	3.92	2.57	1.38	0.69	3.61	2.43
<i>Montastrea annularis</i>	1.56	0.75	1.01	2.23	5.37	2.18
<i>Siderastrea siderea</i>	2.57	1.31	2.11	3.42		1.88
<i>Montastrea cavernosa</i>	2.63		2.51	0.3	3.45	1.78
<i>Colpophyllia natans</i>		4.46		2.23		1.34
<i>Diploria strigosa</i>		3.56			1.38	0.99
<i>Siderastrea radians</i>	0.47				2.81	0.66
<i>Millepora alcicornis</i>	0.19	0.19				0.08
<i>Porites porites</i>					0.26	0.05

Outside Transects :

Meandrina meandrites
Isophyllia sinuosa
Isophyllia rigida

Table 11. Continued

Agaricia agaricites
Agaricia fragilis
Madracis decactis
Mycetophyllia lamarckiana
Diploria labyrinthiformis

1.3.3 Fishes and Motile Megabenthic Invertebrates

The taxonomic composition and abundance of fishes within belt-transects at El Palo Reef are presented in Table 12. A total of 40 species were identified, including 16 species detected outside belt-transect areas. The mean number of species per transect was 11 (range : 8 – 12) and the mean density of fishes was 22 Individuals/30 m² (range : 16 – 34 Individuals/30 m²). Five species represented approximately 67 % of the total individuals within transect areas. The main fish assemblage included the Dusky Damselfish (*Stegastes dorsopunicans*), the Striped and Stoplight parrotfishes (*Scarus iserti*, *Sparisoma viride*), the Blue-head Wrasse (*Thalassoma bifasciatum*), and the Blue Tang (*Acanthurus coeruleus*). With a total of five species present, the parrotfish family (Scaridae) was the most speciose taxonomic group, and combined with doctorfishes (Acanthuridae) and “farmer damselfishes” (e.g. *Stegastes dorsopunicans* - Pomacentridae) constituted the principal herbivorous fish assemblage. The combined abundance of herbivores represented approximately 62 % of the total individuals within belt-transect areas. Opportunistic carnivores which feed on small benthic invertebrates, such as wrasses (Labridae), puffers (Tetraodontidae), grunts (Haemulidae), gobies (Gobiidae), squirrelfishes (Holocentridae) and hamlets (*Hypoplectrus* spp. - Serranidae) were common at this reef with eight species representing about 25% of the total individuals. The zooplanktivorous fish assemblage was best represented by schools of the Thread Herring (*Opisthonema oglinum*) outside belt-transect survey areas. Predators of larger reef invertebrates and small demersal fishes included a small assemblage of groupers (e.g. Graysbe, Red Hind) and snappers (Mangrove and Lane snappers). Pelagic predators included the Houndfish, (*Tylosurus crocodilus*) and the Bar Jack (*Carangoides ruber*).

Three Rock Lobsters, *Panulirus guttatus* and two Spider Crabs, *Mithrax spinosissimus* were observed within belt-transect areas at El Palo Reef (Table 13).

TABLE 12. TAXONOMIC COMPOSITION AND ABUNDANCE OF FISHES AT EL PALO REEF, BOQUERON NATURAL RESERVE, CABO ROJO. MAY 2000

DEPTH: 3.0 m

<i>FISH SPECIES</i>	COMMON NAME	TRANSECTS					MEAN
		1	2	3	4	5	
		(individuals/30 m ²)					
<i>Stegastes dorsopunicans</i>	Dusky Damselfish	3	7	9	4	5	5.6
<i>Scarus iserti</i>	Striped Parrotfish	6	1	4	5	2	3.6
<i>Thalassoma bifasciatum</i>	Blue-head Wrasse	4	0	7	2	0	2.6
<i>Sparisoma viride</i>	Stoplight Parrotfish	1	4	3	1	0	1.8
<i>Acanthurus coeruleus</i>	Blue Tang	1	0	3	1	1	1.2
<i>Holocentrus rufus</i>	Squirrelfish	0	1	1	1	1	0.8
<i>Myripristis jacobus</i>	Black-bar Soldierfish	2	1	0	0	1	0.8
<i>Acanthurus bahianus</i>	Ocean Surgeon	0	0	0	2	1	0.6
<i>Chaetodon capistratus</i>	Four-eye Butterflyfish	1	0	1	0	1	0.6
<i>Ocyurus chrysurus</i>	Yellowtail Snapper	1	0	2	0	0	0.6
<i>Scarus vetula</i>	Queen Parrotfish	0	2	0	1	0	0.6
<i>Acanthurus chirurgus</i>	Doctorfish	0	0	1	0	1	0.4
<i>Haemulon flavolineatum</i>	French Grunt	1	1	0	0	0	0.4
<i>Haemulon macrostomum</i>	Spanish Grunt	1	1	0	0	0	0.4
<i>Abudefduf sexatilis</i>	Sergeant Major	0	0	0	0	1	0.2
<i>Diodon histrix</i>	Porcupinefish	0	0	1	0	0	0.2
<i>Gobiosoma evelynae</i>	Sharknose Goby	1	0	0	0	0	0.2
<i>Gramma loreto</i>	Royal Gramma	0	1	0	0	0	0.2
<i>Holocentrus ascensionis</i>	Longjaw Squirrelfish	1	0	0	0	0	0.2
<i>Holacanthus ciliaris</i>	Queen Angelfish	0	1	0	0	0	0.2
<i>Hypoplectrus puella</i>	Barred Hamlet	0	0	0	0	1	0.2
<i>Sparisoma aurofrenatum</i>	Red-band Parrotfish	0	0	1	0	0	0.2
<i>Sparisoma rubripinne</i>	Yellowtail Parrotfish	0	0	1	0	0	0.2
<i>Stegastes leucostictus</i>	Beau Gregory	0	0	0	0	1	0.2
	TOTAL INDIVIDUALS	23	20	34	17	16	22.0
	TOTAL SPECIES	12	10	12	8	11	11
Outside transects:							
<i>Canthigaster rostrata</i>	Sharpnose Puffer						
<i>Carangoides ruber</i>	Black-bar Jack						
<i>Epinephelus guttatus</i>	Red Hind						
<i>Haemulon plumieri</i>	White Grunt						
<i>Hemiramphus brasiliensis</i>	Ballyhoo						
<i>Hypoplectrus guttavarius</i>	Shy Hamlet						
<i>Lutjanus griseus</i>	Mangrove Snapper						
<i>Lutjanus synagris</i>	Lane Snapper						
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish						

Table 12. Continued

<i>Mugil curema</i>	White Mullet
<i>Mulloides martinicus</i>	Yellowtail Goatfish
<i>Opisthonema oglinum</i>	Thread Herring
<i>Petrometopon cruentatus</i>	Graysbe
<i>Sparisoma radians</i>	Bucktooth Parrotfish
<i>Synodus intermedius</i>	Lizardfish
<i>Tylosurus crocodilus</i>	Houndfish

TABLE 13. TAXONOMIC COMPOSITION AND ABUNDANCE OF MEGA-BENTHIC INVERTEBRATES AT EL PALO REEF, BOQUERON NATURAL RESERVE, CABO ROJO. MAY, 2000

		TRANSECTS					MEAN ABUNDANCE (IND/30 m ²)
Depth: 3.0 m		1	2	3	4	5	
SPECIES	COMMON NAME						
<i>Panulirus guttatus</i>	Rock lobster	1	0	1	1	0	0.6
<i>Mithrax spinosissimus</i>	Spider crab			1	1		0.4
	TOTALS	1	0	2	2	0	1.0

1.3.4 Photo Album – El Palo Reef

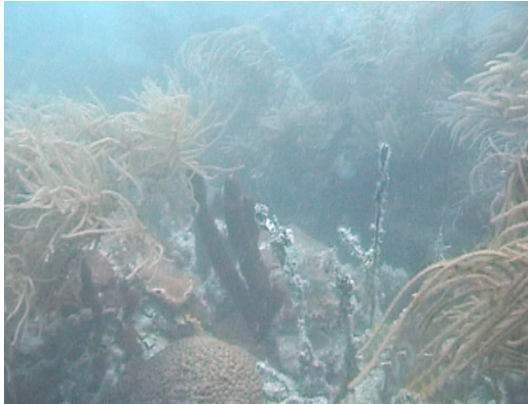


Plate 1. El Palo is a small fringing reef at the entrance of Boqueron Bay. Stony coral colonies were present along the reef slope with a mean cover of 11.4 %.

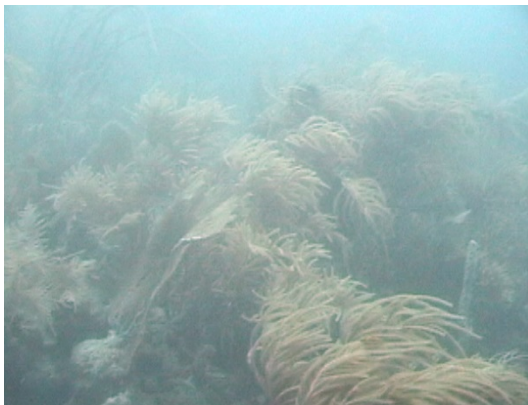
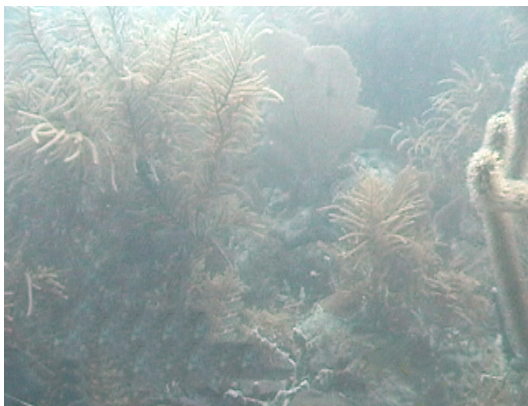


Plate 2.



Plates 2 - 3. With a mean of 28 colonies intersected per transect, soft corals were the numerically dominant sessile-benthic

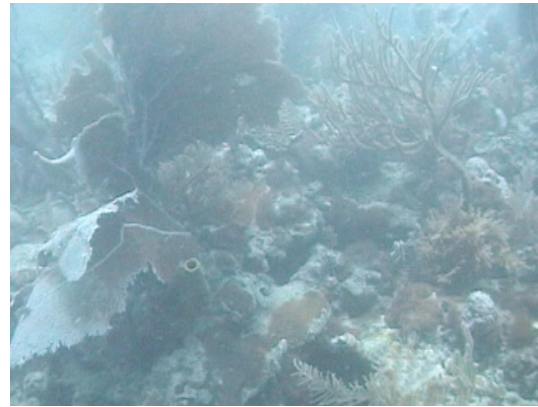


Plate 4



Plates 4 - 5. El Palo Reef evidenced a condition of advanced degradation with many standing as well as broken dead stony coral colonies



Plate 6. Dead coral sections were mostly colonized by turf algae and other encrusting biota, such as sponges and zoanthids. The algal turf was packed with fine sediments.

2.0 La Parguera Natural Reserve

General Description

La Parguera Natural Reserve was designated in 1979 and amended in 1998 to expand its marine boundaries. Its total surface area includes 12, 638 acres (DRNA, 1999). It is located due east of Cabo Rojo on the southwest section of the island. La Parguera is internationally famous for its bioluminescent bays (Bahia Fosforescente, Laguna Monsio José), but also presents some of the largest and best developed coral reefs of Puerto Rico. Coral reefs, seagrass beds and mangrove habitats coexist in La Parguera to form a marine ecosystem of unsurpassed biodiversity in Puerto Rico. The submerged shelf-edge reef of La Parguera is the most extensive and perhaps, one of the oldest coral reefs in Puerto Rico. A series of submerged patch reefs and fringing coral reefs associated with more than twenty emergent islands or keys add to the collection of coral reefs found within La Parguera Natural Reserve.

The fringing reefs of Cayo Media Luna and Cayo Turrumote in La Parguera have been included as monitoring sites of the CARICOMP program in Puerto Rico. A baseline characterization of these reefs has been previously reported (García et al. 1998a). At a depth of 10 meters the live coral cover at Cayo Media Luna (mean : 39.2 %) and Cayo Turrumote (mean : 47.0 %) rank among the highest of coral reefs surveyed at that depth (García et al., in press).

In this study, coral reef community surveys were performed at La Boya, a section of the shelf-edge reef in the outer shelf, at a hard-ground platform south off Margarita Reef, and at a submerged spur and groove reef formation located south of Turrumote (Figure 2). Georeferences and depths of reef surveys at La Parguera are presented in Table 14.

TABLE 14. GEOGRAPHIC COORDINATES OF REEFS STUDIED AT LA PARGUERA NATURAL RESERVE, LAJAS, MAY, 2000

Reef Name	Survey Date	Depth (m)	Latitude	Longitude
La Boya Reef	17-May-00	18.1	18° 00.299' N	067° 19.785' W
South of Margarita Reef	24-May-00	8.2	17° 59.470' N	067° 13.987' W
Canjilones Reef	17-July-00	3.0	18° 00.034' N	067° 12.670' W

2.1 La Boya Reef – La Parguera

2.1.1 Physical Description of La Boya Reef

La Boya Reef is part of an extensive coral reef system associated with the shelf-edge that extends from Punta Verraco to Cabo Rojo on the southwestern tip of Puerto Rico. Off from La Parguera, Lajas, La Boya Reef is approximately six nautical miles away from the coastline. The reef is a “spur and groove” formation that runs north-south, perpendicular to the shelf-edge and to the coastline. The reef starts at a depth of 17 meters, as the spurs rise from a coralline sandy bottom and ends at the shelf-edge at a depth of 22 meters. Down the shelf-edge, scattered and mostly encrusting stony coral colonies are found. Coral spurs rise up 4 - 5 meters in many sections of La Boya, separated by grooves where coralline sands are transported down the

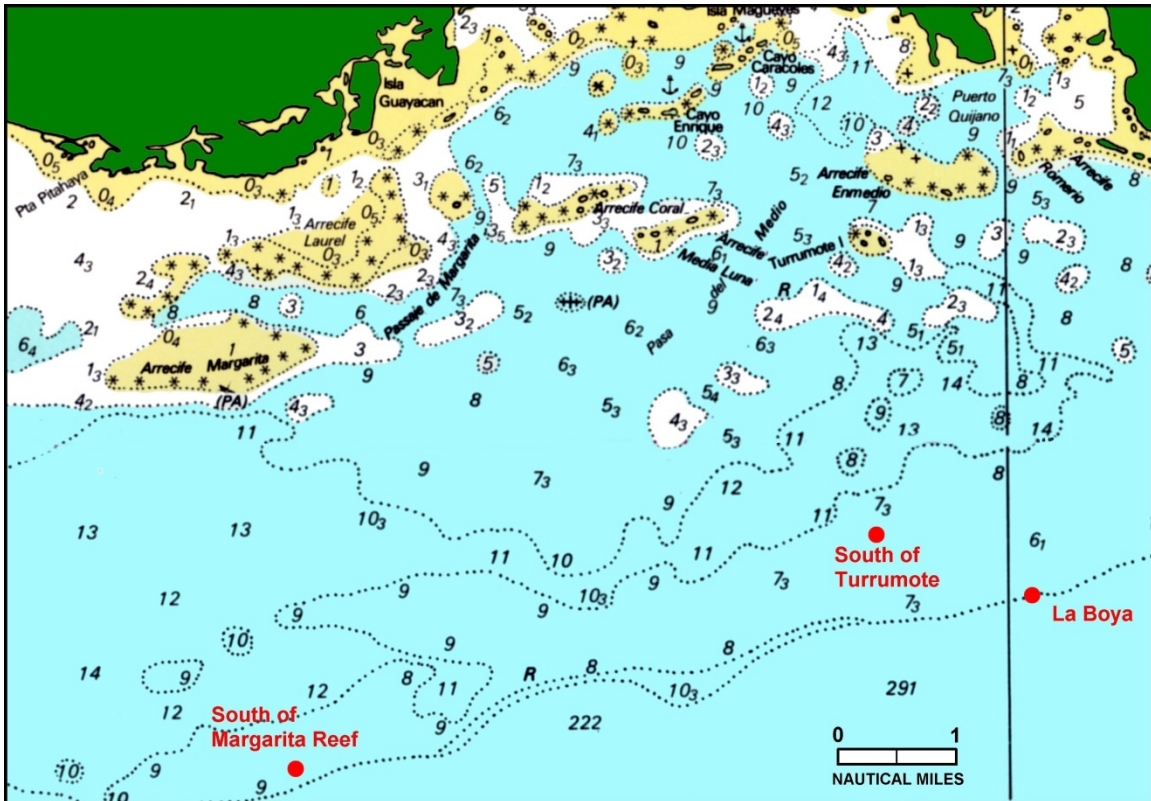


Figure 2. Location of reef surveyed at La Parguera Natural Reserve.

insular slope. The water is generally clear at La Boya, with horizontal underwater visibility normally exceeding 20 meters. Line transects were established on top of consecutive spurs, close to the shelf edge at a depth of 18 meters.

2.1.2 Sessile-Benthic Reef Community

The extensive growth of scleractinian corals was the most prominent feature of the sessile-benthic community of La Boya Reef. This is probably one of the few reefs in Puerto Rico where substrate cover by corals exceeds that of turf algae (Table 15). The mean cover by stony corals at La Boya was 41.2 % (range : 34.1 – 51.4 %). Massive, encrusting and branching coral growth forms were common at this reef. Reef overhangs, associated with the “mushroom-type” growth of Star Coral, *Montastrea annularis* and other coral species that form ledges underneath the colonies represented 12.5 % of the linear cover at La Boya. Soft corals (gorgonians) were common and colonies were intersected at all five transects surveyed, but their densities were relatively low (mean : 12 colonies/transect). The encrusting gorgonian, *Erythropodium caribaeorum*, was present in four out of the five transects surveyed with a mean linear cover of 2.5 %. Algal turf, a mixed assemblage of red articulated coralline and brown macroalgae presented a mean linear cover of 32.8 % (range : 28.9 – 36.2 %). In addition, fleshy brown and calcareous macroalgae had a mean cover of 3.8 %, for an overall linear cover by algae of approximately 37 %. Sponges, both erect and encrusting were prominent components of the sessile-benthos at La Boya Reef with a mean linear cover of 4.9 % (range : 1.3 – 11.7 %). The colonial zoanthid, *Palythoa sp.* was present, but represented a minor component of the reef sessile-benthos in terms of linear cover at La Boya Reef (mean : 0.1 %). Reef benthic community profiles are presented in Appendix 2.1-2.5.

TABLE 15. PERCENT LINEAR COVER BY SESSILE-BENTHIC CATEGORIES AT LA BOYA REEF, LA PARGUERA NATURAL RESERVE, LAJAS. MAY 2,000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	6.03	3.83	5.94	4.87	4.93	5.12
SUBSTRATE CATEGORY						
STONY CORAL	37.08	35.91	34.07	51.35	47.56	41.19
TURF ALGAE	36.21	35.34	33.06	30.55	28.86	32.80
REEF OVERHANG	17.42	7.51	17.75	4.24	15.67	12.52
SPONGE	1.31	3.25	11.67	6.19	1.88	4.86
FLESHY ALGAE	4.24	3.97	2.01	4.31	4.49	3.80
ENCRUSTING GORGONIAN	1.12	7.15	0.82	3.36		2.49
SAND		6.14			0.2	1.27
RUBBLE	2.62				1.34	0.79
HOLE		0.22	0.62			0.17
ZOANTHIDS		0.51				0.10
GORGONIANS (# colonies)	17	7	10	17	7	12

A total of 24 species of scleractinian corals and one hydrocoral (*Millepora* sp) were identified from La Boya Reef (Table 16). Boulder Star Coral, *Montastrea annularis* was the dominant species in terms of linear cover with a mean of 26.7 % (range : 20.5 – 35.8 %). Boulder Star Coral exhibited “mushroom” shaped colonies and also its thick laminar growth at La Boya. Both growth forms produced a great deal of habitat complexity by the formation of ledges underneath the colonies. Star Coral, Great Star Coral (*M. cavernosa*), Lettuce Coral (*Agaricia agaricites*) and Mustard Hill Coral (*Porites astreoides*) were intersected by all five transects surveyed at La Boya. The Finger Coral, *Porites porites* was the most abundant branching coral type, although Staghorn Coral, *Acropora cervicornis* was also present. Brain corals, *Diploria* spp., *Siderastrea siderea* and *Colpophyllia natans* were the most common massive coral forms at La Boya, in addition to the massive colonies of Boulder Star Coral.

TABLE 16. TAXONOMIC COMPOSITION AND LINEAR COVER OF STONY CORALS AT LA BOYA REEF, LA PARGUERA NATURAL RESERVE, LAJAS. MAY 2,000

CORAL SPECIES	TRANSECT					MEAN
	1	2	3	4	5	
<i>Montastrea annularis</i>	20.48	26.94	20.46	30.08	35.76	26.74
<i>Aagaricia agaricites</i>	4.13	0.94	3.52	6.33	3.67	3.72
<i>Porites astreoides</i>	3.87	1.3	1.13	3.5	2.54	2.47
<i>Montastrea cavernosa</i>	0.53	1.73	2.63	3.43	1.61	1.99
<i>Diploria labyrinthiformis</i>		2.75		3.97	0.19	1.38
<i>Porites furcata</i>	4.31				0.19	0.90
<i>Porites porites</i>	0.88	0.41	1.32	1.68		0.86
<i>Meandrina meandrites</i>	0.87		1.95		0.66	0.70
<i>Colpophyllia natans</i>					2.75	0.55
<i>Eusmilia fastigiata</i>				2.36		0.47
<i>Diploria strigosa</i>			1.59			0.32
<i>Acropora cervicornis</i>		1.53				0.31
<i>Siderastrea siderea</i>	0.26	0.31	0.94			0.30
<i>Dichocoenia stokesii</i>	0.79					0.16
<i>Mycetophyllia lamarckiana</i>	0.7					0.14
<i>Millepora alcicornis</i>			0.53			0.11
<i>Scolymia</i> sp.	0.26					0.05
<i>Madracis decactis</i>					0.19	0.04
Outside Transects :						
<i>Dendrogyra cilindrus</i>						
<i>Isophyllia rigida</i>						
<i>Isophyllia sinuosa</i>						
<i>Leptoseris cucullata</i>						
<i>Mycetophyllia ferox</i>						
<i>Stephanocoenia michilini</i>						

2.1.3 Fishes and Motile Megabenthic Invertebrates

A total of 55 fish species were identified during our visual surveys at La Boya Reef, 38 of which were present within belt-transect areas (Table 17). The mean number of species per transect was 24 (range 20 – 27), and the mean density of fishes was 70.4 Individuals/30 m² (range : 51 - 87 Individuals/30 m²). Six species represented approximately 59 % of the total individuals within transect areas. The numerically dominant fish assemblage included the Blue Chromis (*Chromis cyanea*), the Bluehead and Yellowhead wrasses (*Thalassoma bifasciatum*, *Halichoerers garnoti*), the Striped and Stoplight parrotfishes (*Scarus iserti*, *Sparisoma viride*), and the Bicolor Damsselfish (*Stegastes partitus*). Damsselfishes (Pomacentridae) and parrotfishes (Scaridae) were the most specious fish families with five species each. Herbivorous taxa included parrotfishes, doctorfishes (Acanthuridae) and “farmer damsselfishes” (e.g. *Stegastes dorsopunicans*, *S. planifrons* - Pomacentridae). The combined herbivorous assemblage represented approximately 18 % of the total individuals within belt-transect areas. Opportunistic carnivores which feed on small benthic invertebrates, such as wrasses (Labridae), puffers (Tetraodontidae), gobies (Gobiidae), hamlets (*Hypoplectrus* spp.- Serranidae), squirrelfishes (Holocentridae) and goatfishes (Mullidae) represented about 33 % of the total individuals. The zooplanktivorous fish assemblage recorded within transect areas represented approximately 42 % of the total individuals and included the Blue and (*Chromis cyanea*, *C. multilineata*) the Bicolor Damsselfish (*Stegastes partitus*), the Black Durgon (*Melichthys niger*) and the Masked Goby (*Coryphopterus personatus*). Also a zooplankton feeder, the Creole Wrasse (*Clepticus parrae*) was present in large schools outside transect areas. Predators of larger reef invertebrates and small demersal fishes included several species of grunts (Haemulidae), snappers (Lutjanidae), groupers (Serranidae), Moray Eels (Muraenidae) and hogfishes (Labridae). Within this group, several species of high commercial value included the Mahogany, Schoolmaster and Yellowtail snappers (*Lutjanus mahogany*, *L. apodus* and *Ocyurus chrysurus*). Other fish species of commercial value not observed during this survey that are known from this reef include the Hogfish, Red Hind and Nassau groupers, and the Mutton, Lane and Cubera snappers, among others. Pelagic predators, such as the Great Barracuda, Cero Mackerel and the Bar Jack were also present at La Boya Reef during our snapshot survey of the fish fauna at La Boya Reef.

Undoubtedly, this taxonomic characterization falls short of providing a complete list of the resident and transient ichthyofauna associated with La Boya Reef. Additional surveys are needed to construct a more comprehensive characterization of the fish community. One Spanish Lobster, *Scyllarides* sp., was observed within belt-transect areas at La Boya Reef (Table 18).

TABLE 17. TAXONOMIC COMPOSITION AND ABUNDANCE OF FISHES AT LA BOYA REEF, LA PARGUERA NATURAL RESERVE, LAJAS. MAY 2000

DEPTH: 18.1 m

FISH SPECIES	COMMON NAME	TRANSECTS					MEAN
		1	2	3	4	5	
		(individuals/30 m2)					
<i>Chromis cyanea</i>	Blue Chromis	6	12	8	26	12	12.8
<i>Stegastes partitus</i>	Bicolor Damsselfish	7	12	14	13	11	11.4
<i>Thalassoma bifasciatum</i>	Blue-head Wrasse	9	12	1	14	7	8.6
<i>Scarus iserti</i>	Striped Parrotfish	5	5	4	1	3	3.6
<i>Halichoeres garnoti</i>	Yellowhead Wrasse	0	3	4	3	4	2.8
<i>Sparisoma viride</i>	Stoplight Parrotfish	1	5	1	4	2	2.6
<i>Acanthurus bahianus</i>	Ocean Surgeon	1	1	3	2	4	2.2

Table 17. Continued

<i>Coryphopterus personatus</i>	Masked Goby	0	4	6	0	1	2.2
<i>Myripristis jacobus</i>	Black-bar Soldierfish	4	0	4	1	2	2.2
<i>Chromis multilineata</i>	Brown Chromis	4	2	0	4	0	2.0
<i>Chaetodon capistratus</i>	Four-eye Butterflyfish	2	2	2	0	2	1.6
<i>Gobiosoma evelynae</i>	Sharknose Goby	0	1	1	3	2	1.4
<i>Petrometopon cruentatus</i>	Graysbe	1	1	1	1	2	1.2
<i>Sparisoma aurofrenatum</i>	Red-band Parrotfish	1	1	2	1	1	1.2
<i>Stegastes planifrons</i>	Yellow Damselfish	0	2	1	1	2	1.2
<i>Coryphopterus sp.</i>	Goby	1	0	0	3	1	1.0
<i>Mulloides martinicus</i>	Yellowtail Goatfish	0	4	1	0	0	1.0
<i>Scarus taeniopterus</i>	Princess Parrotfish	1	0	0	4	0	1.0
<i>Acanthurus chirurgus</i>	Doctorfish	1	1	1	0	1	0.8
<i>Aulostomus maculatus</i>	Trumpetfish	1	1	1	1	0	0.8
<i>Haemulon flavolineatum</i>	French Grunt	0	2	1	1	0	0.8
<i>Holocentrus rufus</i>	Squirrelfish	1	0	0	2	1	0.8
<i>Melichthys niger</i>	Black Durgon	0	2	1	0	1	0.8
<i>Scarus vetula</i>	Queen Parrotfish	2	1	0	0	1	0.8
<i>Acanthurus coeruleus</i>	Blue Tang	0	1	0	0	2	0.6
<i>Flammeo marianus</i>	Longspine Squirrelfish	0	1	0	0	2	0.6
<i>Gramma loreto</i>	Royal Gramma	0	2	0	1	0	0.6
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish	0	0	3	0	0	0.6
<i>Ophioblennius atlanticus</i>	Redlip Blenny	0	1	2	0	0	0.6
<i>Bodianus rufus</i>	Spanish Hogfish	0	1	0	0	1	0.4
<i>Canthigaster rostrata</i>	Sharnose Puffer	0	1	0	0	1	0.4
<i>Holocentrus ascensionis</i>	Longjaw Squirrelfish	0	0	1	0	1	0.4
<i>Lactophrys bicaudalis</i>	Spotted Trunkfish	0	1	0	0	1	0.4
<i>Carangoides ruber</i>	Black-bar Jack	0	0	0	0	1	0.2
<i>Chaetodon aculeatus</i>	Longsnout Butterflyfish	0	0	0	1	0	0.2
<i>Gymnothorax sp.</i>	Moray Eel	1	0	0	0	0	0.2
<i>Lactophrys triqueter</i>	Smooth Trunkfish	1	0	0	0	0	0.2
<i>Serranus tigrinus</i>	Harlequin Bass	1	0	0	0	0	0.2
	TOTAL INDIVIDUALS	51	82	63	87	69	70.4
	TOTAL SPECIES	20	27	24	20	27	24

Outside transects:

<i>Anisotremus virginicus</i>	Porkfish
<i>Clepticus parrae</i>	Creole Wrasse
<i>Haemulon macrostomum</i>	Spanish Grunt
<i>Lutjanus mahogani</i>	Mahogani Snapper
<i>Lutjanus synagris</i>	Lane Snapper
<i>Ocyurus chrysurus</i>	Yellowtail Snapper
<i>Priacanthus cruentatus</i>	Glasseye
<i>Haemulon plumieri</i>	White Grunt
<i>Lutjanus apodus</i>	Schoolmaster Snapper
<i>Sphyræna barracuda</i>	Great Barracuda

Table 17. Continued

<i>Scomberomorus regalis</i>	Cero
<i>Pomacanthus arcuatus</i>	Gray Angelfish
<i>Holacanthus ciliaris</i>	Queen Angelfish
<i>Chaetodon striatus</i>	Banded Butterflyfish
<i>Holacanthus tricolor</i>	Rock Beauty
<i>Scarus coelestinus</i>	Midnight Parrotfish
<i>Malacanthus plumieri</i>	Sand Tilefish

TABLE 18. TAXONOMIC COMPOSITION AND ABUNDANCE OF MEGA-BENTHIC INVERTEBRATES AT LA BOYA REEF, LA PARGUERA NATURAL RESERVE, LAJAS. MAY 2000

		TRANSECTS					MEAN ABUNDANCE (IND/30 m ²)
Depth: 18.1 m		1	2	3	4	5	
SPECIES	COMMON NAME						
<i>Scyllarides sp.</i>	Spanish lobster			1			0.2
	TOTALS	0	0	1	0	0	0.2

2.1.4 Photo Album - La Boya Reef, La Parguera

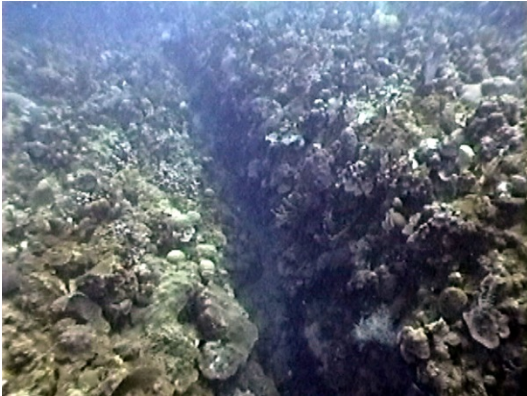


Plate 1. La Boya Reef is an extensive spur and groove formation at the shelf-edge off La Parguera. In many sections, the reef spurs rise up to 4-5 meters from the base.

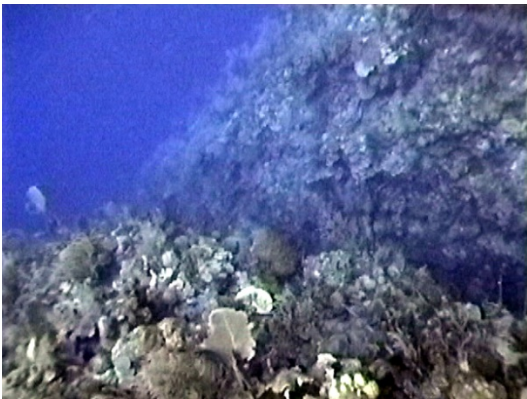


Plate 2. The reef drops down abruptly at a depth of approximately 20 meters creating a coral wall down to depths of 30 meters.

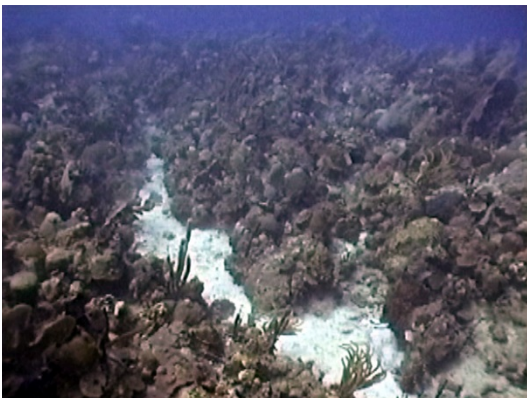


Plate 3. Reef spurs diminish in size shoreward, ending in an extensive sand basin.

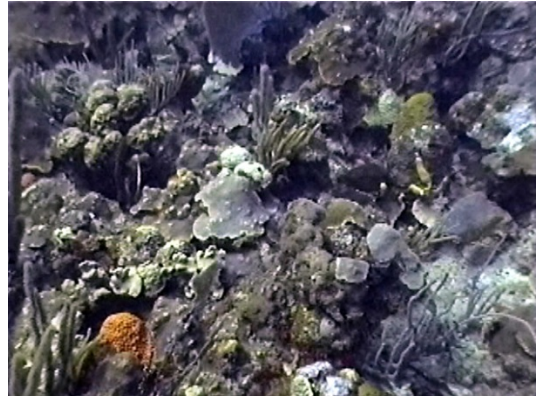
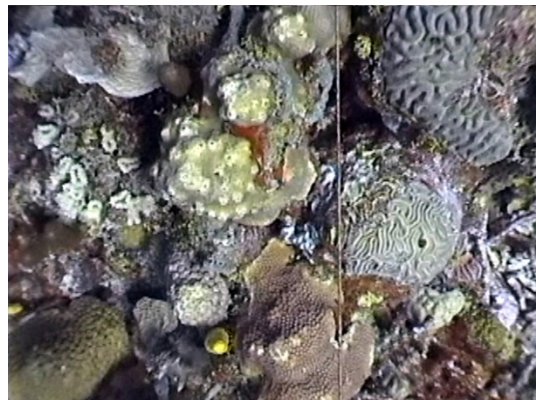


Plate 4



Plates 4 - 5. With a total of 18 species intercepted by line transects, the lush growth of scleractinian corals was the most prominent feature of the sessile-benthic community at La Boya Reef



Plate 6. La Boya is one of the few coral reef systems in Puerto Rico where mean live coral cover (e.g. 41.2 %) exceeds that of benthic algae (32.8 %).



Plate 7



Plates 7 – 8. Soft corals (gorgonians) were present in relatively low abundance with a mean of 12 colonies intercepted per transect. Evidently, scleractinian corals have claimed extensive space at this reef.



Plate 9. A total of 55 fish species were identified during our snapshot survey at La Boya Reef. Undoubtedly, much more species are present and additional surveys are needed for a more comprehensive characterization of the fish community at this reef.

Margarita Hard Ground Reef – La Parguera

2.2.1 Physical Description of Margarita Hard Ground Reef

At approximately three nautical miles due south from Margarita Reef there is an extensive hard ground reef that comes up as a ridge from a sandy bottom at a depth of 22 meters to a mostly flat platform at a depth of 14 meters (Fig. 2). The hard ground platform leads to the shelf-edge. There were no “spur and groove” or patch reef formations within the hard ground. Most of the stony coral development was concentrated along the walls at the base of the ridge. Our survey was performed on top of the ridge at a depth of 14 meters. Transects were installed on a north–south axis, perpendicular to the shelf edge.

2.2.2 Sessile-Benthic Reef Community

Soft corals (gorgonians) represent the most prominent component of the sessile-benthic community at the Margarita Hard Ground Reef. The mean number of colonies intersected by linear transects was 39 (range : 35 – 44 colonies/transect). Table 19 presents the linear cover by sessile-benthic categories from linear transects surveyed at this reef. Most of the colonies were of small to medium sizes. The encrusting gorgonian, *Erythropodium caribbaeorum* was present in low amounts in the reef. In terms of linear cover, the algal turf was the dominant biological assemblage, with a mean cover of 74.9 % (range : 61.8 – 83.5 %). Fleshy brown (*Dictyota* sp.) and calcareous (*Halimeda* sp) macroalgae were present at all transects with a mean linear cover of 5.2 %. Thus, the total cover by algae at this reef was approximately 80 %. Stony corals, mostly represented by encrusting and small mound growth forms ranked second in linear cover with a mean of 9.2 % (range : 4.1 – 14.0 %). The mean rugosity along linear transects was 1.5 %. Such low rugosity was influenced by the lack of vertically projected coral colonies and the mostly flat reef platform. Sponges, both erect and encrusting (*Xestospongia muta*, *Aplysina* sp., *Agelas* sp., *Callispongia* sp., *Ircina* sp) were common at the hard ground reef with a mean linear cover of 6.1 % (range : 1.0 – 15.0 %). Abiotic substrates, including reef overhangs, sand and silt combined for a linear cover of approximately 4.3%. Reef benthic community profiles are presented in Appendix 2.6 - 2.10.

A total of 17 species of scleractinian corals and one hydrocoral (*Millepora* sp) were identified from the Margarita Hard Ground Reef (Table 20). Star Coral, *Montastrea annularis* was the dominant species in terms of linear cover with a mean of 5.2 % (range : 1.2 – 11.8 %). Of the 13 stony coral species identified within transect lines, the Star Coral was the only species present at all transects. It was mostly found growing as small mound-shaped colonies, sometimes associated with erect sponges forming sponge-coral bioherms at the hard ground reef. Mustard Hill Coral, Lettuce Coral and Symmetrical Brain Coral (*Diploria strigosa*) were present in four transects. The brain corals, *Diploria* spp., *Siderastera siderea* and Pillar Coral, *Dendrogyra cylindrus*, were the most common massive coral forms at Margarita Hard Ground Reef, in addition to the massive colonies of Star Coral. The branching Staghorn Coral, *Acropora cervicornis* was also present outside transects.

TABLE 19. PERCENT LINEAR COVER BY SESSILE-BENTHIC CATEGORIES AT SOUTH OF MARGARITA REEF, LA PARGUERA NATURAL RESERVE, LAJAS. MAY 2,000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	1.83	1.65	1.75	1.17	0.99	1.48
SUBSTRATE CATEGORY						
TURF ALGAE	61.85	82.92	72.08	83.52	74.13	74.90
STONY CORALS	10.74	4.12	12.33	13.97	5.1	9.25
SPONGES	8.54	2.92	3.15	0.98	15.03	6.12
FLESHY ALGAE	11.42	4.64	3.74	0.63	5.74	5.23
REEF OVERHANG	6.77	4.46	6.54	0.9		3.73
SAND		0.94	1.68			0.52
ENCRUSTING GORGONIAN	0.68					0.14
SILT			0.48			0.10
GORGONIANS (# col)	41	37	44	37	35	39

TABLE 20. TAXONOMIC COMPOSITION AND LINEAR COVER OF STONY CORALS AT SOUTH OF MARGARITA REEF, LA PARGUERA NATURAL RESERVE, LAJAS. MAY 2,000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	1.83	1.65	1.75	1.17	0.99	1.48
CORAL SPECIES						
<i>Montastrea annularis</i>	6.93	1.22	4.6	11.82	1.18	5.15
<i>Agaricia agaricites</i>	0.84	0.6	3.21		1.28	1.19
<i>Dichocoenia stokesii</i>			2.72		0.64	0.67
<i>Diploria strigosa</i>	0.84	0.24		0.76	0.73	0.51
<i>Porites astreoides</i>	0.71		0.36		0.77	0.37
<i>Stephanocoenia michilini</i>	1.42					0.28
<i>Isophyllastrea rigida</i>				1.39		0.28
<i>Diploria labyrinthiformis</i>		0.74	0.36			0.22
<i>Siderastrea siderea</i>		0.6	0.36			0.19
<i>Siderastrea sp.</i>					0.51	0.10
<i>Madracis decactis</i>		0.24	0.24			0.10
<i>Montastrea cavernosa</i>		0.48				0.10
<i>Siderastrea radians</i>			0.48			0.10

2.2.3 Fishes and Motile Megabenthic Invertebrates

A total of 59 fish species were identified during our visual survey at Margarita Hard Ground Reef, 27 of which were present within belt-transect areas (Table 21). The mean number of species per transect was 15 (range 13 – 17), and the mean density of fishes was 33.4 Individuals/30 m² (range : 21 - 56 Individuals/30 m²). Six species represented approximately 65 % of the total individuals within transect areas. The numerically dominant fish assemblage included the Bluehead Wrasse (*Thalassoma bifasciatum*), the Bicolor Damselfish (*Stegastes partitus*), the Four-eye Butterflyfish (*Chaetodon capistratus*) and the Red-band, Princess and Striped parrotfishes (*Sparisoma aurofrenatum*, *Scarus taeniopterus*, *S. iserti*). Parrotfishes (Scaridae), represented by five species were the most specious fish family within belt-transect areas. Herbivorous taxa included mostly parrotfishes and doctorfishes (Acanthuridae). The combined herbivorous assemblage represented approximately 32 % of the total individuals within belt-transect areas. Opportunistic carnivores which feed on small benthic invertebrates, such as wrasses (Labridae), puffers (Tetraodontidae), gobies (Gobiidae), hamlets (*Hypoplectrus* spp.-Serranidae), squirrelfishes (Holocentridae) and goatfishes (Mullidae) represented about 48 % of the total individuals. The zooplanktivorous fish assemblage recorded within transect areas represented approximately only about 10 % of the total individuals and included the Bicolor Damselfish (*Stegastes partitus*) and the Black Durgon (*Melichthys niger*). Predators of larger reef invertebrates and small demersal fishes included several species of grunts (Haemulidae), snappers (Lutjanidae), groupers (Serranidae), Moray Eels (Muraenidae) and hogfishes (Labridae). Within this group, several species of high commercial value included the Schoolmaster and Lane snappers (*Lutjanus apodus*, *L. synagris*), the Red Hind (*Epinephelus guttatus*) and the Hogfish (*Lachnolaimus maximus*). Pelagic predators, such as the Great Barracuda were also present at Margarita Hard Ground Reef during our snapshot survey of the reef community. No motile megabenthic invertebrates were detected within belt-transect areas.

TABLE 21. TAXONOMIC COMPOSITION AND ABUNDANCE OF FISHES SOUTH OF MARGARITA REEF, LA PARGUERA NATURAL RESERVE, LAJAS. MAY 2000

DEPTH: 14.5 m		TRANSECTS					MEAN
		1	2	3	4	5	
<i>FISH SPECIES</i>	COMMON NAME	(individuals/30 m ²)					
<i>Thalassoma bifasciatum</i>	Blue-head Wrasse	2	16	0	0	26	8.8
<i>Stegasres partitus</i>	Bicolor Damselfish	3	4	4	1	3	3.0
<i>Chaetodon capistratus</i>	Four-eye Butterflyfish	3	2	1	5	3	2.8
<i>Sparisoma aurofrenatum</i>	Red-band Parrotfish	2	2	3	1	6	2.8
<i>Scarus taeniopterus</i>	Princess Parrotfish	1	4	2	3	2	2.4
<i>Scarus iserti</i>	Striped Parrotfish	4	0	5	1	0	2.0
<i>Acanthurus bahianus</i>	Ocean Surgeon	2	2	2	1	1	1.6
<i>Holocentrus rufus</i>	Squirrelfish	1	2	1	2	2	1.6
<i>Halichoeres garnoti</i>	Yellowhead Wrasse	1	1	3	1	1	1.4
<i>Acanthurus coeruleus</i>	Blue Tang	1	0	1	1	1	0.8
<i>Halichoeres maculipinna</i>	Clown Wrasse	0	1	0	0	3	0.8
<i>Petrometopon cruentatus</i>	Graysbe	1	1	1	0	1	0.8
<i>Haemulon sciurus</i>	Bluestriped Grunt	1	0	1	0	1	0.6
<i>Acanthurus chirurgus</i>	Doctorfish	1	0	0	0	1	0.4
<i>Cephalopholis fulva</i>	Coney	0	0	0	0	2	0.4
<i>Holocentrus ascencionis</i>	Longjaw Squirrelfish	0	1	1	0	0	0.4
Table 21. Continued							
<i>Melichthys niger</i>	Black Durgon	0	0	1	0	1	0.4
<i>Pseudupeneus maculatus</i>	Spotted Goatfish	0	1	0	1	0	0.4

<i>Scarus vetula</i>	Queen Parrotfish	0	0	1	1	0	0.4
<i>Anisotremus virginicus</i>	Porkfish	0	0	1	0	0	0.2
<i>Canthigaster rostrata</i>	Sharpnose Puffer	0	0	0	1	0	0.2
<i>Equetus punctatus</i>	Spotted Drum	0	1	0	0	0	0.2
<i>Gobiosoma evelynae</i>	Sharknose Goby	0	0	0	0	1	0.2
<i>Haemulon flavolineatum</i>	French Grunt	0	0	0	1	0	0.2
<i>Scorpaena plumieri</i>	Spotted Scorpionfish	1	0	0	0	0	0.2
<i>Serranus tigrinus</i>	Harlequin Bass	0	0	0	0	1	0.2
<i>Sparisoma viride</i>	Stoplight Parrotfish	0	0	0	1	0	0.2
	TOTAL INDIVIDUALS	24	38	28	21	56	33.4
	TOTAL SPECIES	14	13	15	14	17	15

Outside transects:

<i>Abudefduf sexatilis</i>	Sergeant Major
<i>Aulostomus maculatus</i>	Trumpetfish
<i>Bodianus rufus</i>	Spanish Hogfish
<i>Cantherhines pullus</i>	Tail-light Filefish
<i>Carangoides ruber</i>	Bar Jack
<i>Chaetodon striatus</i>	Banded Butterflyfish
<i>Chromis multilineata</i>	Brown Chromis
<i>Epinephelus guttatus</i>	Red Hind
<i>Equetus lanceolatus</i>	Jackknife Fish
<i>Flammeo marianus</i>	Longspine Squirrelfish
<i>Gymnothorax moringa</i>	Spotted Moray
<i>Gymnothorax sp.</i>	Moray Eel
<i>Haemulon carbonarium</i>	Caesar Grunt
<i>Haemulon macrostomum</i>	Spanish Grunt
<i>Haemulon plumieri</i>	White Grunt
<i>Halichoeres bivittatus</i>	Slippery Dick
<i>Holacanthus ciliaris</i>	Queen Angelfish
<i>Holacanthus tricolor</i>	Rock Beauty
<i>Hypoplectrus chlorurus</i>	Yellowtail Hamlet
<i>Hypoplectrus unicolor</i>	Butter Hamlet
<i>Lachnolaimus maximus</i>	Hogfish
<i>Lutjanus apodus</i>	Schoolmaster Snapper
<i>Lutjanus synagris</i>	Lane Snapper
<i>Mulloides martinicus</i>	Yellowtail Goatfish
<i>Myripristis jacobus</i>	Black-bar Souldierfish
<i>Ophioblennius atlanticus</i>	Redlip Blenny
<i>Pomacanthus paru</i>	French Angelfish
<i>Scarus coelestinus</i>	Midnight Parrotfish
<i>Scomberomorus regalis</i>	Cero
<i>Sparisoma radians</i>	Bucktooth Parrotfish
<i>Sparisoma rubripinne</i>	Yellowtail Parrotfish
<i>Sphyrnaena barracuda</i>	Great Barracuda

**2.2.4 Photo Album- Margarita Hard
Ground Reef, La Parguera**

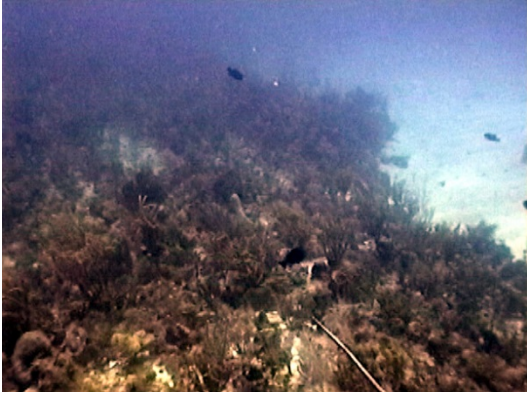


Plate 1.

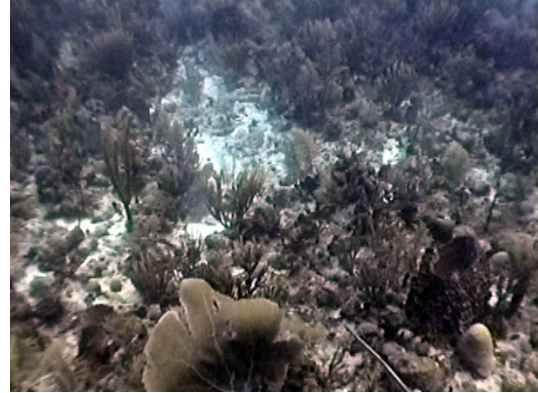
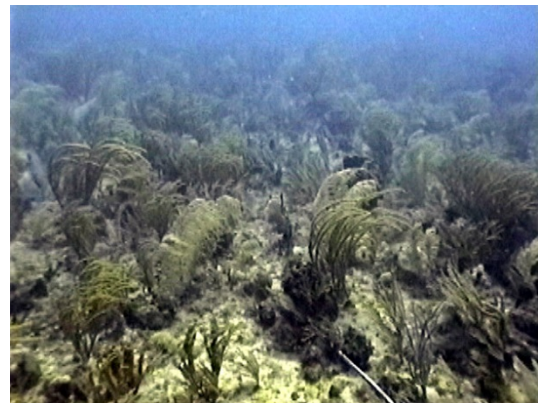


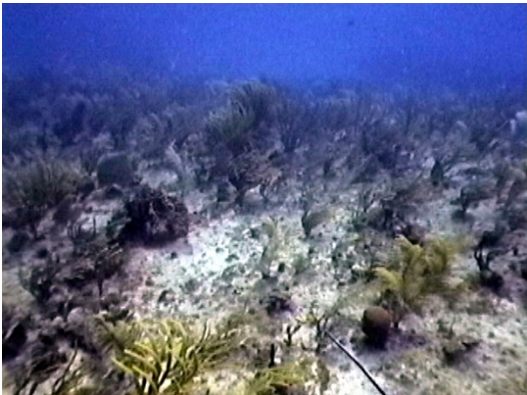
Plate 4



Plate 2.



Plates 4 – 5. Soft corals (gorgonians) were the most prominent sessile-benthic invertebrate component of the reef with a mean of 39 colonies intercepted per transect. Stony corals occurred mostly as small, encrusting colonies with a mean surface cover of 9.2 %.



Plates 1 – 3. South of Margarita Reef, La Parguera, there is an extensive hard ground reef system that comes up as a ridge from a sandy bottom at a depth of 22 meters to a mostly flat platform at a depth of 14 meters.

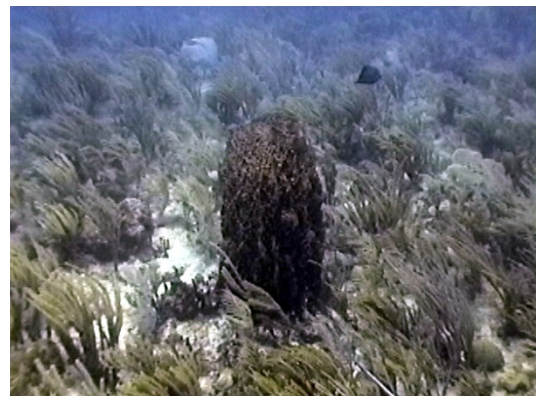


Plate 6. Erect and encrusting sponges were present at all transects surveyed and ranked third in surface cover with a mean of 6.1 %.



Plate 7. With a mean linear cover of 74.9 % a fine and short-cut algal turf was the dominant sessile-benthic assemblage at Margarita Hard Ground Reef.



Plate 8. A total of 61 fish species were identified during our visual survey at Margarita Hard Ground Reef.



Plate 9. With an average of 15 species and 25 individuals per belt-transect, Margarita Hard Ground Reef presented a relatively poor ichthyofauna as compared to other reefs in La Parguera.

2.3 Canjilones Reef – La Parguera

2.3.3 Physical Description of Canjilones Reef

At about two nautical miles south of Cayo Turrumote a “spur and groove” reef formation lies submerged at a depth of 15 meters. The spurs of the reef, where most of the coral growth is concentrated are aligned north-south, perpendicular to the shoreline. The reef extends over one nautical mile towards the shelf-edge as a series of discontinuous spurs, locally known as “canjilones”. Reef spurs are separated from each other by coralline sand channels. The spurs range in height from 2 – 4 meters in reef sections surveyed. Water transparency was at least 20 meters during our survey.

2.3.2 Sessile-Benthic Reef Community

A dense algal turf intermixed with clusters of fleshy brown macroalgae (mostly *Dictyota sp.*) was the dominant biological assemblage at Canjilones Reef with a combined linear cover of approximately 70.2% (Table 22). The algal turf was found overgrowing most of the available hard ground substrate. There was no indication of massive overgrowth of dead coral colonies. Soft coral (gorgonian) colonies were abundant (mean = 29 colonies/transect), and represented the main feature providing protective habitat at this reef. Substrate rugosity was relatively low (mean : 2.67meters), due in part to the low abundance and small size of stony coral colonies. Live stony corals presented a mean linear cover of 17.7 % (range : 9.3 – 24.3 %) and were present mostly as encrusting colonies. Vertically projected coral colonies of large size were rare at this reef. Reef overhangs ranked third in terms of linear cover by substrate categories with a mean of 8.1 %. These were largely associated with discontinuities of the reef hard ground. Colonial zoanthids (*Palythoa sp.*) and the encrusting gorgonian (*Erythropodium caribaeorum*) colonized small sections of the reef hard substrates. Their combined linear cover was 1.8 %. Reef benthic community profiles are presented in Appendix 2.11 – 2.15.

TABLE 22. PERCENT LINEAR COVER BY SESSIL-BENTHIC CATEGORIES AT CANJILONES REEF, LA PARGUERA NATURAL RESERVE, LAJAS. MAY 2,000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	2.3	2.34	2.24	3.72	2.75	2.67
SUBSTRATE CATEGORY						
TURF ALGAE	62.71	70.43	79.67	54.26	72.55	67.92
STONY CORAL	24.29	13.61	9.31	24.03	17.25	17.70
REEF OVERHANG	8.61	8.02	4.17	11.73	8.16	8.14
FLESHY ALGAE	1.06	3.41	2.61	3.93	0.55	2.31
SPONGES	2.52	0.89	2.53	4.01	0.63	2.12
ZOANTHIDS	0.57	1.05	0.65	1.46	0.86	0.92
ENCRUSTING GORGONIAN	0.24	2.59	1.06	0.58		0.89
GORGONIAN (# colonies)	36	24	30	36	19	29

A total of 22 scleractinian corals and one hydrocoral (*Millepora alcicornis*). were identified during our snapshot survey at Canjilones Reef in La Parguera (Table 23). Boulder Star Coral, (*Montastrea annularis*), Lettuce Coral (*Agaricia agaricites*), Massive Starlet Coral (*Siderastrea siderea*) and Symmetrical

Brain Coral (*Diploria strigosa*) were the dominant coral species in terms of linear cover with means of 5.7 %, 3.8 %, 2.3 % and 1.9 %, respectively. Their combined linear cover represented 77.4 % of the total cover by stony corals at this reef. Colonies of the first three species were common and intersected by all five transects surveyed. Corals were mostly present as isolated colonies, contributing only slightly to the overall substrate relief and habitat complexity.

TABLE 23. TAXONOMIC COMPOSITION AND LINEAR COVER OF STONY CORALS AT CANJILONES REEF, LA PARGUERA NATURAL RESERVE, LAJAS. MAY 2,000

CORAL SPECIES	TRANSECT					MEAN
	1	2	3	4	5	
<i>Montastrea annularis</i>	3.09	3.58	3.34	12.54	5.74	5.66
<i>Agaricia agaricites</i>	6.67	5.35	1.63	2.84	2.36	3.77
<i>Siderastrea siderea</i>	4.23	0.68	0.34	3.43	2.67	2.27
<i>Diploria strigosa</i>	7.56		0.69	1.13		1.88
<i>Porites astreoides</i>	0.8	0.68	1.14	0.8	0.44	0.77
<i>Dendrogyra cylindrus</i>					3.76	0.75
<i>Agaricia sp.</i>				2.26	1.18	0.69
<i>Madracis decactis</i>	0.57	0.68	0.34		1.1	0.54
<i>Montastrea cavernosa</i>		1.38				0.28
<i>Diploria labyrinthiformis</i>	1.37					0.27
<i>Isophyllastrea rigida</i>		0.46		0.72		0.24
<i>Madracis pharensis</i>			0.8			0.16
<i>Meandrina meandrites</i>			0.57	0.21		0.16
<i>Millepora alcicornis</i>		0.46		0.1		0.11
<i>Mycetophyllia lamarckiana</i>			0.46			0.09
<i>Leptoseris cucullata</i>		0.34				0.07
Outside Transects :						
<i>Porites porites</i>						
<i>Agaricia fragilis</i>						
<i>Dichocoenia stokesii</i>						
<i>Mussa sp.</i>						
<i>Eusmilia fastigiata</i>						
<i>Colpophyllia natans</i>						
<i>Acropora cervicornis</i>						

2.3.4 Reef Fishes and Motile Megabenthic Invertebrates

A total of 48 fish species were identified during our visual survey at Canjilones Reef, 32 of which were present within belt-transect areas (Table 24). The mean number of species per transect was 19 (range

16 – 21), and the mean density of fishes was 44 Individuals/30 m² (range : 32 - 60 Individuals/30 m²). Eight species represented approximately 66 % of the total individuals within transect areas. The numerically dominant fish assemblage included the Bluehead Wrasse (*Thalassoma bifasciatum*), the Bicolor Damselfish (*Stegastes partitus*), the Sharknose Goby (*Gobiosoma evelynae*), the Yellowhead Wrasse (*Halichoeres garnoti*) and the assemblage of Red-band, Princess, Striped and Bucktooth parrotfishes (*Sparisoma aurofrenatum*, *Scarus taeniopterus*, *S. iserti*, *Sparisoma radians*). Parrotfishes (Scaridae), represented by five species were the most speciose fish family within belt-transect areas. Two additional parrotfishes were observed outside transect areas. Herbivorous taxa included mostly parrotfishes and doctorfishes (Acanthuridae). The combined herbivorous assemblage represented approximately 32 % of the total individuals within belt-transect areas. Opportunistic carnivores which feed on small benthic invertebrates, such as wrasses (Labridae), puffers (Tetraodontidae), gobies (Gobiidae), hamlets (*Hypoplectrus* spp.- Serranidae), squirrelfishes (Holocentridae) and goatfishes (Mullidae) represented about 28 % of the total individuals. The zooplanktivorous fish assemblage recorded within transect areas included the Bicolor Damselfish (*Stegastes partitus*) and the Blue Chromis (*Chromis cyanea*), representing about 12 % of the total individuals within belt-transects. Predators of larger reef invertebrates and small demersal fishes included several species of grunts (Haemulidae), snappers (Lutjanidae), and groupers (Serranidae). The Bar Jack (*Carangoides ruber*) was the only pelagic species observed. Aside from a few Schoolmaster Snappers (*Lutjanus apodus*) and Coneys (*Cephalopholis fulva*) the occurrence of commercially important fishes was notoriously lacking. No motile megabenthic invertebrates were detected within belt-transect areas.

TABLE 24. TAXONOMIC COMPOSITION AND ABUNDANCE OF FISHES AT CANJILONES REEF, LA PARGUERA NATURAL RESERVE, LAJAS. MAY 2000

DEPTH: 13.6 m

FISH SPECIES	COMMON NAME	TRANSECTS					MEAN
		1	2	3	4	5	
		(individuals/30 m ²)					
<i>Thalassoma bifasciatum</i>	Blue-head Wrasse	2	7	11	2	11	6.6
<i>Stegasres partitus</i>	Bicolor Damselfish	1	6	10	2	4	4.6
<i>Gobiosoma evelynae</i>	Sharknose Goby	3	4	6	3	4	4.0
<i>Scarus iserti</i>	Striped Parrotfish	4	2	8	2	1	3.4
<i>Sparisoma radians</i>	Bucktooth Parrotfish	1	3	5	3	4	3.2
<i>Halichoeres garnoti</i>	Yellowhead Wrasse	0	3	2	4	5	2.8
<i>Sparisoma aurofrenatum</i>	Red-band Parrotfish	4	3	1	2	2	2.4
<i>Scarus taeniopterus</i>	Princess Parrotfish	5	2	0	1	3	2.2
<i>Haemulon flavolineatum</i>	French Grunt	2	1	2	1	1	1.4
<i>Chaetodon capistratus</i>	Four-eye Butterflyfish	2	2	2	0	1	1.4
<i>Acanthurus bahianus</i>	Ocean Surgeon	2	2	1	2	0	1.4
<i>Canthigaster rostrata</i>	Sharpnose Puffer	3	2	0	1	1	1.4
<i>Holocentrus rufus</i>	Squirrelfish	2	1	1	1	1	1.2
<i>Acanthurus chirurgus</i>	Doctorfish	1	1	1	0	1	0.8
<i>Serranus tigrinus</i>	Harlequin Bass	1	0	2	1	0	0.8
<i>Mycrospathodon chrysurus</i>	Yellowtail Damselfish	0	1	1	1	1	0.8
<i>Cephalopholis fulva</i>	Coney	1	1	0	1	0	0.6
Table 24. Continued							
<i>Aulostomus maculatus</i>	Trumpetfish	0	1	1	1	0	0.6
<i>Petrometopon cruentatus</i>	Graysbe	0	1	1	1	0	0.6
<i>Scarus vetula</i>	Queen Parrotfish	0	0	1	1	1	0.6
<i>Holacanthus tricolor</i>	Rock Beauty	1	0	1	0	0	0.4

<i>Pseudupeneus maculatus</i>	Spotted Goatfish	0	0	1	0	1	0.4
<i>Chromis cyanea</i>	Blue Chromis	0	0	0	0	2	0.4
<i>Lactophrys triqueter</i>	Smooth Trunkfish	0	0	1	0	0	0.2
<i>Hypoplectrus guttavarius</i>	Shy Hamlet	0	1	0	0	0	0.2
<i>Myripristis jacobus</i>	Black-bar Souldierfish	0	1	0	0	0	0.2
<i>Stegastes planifrons</i>	Yellow Damselfish	0	1	0	0	0	0.2
<i>Amblicirrhitis pinnos</i>	Redspotted Hawkfish	0	0	1	0	0	0.2
<i>Haemulon sciurus</i>	Bluestriped Grunt	0	0	0	1	0	0.2
<i>Acanthurus coeruleus</i>	Blue Tang	0	0	0	1	0	0.2
<i>Epinephelus guttatus</i>	Red Hind	0	0	0	0	1	0.2
	TOTAL INDIVIDUALS	35	46	60	32	45	44.0
	TOTAL SPECIES	16	21	20	21	19	19

Outside transects:

<i>Abudefduf sexatilis</i>	Sergeant Major
<i>Anisotremus virginicus</i>	Porkfish
<i>Balistes vetula</i>	Queen Triggerfish
<i>Bodianus rufus</i>	Spanish Hogfish
<i>Calamus pluma</i>	Pluma
<i>Carangoides ruber</i>	Bar Jack
<i>Chaetodon striatus</i>	Banded Butterflyfish
<i>Haemulon macrostomum</i>	Spanish Grunt
<i>Haemulon plumieri</i>	White Grunt
<i>Hypoplectrus unicolor</i>	Butter Hamlet
<i>Lutjanus apodus</i>	Schoolmaster Snapper
<i>Malacanthus plumieri</i>	Sand Tilefish
<i>Melichthys niger</i>	Black Durgon
<i>Pomacanthus arcuatus</i>	Gray Angelfish
<i>Sparisoma rubripinne</i>	Yellowtail Parrotfish
<i>Sparisoma viride</i>	Stoplight Parrotfish

2.3.4 Photo Album - Canjilones Reef, La Parguera

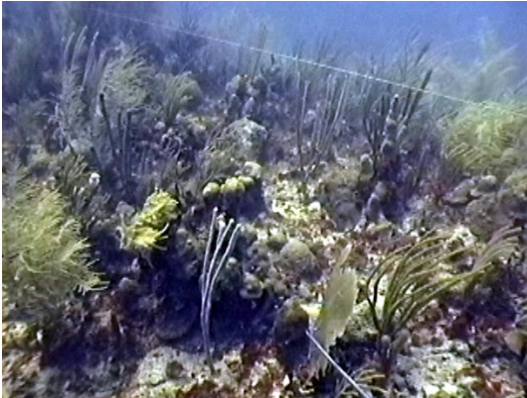


Plate 1

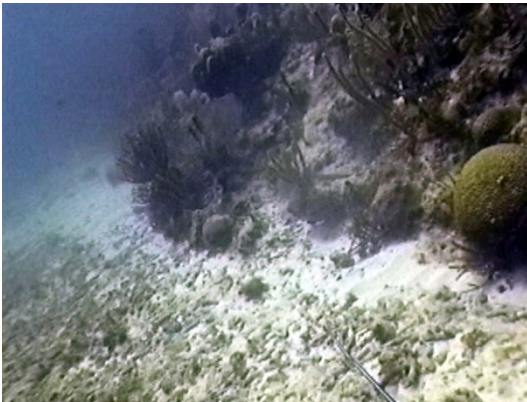


Plate 1 – 2. Canjilones Reef is a “spur and groove” formation aligned perpendicular to the shoreline. The spurs range in height from 2-4 meters, separated from each other by coralline sand channels.



Plate 3. Stony corals were mostly found as small and medium sized encrusting colonies with a mean linear cover of 17.7 %.



Plate 4. A dense algal turf, intermixed with fleshy brown macroalgae was the main biological assemblage in terms of linear cover with a mean of 70.2 %.



Plate 5. Soft corals, with a mean of 29 colonies per transect were highly prominent and represented the main biological assemblage contributing vertical relief at Canjilones Reef.



Plate 6. Erect and encrusting sponges were present at all transect surveyed.
3.0 Isla Desecheo Natural Reserve

General Description

Isla Desecheo is an oceanic island in the Mona Passage, located approximately nine nautical miles off Rincon, north west coast of Puerto Rico. The island, which used to be a U.S. Navy shooting range was designated as a Natural Reserve in 1999. Marine communities at Desecheo are influenced by clear waters, strong currents and seasonally high wave action from North-Atlantic winter swells (cold fronts). Coral reefs are established on the west and northwest sections of the insular shelf at depths between 10 - 30 meters. Coral community surveys were performed at North Reef, Puerto Botes Reef and Puerto Canoas Reef (Figure 3). Georeferences and depths of reef surveys at Isla Desecheo are presented in Table 25.

TABLE 25. GEOGRAPHIC COORDINATES AND DEPTH OF REEFS STUDIED AT ISLA DESECHEO NATURAL RESERVE, JUNE, 2000

Reef Name	Survey Date	Depth (m)	Latitude	Longitude
North Reef	20-June-00	10.6	18° 23.416' N	067° 29.229' W
Puerto Canoas Reef	21-June-00	17.6	18° 22.699' N	067° 29.026' W
Puerto Botes Reef	22-June-00	17.0	18° 22.895' N	067° 29.316' W

3.1 North Reef – Isla Desecheo

3.1.1 Physical Description of North Reef

North Reef, on the northwest corner of the island, is formed by a series of massive lava rock promontories, some of which appear to have been displaced from the main island shelf. Due north of the island there is an isolated pinnacle known as “Yellow Reef” that rises from the base of the reef platform at a depth of 60 meters to about 6 meters from the surface. Our survey at North Reef was performed at the upper terrace of one of the shelf promontories close to the shoreline at depths between 10-12 meters. Transects were established north-south at two adjacent promontories separated from each other by a sandy channel with its base at a depth of 18 meters.

3.1.2 Sessile-Benthic Reef Community

The sessile-benthic community at Desecheo’s North Reef consists of a low relief, but dense algal turf and other encrusting reef biota forming a carpet mosaic over the rock substrate. The algal turf, a multi species assemblage in which articulated red coralline algae (*Amphiroa* sp., *Jania* sp.) were the main components, was the dominant substrate category in terms of linear cover with a mean of 52.7 % (range: 15.8 – 68.5 %, see Table 26). Brown macroalgae (mostly *Dictyota* sp.) added a mean cover of 12.6 %, for a total linear cover by algae of 65.3 %. Stony corals ranked second in linear cover with a mean of 25.2 % (range: 16.6 – 39.0 %). Corals were mostly found as encrusting colonies growing over the rock, particularly at crevices and other substrate discontinuities. In particular, encrusting coral colonies were common on vertical surfaces, which minimizes the abrasive effect of strong surge and wave action. Massive colonies were rare at the flat terraces where our reef survey was performed. However, large massive colonies were present outside transect areas in reef areas less exposed to wave action. Soft corals

(gorgonians) were present in very low densities (mean: 7 colonies/transect), and mostly represented by small colonies of the Common Sea Fan, *Gorgonia ventalina*. Sponges, mostly encrusting types, were common among the algal turf and presented a mean linear cover of 5.0 % (range 0 – 11.0 %). The basket sponge, *Xestospongia muta* was also present at North Reef. The colonial zoanthid (*Palythoa sp.*) was found encrusting hard substrates in small sections of the reef. Abiotic substrates were rare. Reef overhangs were mostly associated to substrate discontinuities, rather than to stony coral ledges. Sand and coral rubble were found at depressions and other depositional areas, mostly at crevices within the reef. Substrate rugosity was relatively low (mean : 3.01 meters), due in part to the low abundance and small size of stony coral colonies. Reef benthic community profiles are presented in Appendix 3.1 – 3.5.

TABLE 26. PERCENT LINEAR COVER BY SESSIL-BENTHIC CATEGORIES AT NORTH REEF, ISLA DESECHEO NATURAL RESERVE, MAYAGUEZ. JUNE, 2,000

DEPTH: 10.6 m	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	3.59	2.94	3.14	1.99	3.39	3.01
SUBSTRATE CATEGORY						
TURF ALGAE	15.75	55.86	62.58	60.76	68.49	52.69
STONY CORALS	39.00	19.70	25.63	16.61	25.24	25.24
FLESHY ALGAE	38.63	15.45	0.76	8.35		12.64
SPONGES		0.76	11.03	9.02	4.18	5.00
REEF OVERHANGS	6.62	6.17		1.17		2.79
SAND				4.09		0.82
ROCK					2.09	0.42
RUBBLE		1.08				0.22
ZOANTHIDS		0.98				0.20
GORGONIANS (# col.)	3	8	8	8	9	7

Thirteen (13) scleractinian corals and three (3) hydrocorals (*Millepora alcicornis*, *M. complanata*, *Stylaster roseus*) were identified during our snapshot survey at North Reef, Isla Desecheo (Table 27). Fire corals (*Millepora spp.*) occurred mostly as encrusting colonies over hard substrates, including dead gorgonians. The Rose Lace Coral, *Stylaster roseus* was observed growing in holes, crevices and other depressions that minimize mechanical detachment by wave/surge action. The strong wave energy probably precludes the establishment of coral species unable to grow encrusting over the substrate. The combined linear cover by the dominant four species represented 69.3 % of the total cover by stony corals. The dominant coral assemblage in terms of linear cover included the Symmetrical Brain Coral (*Diploria strigosa*), the Great Star Coral (*Montastrea cavernosa*), the Boulder Star Coral, (*Montastrea annularis*) and the Mustard Hill Coral (*Porites astreoides*). The former and latter species were present at all five transects surveyed, which suggests that these are probably the most abundant species at this reef. The Branching and Blade Fire Coral (*Millepora alcicornis* and *M. complanata*) were also common at North Reef and presented a combined linear cover of 3.2%. Corals were mostly present as isolated colonies and represented a minor contribution to the overall substrate relief and habitat complexity.

TABLE 27. TAXONOMIC COMPOSITION AND LINEAR COVER OF STONY CORALS AT NORTH REEF, ISLA DESECHEO NATURAL RESERVE, MAYAGUEZ. JUNE, 2,000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	3.59	2.94	3.14	1.99	3.39	3.01
CORAL SPECIES						
<i>Diploria strigosa</i>	12.65	5.34	3.12	3.52	3.29	5.58
<i>Montastrea cavernosa</i>	8.16	7.52		8.11		4.76
<i>Montastrea annularis</i>	8.82	3.01	2.45		9.27	4.71
<i>Porites astreoides</i>	1.68	1.08	2.05	1.42	5.97	2.44
<i>Millepora complanata</i>			1.07	3.09	5.15	1.86
<i>Dendrogyra cylindrus</i>			8.79			1.76
<i>Millepora alcicornis</i>	4.48	0.54	1.29	0.47		1.36
<i>Porites porites</i>			4.29			0.86
<i>Agaricia agaricites</i>		1.78	1.07		0.95	0.76
<i>Diploria labyrinthiformis</i>	3.23	0.44				0.73
<i>Meandrina meandrites</i>			1.5		0.63	0.43
Outside Transects:						
<i>Eusmilia fastigiata</i>						
<i>Isophyllia rigida</i>						
<i>Porites furcata</i>						
<i>Dichocoenia stokeii</i>						
<i>Stylaster roseus</i>						

3.1.3 Fishes and Motile Megabenthic Invertebrates

A total of 49 fish species were identified during our visual surveys at Desecheo's North Reef, of which 38 were present within belt-transect areas (Table 28). The mean number of species per transect was 21 (range 20 – 22), and the mean density of fishes was 127.4 Individuals/30 m² (range : 106 - 171 Individuals/30 m²). Five species represented approximately 69 % of the total individuals within transect areas. The numerically dominant fish assemblage included the Bluehead Wrasse (*Thalassoma bifasciatum*), Bicolor Damselfish (*Stegastes partitus*), Blue Chromis (*Chromis cyanea*), Saddled Blenny (*Malacoctenus triangulatus*) and the Coney (*Cephalopholis fulva*).

Opportunistic carnivores which feed on small benthic invertebrates, such as wrasses (Labridae), blennies (Labrisomidae), squirrelfishes (Holocentridae) and Coneys (Serranidae) represented about 51% of the total individuals within belt-transect areas (Table 29). The Bluehead Wrasse was the most abundant species in the reef with a mean density of 49 Individuals/30 m². Guilds of 15-25 individuals were common and included juveniles as well as adult fish. There was an exceptionally high abundance of Saddled Blennies and Coneys, as compared to other reefs surveyed. In the case of blennies, it is possible that protective and/or food availability features of the algal turf habitat in which they dwell were favorable for this species. The high abundance of Coneys was largely associated with early post-settlement and juvenile individuals. It is evident that this reef functions as a recruitment site for Coneys. It would be interesting, and of primordial relevance since it is a commercially important species, to determine if Coneys are self-recruiting, or if the reef just acts as a sink for post larval stages. Adult Coneys were also present in the reef.

The zooplanktivorous fish assemblage recorded within transect areas represented approximately 27 % of the total individuals and included the Blue and Brown Chromis (*Chromis cyanea*, *C. multilineata*), the Bicolor Damselfish (*Stegastes partitus*), the Creole Wrasse (*Clepticus parrae*), the Black Durgon (*Melichthys niger*) and the Creole Fish (*Paranthias furcifer*). Herbivorous taxa included mostly parrotfishes, and doctorfishes (Acanthuridae). The combined herbivorous assemblage represented approximately 8 % of the total individuals within belt-transect areas. Predators of larger reef invertebrates and small fishes were observed outside transect areas. These included the Schoolmaster Snapper (*Lutjanus apodus*), the Great Barracuda (*Sphyraena barracuda*) and the Cero Mackerel (*Scomberomorus regalis*). Undoubtedly, this taxonomic characterization falls short of providing a complete list of the resident and transient ichthyofauna associated with Desecheo's North Reef. Additional surveys are needed to construct a more comprehensive characterization of the fish community. One large Spiny Lobster (*Panulirus argus*) and the Coral Crab (*Carpilus coralinus*) were present within belt-transect areas (Table 29).

TABLE 28. TAXONOMIC COMPOSITION AND ABUNDANCE OF FISHES AT NORTH REEF, ISLA DESECHEO, MAYAGUEZ. JUNE, 2000

DEPTH: 10.6 m

FISH SPECIES	COMMON NAME	TRANSECTS					MEAN
		1	2	3	4	5	
		(individuals/30 m ²)					
<i>Thalassoma bifasciatum</i>	Blue-head Wrasse	30	35	80	60	40	49.0
<i>Stegastes partitus</i>	Bicolor Damselfish	30	15	21	23	18	21.4
<i>Chromis cyanea</i>	Blue Chromis	0	22	2	10	8	8.4
<i>Malacoctenus triangulatus</i>	Saddled Blenny	4	5	1	6	9	5.0
<i>Cephalopholis fulva</i>	Coney	5	4	5	4	5	4.6
<i>Sparisoma radians</i>	Bucktooth Parrotfish	6	0	5	2	2	3.0
<i>Clepticus parrae</i>	Creole Wrasse	0	0	0	12	0	2.4
<i>Acanthurus coeruleus</i>	Blue Tang	0	3	2	3	2	2.0
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish	3	3	0	3	1	2.0
<i>Chromis multilineata</i>	Brown Chromis	0	2	3	4	0	1.8
<i>Malacoctenus sp.</i>	Blenny	2	3	0	1	3	1.8
<i>Halichoeres maculipinna</i>	Clown Wrasse	4	0	2	0	2	1.6
<i>Melichthys niger</i>	Black Durgon	0	2	3	2	1	1.6
<i>Acanthurus bahianus</i>	Ocean Surgeon	1	0	2	1	3	1.4
<i>Scarus taeniopterus</i>	Princess Parrotfish	2	3	0	0	2	1.4
<i>Sparisoma aurofrenatum</i>	Red-band Parrotfish	2	0	3	0	2	1.4
<i>Abudefduf sexatilis</i>	Sergeant Major	3	3	0	0	0	1.2
<i>Amblicirrhitos pinnos</i>	Redspotted Hawkfish	1	1	3	1	0	1.2
<i>Gobiosoma evelynae</i>	Sharknose Goby	3	0	1	0	2	1.2
<i>Lactophrys triqueter</i>	Smooth Trunkfish	1	2	1	1	0	1.0
<i>Halichoeres garnoti</i>	Yellowhead Wrasse	2	1	0	0	1	0.8
<i>Holacanthus tricolor</i>	Rock Beauty	0	1	1	1	1	0.8
<i>Holocentrus ascencionis</i>	Longjaw Squirrelfish	1	1	0	1	1	0.8
<i>Ophioblennius atlanticus</i>	Redlip Blenny	3	0	0	1	0	0.8
Table 28. Continued							
<i>Sparisoma viride</i>	Stoplight Parrotfish	0	1	2	1	0	0.8
<i>Chaetodon capistratus</i>	Four-eye Butterflyfish	2	0	0	0	1	0.6

<i>Paranthias furcifer</i>	Creole Fish	0	0	0	3	0	0.6
<i>Bodianus rufus</i>	Spanish Hogfish	0	1	0	1	0	0.4
<i>Chaetodon striatus</i>	Banded Butterflyfish	2	0	0	0	0	0.4
<i>Scarus iserti</i>	Striped Parrotfish	0	0	2	0	0	0.4
<i>Acanthostracion quadricornis</i>	Scrawled Cowfish	0	0	0	1	0	0.2
<i>Cantherhines macrocerus</i>	Whitespotted Filefish	0	1	0	0	0	0.2
<i>Cantherhines pullus</i>	Tail-light Filefish	0	0	1	0	0	0.2
<i>Carangoides ruber</i>	Black-bar Jack	0	0	0	0	1	0.2
<i>Holocentrus rufus</i>	Squirrelfish	0	1	0	0	0	0.2
<i>Myrichthys oculatus</i>	Goldspotted Snake Eel	1	0	0	0	0	0.2
<i>Scarus vetula</i>	Queen Parrotfish	0	0	1	0	0	0.2
<i>Scorpaena plumieri</i>	Spotted Scorpionfish	0	0	0	0	1	0.2
TOTAL INDIVIDUALS		108	110	171	142	106	127.4
TOTAL SPECIES		21	22	20	22	20	21

Outside transects:

<i>Scomberomorus regalis</i>	Cero
<i>Lactophrys bicaudalis</i>	Spotted Trunkfish
<i>Grama loreto</i>	Royal Gramma
<i>Caranx lugubris</i>	Black Jack
<i>Holacanthus ciliaris</i>	French Angelfish
<i>Myripristis jacobus</i>	Black-bar Souldierfish
<i>Sphyrnaea barracuda</i>	Great Barracuda
<i>Balistes vetula</i>	Queen Triggerfish
<i>Equetus punctatus</i>	Spotted Drum
<i>Lutjanus apodus</i>	Schoolmaster Snapper
<i>Kyphosus sp.</i>	Bermuda Chub

TABLE 29. TAXONOMIC COMPOSITION AND ABUNDANCE OF MEGA-BENTHIC INVERTEBRATES AT NORTH REEF, ISLA DESECHEO, MAYAGUEZ. JUNE, 2000

Depth: 10.6 m	SPECIES	COMMON NAME	TRANSECTS					MEAN ABUNDANCE (IND/30 m ²)
			1	2	3	4	5	
	<i>Carpilius coralinus</i>	Coral crab	0	0	0	0	1	0.2
	<i>Panulirus argus</i>	Spiny Lobster	0	1	0	0	0	0.2
	TOTALS		0	1	0	0	1	0.4

3.1.4 Photo Album North Reef – Isla Desecheo



Plate 1



Plate 4

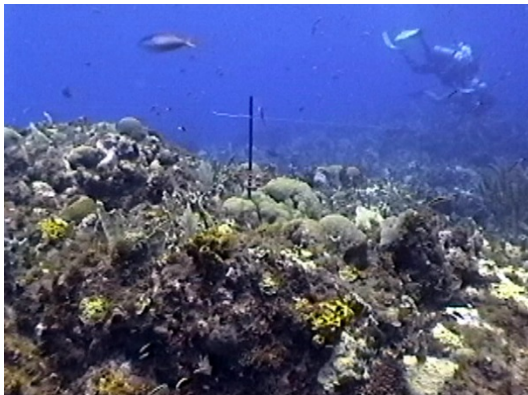


Plate 2

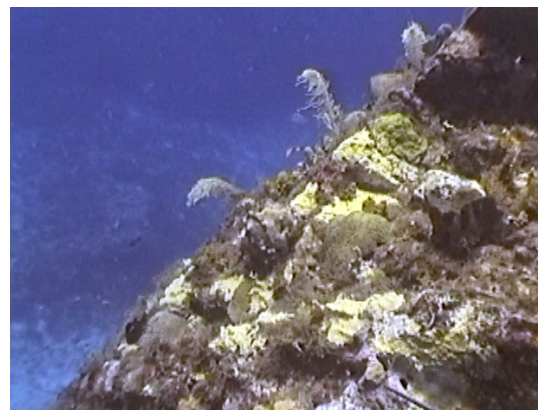


Plate 4 - 5. The sessile-benthic community consists of a low relief but dense algal turf and other encrusting reef biota, forming a carpet mosaic over the rock substrate.



Plates 1 – 3. North Reef, on the northwest corner of Isla Desecheo is formed by a series of massive lava rock promontories, some of which appear to have been displaced from the main island shelf, previously used as a naval shooting range.



Plate 6. Stony corals presented a mean linear cover of 25.2 % at North Reef. Encrusting colonies prevailed, but branching and massive colonies were also present.

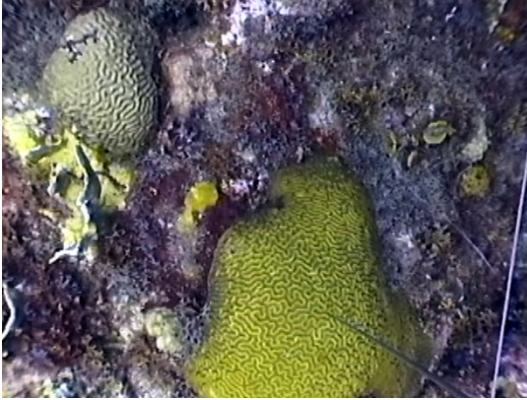


Plate 7

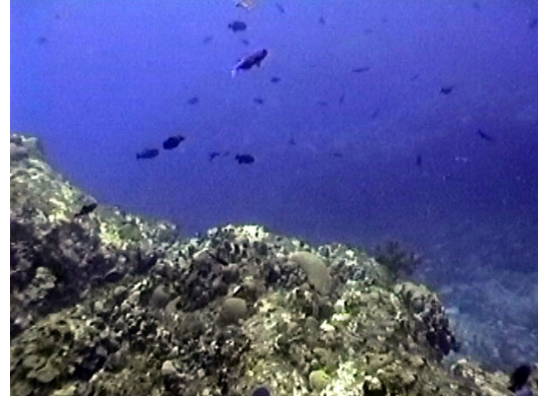


Plate 10. A total of 49 fish species were identified at North Reef. Zooplanktivorous populations, including the Creole Wrasse, Blue and Brown Chromis and the Black Durgon were highly prominent.

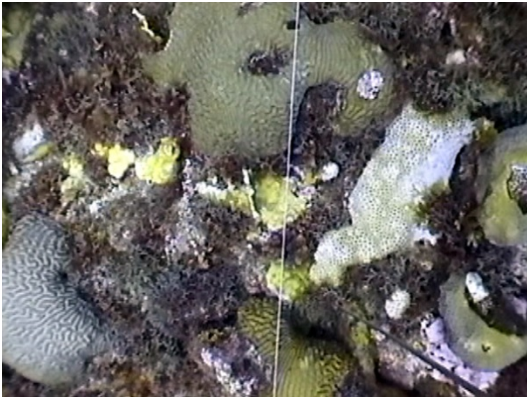


Plate 8



Plate 11. The high abundance of Coneys was associated with early post-settlement and juvenile individuals, establishing the relevance of this reef system as a nursery site for this species.



Plates 7- 9. Encrusting (*Diploria strigosa*) and branching coral colonies (*Porites porites*) formed part of the biological substrate mosaic at North Reef.



Plate 12. Large Spiny Lobster (*Panulirus argus*) at North Reef.

3.2 Puerto Canoas Reef

3.2.1 Physical description of Puerto Canoas Reef

Puerto Canoas is located on the western section of Isla Desecheo. This is the leeward, or protected side of the island where the most extensive coral reef system is found. The insular shelf is narrow (< 0.25 nautical miles) and slopes from the shoreline to a relatively flat terrace at a depth of 15 meters. The terrace extends to a depth of approximately 23 meters. It is across this fringe where most of the coral reef system has developed. Beyond 23 meters, the shelf slopes down to a deeper terrace at depths of 50 – 60 meters, before dropping down the insular slope to depths of more than 600 meters. The coral reef system at Puerto Canoas is exuberant, with huge stony coral colonies growing close together and forming large coral promontories that provide very high topographic relief. At some points, sand channels cut through the reef towards the shelf-edge. Permanent transects were aligned east-west at a depth of 17.6 meters.

3.2.2 Sessile-Benthic Reef Community

Puerto Canoas features one of the most impressive developments by stony corals from the puertorrican reefs surveyed. With a mean linear cover of 52.2 % (range : 42.3 – 64.9 %), stony corals represented the dominant component of the sessile-benthic reef community at Puerto Canoas (Table 30). Large, massive and branching coral colonies have grown close together to construct a highly complex and heterogeneous reef habitat. Coralline sand patches separated fairly extensive reef sections. Reef overhangs, largely associated with the “mushroom type” growth of Boulder Star Coral, *Montastrea annularis* accounted for an additional 7.3% of the total linear cover at Puerto Canoas. On the other hand, soft corals presented an extremely low density of colonies (mean: 1.0 colonies/transect) at reef areas surveyed. This is probably related to space limitations due to the high cover by stony corals. Erect and encrusting sponges were present at three of the five transects surveyed for a mean cover of 0.9 %. Reef sections not colonized by stony corals or sponges were covered by a dense algal turf comprised of a mixed assemblage of red coralline and brown macroalgae. The mean cover by algal turf was 33.8 % (range : 24.9 – 43.9 %). Fleshy brown (*Padina* sp., *Lobophora* sp.) and calcareous (*Halimeda* sp.) macroalgae contributed an additional 2.4 % to the total algal cover at Puerto Canoas Reef. Reef benthic community profiles are presented in Appendix 3.6 – 3.10.

TABLE 30. PERCENT LINEAR COVER BY SESSIL-BENTHIC CATEGORIES AT PUERTO CANOAS REEF, ISLA DESECHEO NATURAL RESERVE, MAYAGUEZ. JUNE, 2,000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	2.92	3.55	3.16	3.58	3.61	3.36
SUBSTRATE CATEGORY						
STONY CORAL	44.97	63.32	64.89	42.34	45.41	52.19
TURF ALGAE	37.69	24.94	25.92	43.89	36.51	33.79
REEF OVERHANG	13.16	6.79	4.18	8.62	3.97	7.34
FLESHY ALGAE	1.16	3.62	4.48	4.05	7.79	4.22
SAND		0.22	0.53		5.88	1.33
SPONGES	3.02	0.52		1.10		0.93
HOLE		0.59			0.44	0.21
GORGONIANS (# col.)	0	0	1	2	0	1

A total of 21 scleractinian corals and two hydrocorals (*Millepora spp.*) were identified during our snapshot survey at Puerto Canoas Reef, Isla Desecheo (Table 31). The Boulder Star Coral, (*Montastrea annularis*) was the dominant coral species in terms of linear cover with a mean of 32% (range : 16.0 – 51.5 %), representing 62 % of the total cover by stony corals at Puerto Canoas Reef. In addition to the Boulder Star Coral, Mustard Hill Coral (*Porites astreoides*), Boulder Brain Coral (*Colpophyllia natans*), and Lettuce Coral (*Agaricia agaricites*) were present at all transects surveyed. Flower coral (*Eusmilia fastigiata*) was present in four transects as very large colonies, reaching a maximum linear cover of 11.5% at transect 1. Boulder Star Coral exhibited variable growth forms, including very large “mushroom type” colonies that formed deep coral ledges and also presented extensive laminar sections in some areas. Branching corals were represented by Finger Coral (*Porites porites*), Ten-Ray Star Coral (*Madracis decactis*) and Staghorn Coral (*Acropora cervicornis*). Several colonies of *M. annularis* were affected by what appeared to be infectious diseases.

TABLE 31. TAXONOMIC COMPOSITION AND LINEAR COVER OF STONY CORALS AT PUERTO CANOAS REEF, ISLA DESECHEO NATURAL RESERVE, MAYAGUEZ. JUNE, 2,000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	2.92	3.55	3.16	3.58	3.61	3.36

CORAL SPECIES

<i>Montastrea annularis</i>	16.01	45.09	51.49	24.68	24.91	32.44
<i>Agaricia agaricites</i>	4.57	4.35	2.05	2.8	11.08	4.97
<i>Colpophyllia natans</i>	8.06	7.69	1.07	2.07	1.03	3.98
<i>Eusmilia fastigiata</i>	11.51		1.07	3.64	3.23	3.89
<i>Porites astreoides</i>	2.09	4.5	1.93	2.72	1.54	2.56
<i>Diploria labyrinthiformis</i>	0.87		3.95			0.96
<i>Millepora complanata</i>			2.25	1.35		0.72
<i>Porites porites</i>	1.16	1.48				0.53
<i>Diploria strigosa</i>			0.54	1.35	0.72	0.52
<i>Montastrea cavernosa</i>					2.38	0.48
<i>Meandrina meandrites</i>				1.55	0.52	0.41
<i>Agaricia fragilis</i>	0.7			0.73		0.29
<i>Acropora cervicornis</i>				1.14		0.23
<i>Madracis decactis</i>		0.21	0.54			0.15
<i>Leptoseris cucullata</i>				0.31		0.06

Outside Transects:

Mycetophyllia ferox
Siderastrea siderea
Dichocoenia stokesii
Millepora alcicornis
Isophyllia rigida
Porites furcata
Dendrogyra cylindrus
Mycetophyllia lamarkiana

3.2.3 Fishes and Motile Megabenthic Invertebrates

A total of 66 fish species were identified during our visual surveys at Puerto Canoas Reef, 54 of which were present within belt-transect areas (Table 32). The mean number of species per transect was 29 (range 25 – 37), and the mean density of fishes was 208.6 Individuals/30 m² (range : 178 - 232 Individuals/30 m²). Five species represented approximately 70 % of the total individuals within transect areas. The numerically dominant fish assemblage included the Blue and Brown Chromis (*Chromis cyanea*, *C. multilineata*), Bluehead Wrasse (*Thalassoma bifasciatum*), Bicolor Damselfish (*Stegastes partitus*) and the Creole Wrasse (*Clepticus parrae*). These five species were present at all five transects surveyed. Other very common species present at all transects included the Peppermint Goby, (*Coryphopterus lipernes*), the Yellow-eye and Yellowtail Damselfishes (*Stegastes planifrons*, *Microspathodon chrysurus*), Stoplight parrotfish (*Sparisoma viride*) and the Sharknose Goby (*Gobiosoma evelynae*). Both gobies were observed over live coral heads, particularly the Boulder Star, Great Star and Boulder Brain Corals (*Montastrea annularis*, *M. cavernosa*, *Colpophyllia natans*). Bicolor Damselfishes occupied demersal territories within the reef, whereas *Chromis* spp. and the Bluehead and Creole Wrasses were distributed in schools of variable sizes over coral heads in the reef.

The zooplanktivorous fish assemblage included four out of the five numerically dominant species at Puerto Canoas, representing approximately 54% of the total fishes recorded within belt-transect areas. It is interesting that a reef system established in nutrient depleted, oligotrophic waters sustains such a large assemblage of zooplanktivorous fishes. It is possible that meroplanktonic (larval) taxa from the sessil-benthic reef biota supply a significant portion of the food energy required by the zooplanktivorous assemblage. Such an effective benthic-pelagic coupling enhances reef productivity as well as biodiversity as top pelagic predators, such as the Great Barracuda, (*Sphyraena barracuda*), Rainbow Runner (*Elagatis bipinnulatus*) and other piscivores are attracted to the available food sources represented by the zooplanktivorous fishes.

Opportunistic carnivores which feed on small benthic invertebrates, such as wrasses (Labridae), gobies (Gobiidae), squirrelfishes (Holocentridae), grunts (Haemulidae), goatfishes (Mullidae) and small groupers (e.g. Coney, Graysbe - Serranidae) represented about 35% of the total individuals within belt-transect areas (Table 32). The Bluehead Wrasse was the second most abundant species in the reef with a mean density of 36.2 Individuals/30 m². Guilds of 10-20 individuals were common and included juveniles as well as adult fish. Herbivorous taxa included mostly parrotfishes, doctorfishes (Acanthuridae) and “farmer damselfishes” (*Stegastes planifrons*). The combined herbivorous assemblage represented approximately 5 % of the total individuals within belt-transect areas. Predators of larger reef invertebrates and small fishes included the Yellowtail, Schoolmaster, Lane and Mahogany Snappers (*Ocyurus chrysurus*, *Lutjanus apodus*, *L. synagris*, *L. mahogany*), moray eels (Muraenidae) and large groupers, such as the Nassau and Yellowfin Groupers (*Epinephelus striatus*, *Mycteroperca venenosa*). Undoubtedly, this taxonomic characterization falls short of providing a complete list of the resident and transient ichthyofauna associated with Desecheo’s Puerto Canoa’s Reef. Additional surveys are needed to construct a more comprehensive characterization of the fish community. The long-spined Sea Urchin, *Diadema antillarum* was observed outside belt-transect areas.

TABLE 32. TAXONOMIC COMPOSITION AND ABUNDANCE OF FISHES AT PUERTO CANOAS REEF, ISLA DESECHEO, MAYAGUEZ. JUNE, 2000

DEPTH: 17.6 m

FISH SPECIES	COMMON NAME	TRANSECTS					MEAN
		1	2	3	4	5	
		(individuals/30 m ²)					
<i>Chromis cyanea</i>	Blue Chromis	40	50	40	50	63	48.6
<i>Thalassoma bifasciatum</i>	Blue-head Wrasse	45	36	57	18	25	36.2
<i>Clepticus parrae</i>	Creole Wrasse	31	30	25	27	8	24.2
<i>Stegastes partitus</i>	Bicolor Damselfish	14	27	23	34	10	21.6
<i>Chromis multilineata</i>	Brown Chromis	28	31	11	0	5	15.0
<i>Mulloides martinicus</i>	Yellowtail Goatfish	0	0	0	0	40	8.0
<i>Coryphopterus lipernes</i>	Peppermint Goby	3	10	7	10	9	7.8
<i>Halichoeres garnoti</i>	Yellowhead Wrasse	2	3	4	6	6	4.2
<i>Halichoeres maculipinna</i>	Clown Wrasse	11	0	5	2	3	4.2
<i>Sparisoma viride</i>	Stoplight Parrotfish	4	1	3	4	4	3.2
<i>Gramma loreto</i>	Royal Gramma	2	5	8	0	0	3.0
<i>Gobiosoma evelynae</i>	Sharknose Goby	3	2	4	3	1	2.6
<i>Stegastes planifrons</i>	Yellow Damselfish	2	3	2	1	2	2.0
<i>Myripristis jacobus</i>	Black-bar Souldierfish	2	2	2	3	0	1.8
<i>Petrometopon cruentatus</i>	Graysbe	1	3	2	1	1	1.6
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish	2	1	1	1	2	1.4
<i>Carangoides ruber</i>	Black-bar Jack	0	3	3	0	0	1.2
<i>Chaetodon capistratus</i>	Four-eye Butterflyfish	2	0	2	2	0	1.2
<i>Flammeo marianus</i>	Longspine Squirrelfish	0	2	1	1	2	1.2
<i>Kyphosus sp.</i>	Bermuda Chub	0	6	0	0	0	1.2
<i>Melichthys niger</i>	Black Durgon	2	1	0	0	3	1.2
<i>Paranthias furcifer</i>	Creole Fish	3	0	1	2	0	1.2
<i>Acanthurus coeruleus</i>	Blue Tang	1	2	0	1	1	1.0
<i>Cephalopholis fulva</i>	Coney	2	0	2	1	0	1.0
<i>Goby sp. 1</i>	Goby	1	3	0	0	1	1.0
<i>Scarus iserti</i>	Striped Parrotfish	0	0	2	1	2	1.0
<i>Sparisoma radians</i>	Bucktooth Parrotfish	1	1	0	3	0	1.0
<i>Amblicirrhitos pinnos</i>	Redspotted Hawkfish	0	2	2	0	0	0.8
<i>Holocentrus ascencionis</i>	Longjaw Squirrelfish	1	0	1	2	0	0.8
<i>Holocentrus rufus</i>	Squirrelfish	0	1	0	0	3	0.8
<i>Scarus taeniopterus</i>	Princess Parrotfish	3	0	0	0	1	0.8
<i>Sparisoma aurofrenatum</i>	Red-band Parrotfish	3	0	0	0	1	0.8
<i>Chaetodon aculeatus</i>	Longsnout Butterflyfish	1	0	0	1	1	0.6
<i>Haemulon flavolineatum</i>	French Grunt	1	2	0	0	0	0.6
<i>Serranus tigrinus</i>	Harlequin Bass	0	0	2	0	1	0.6
<i>Bodianus rufus</i>	Spanish Hogfish	1	1	0	0	0	0.4
<i>Canthigaster rostrata</i>	Sharpnose Puffer	1	1	0	0	0	0.4
<i>Chaetodon striatus</i>	Banded Butterflyfish	2	0	0	0	0	0.4
<i>Holacanthus tricolor</i>	Rock Beauty	0	0	0	2	0	0.4
<i>Lactophrys bicaudalis</i>	Spotted Trunkfish	1	1	0	0	0	0.4
<i>Malacoctenus triangulatus</i>	Saddled Blenny	0	1	0	1	0	0.4

Table 32. Continued

<i>Ocyurus chrysurus</i>	Yellowtail Snapper	0	0	2	0	0	0.4
<i>Acanthurus bahianus</i>	Ocean Surgeon	0	0	0	0	1	0.2
<i>Acanthurus chirurgus</i>	Doctorfish	0	0	0	0	1	0.2
<i>Acanthostracion quadricornis</i>	Scrawled Cowfish	0	0	0	0	1	0.2
<i>Aulostomus maculatus</i>	Trumpetfish	1	0	0	0	0	0.2
<i>Cantherhines macrocerus</i>	Whitespotted Filefish	1	0	0	0	0	0.2
<i>Equetus punctatus</i>	Spotted Drum	1	0	0	0	0	0.2
<i>Lactophrys triqueter</i>	Smooth Trunkfish	0	0	0	0	1	0.2
<i>Ophioblennius atlanticus</i>	Redlip Blenny	0	1	0	0	0	0.2
<i>Priacanthus cruentatus</i>	Glasseye	1	0	0	0	0	0.2
<i>Scarus vetula</i>	Queen Parrotfish	1	0	0	0	0	0.2
<i>Sparisoma rubripinne</i>	Yellowtail Parrotfish	1	0	0	0	0	0.2
<i>Sparisoma sp.</i>	Juvenile Parrotfish	0	0	0	1	0	0.2
	TOTAL INDIVIDUALS	222	232	212	178	199	208.6
	TOTAL SPECIES	37	29	25	25	28	29

Outside transects:

<i>Elagatis bipinnulatus</i>	Rainbow Runner
<i>Mycteroperca venenosa</i>	Yellowfin Grouper
<i>Epinephelus guttatus</i>	Red Hind
<i>Sphyrnaena barracuda</i>	Great Barracuda
<i>Rypticus saponaceus</i>	Soapfish
<i>Epinephelus stiatius</i>	Nassau Grouper
<i>Gymnothorax moringa</i>	Spotted Moray
<i>Gymnothorax funebris</i>	Green Moray
<i>Caranx lugubris</i>	Black Jack
<i>Lutjanus mahogany</i>	Mahogany Snapper
<i>Lutjanus synagris</i>	Lane Snapper
<i>Chaetodon striatus</i>	Banded Butterflyfish

3.2.4 Photo Album – Puerto Canoas Reef, Isla Desecheo

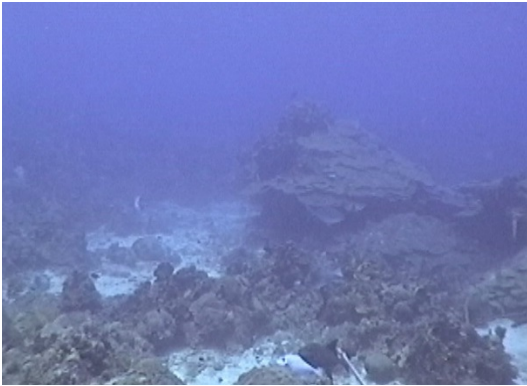


Plate 1. Puerto Canoas is a patch reef formation that has developed at depths between 15-23 meters on top of a hard ground platform covered by coralline sand.

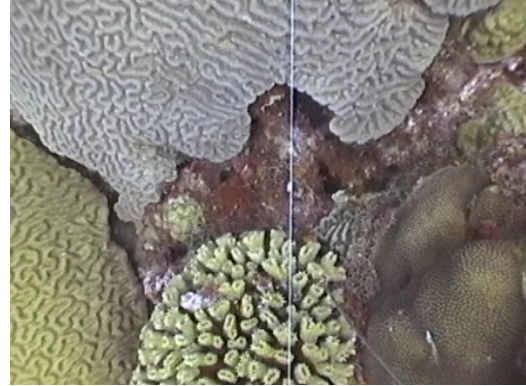


Plate 4. With a mean live coral cover of 52.2 %, Puerto Canoas belongs to a very small group of Puertorrican reefs where live coral cover exceeds that of algae.

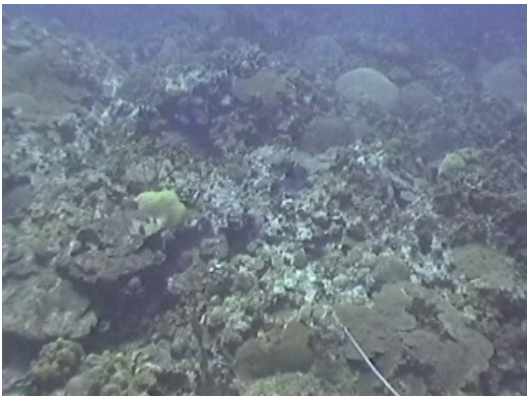
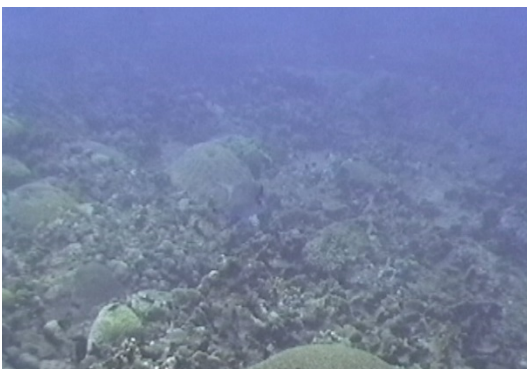


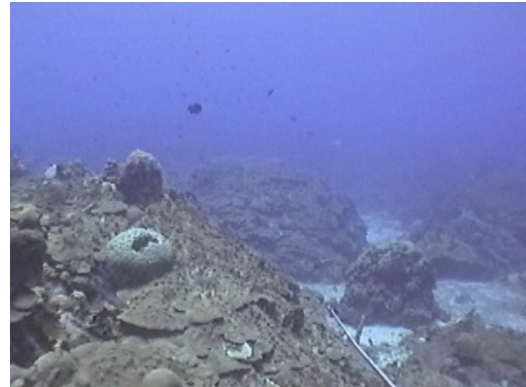
Plate 2



Plate 5



Plates 2 – 3. The coral reef system at Puerto Canoas is exuberant, with massive, branching and encrusting coral colonies growing close together to produce a highly complex and heterogeneous reef habitat.



Plates 5 – 6. Boulder Star Coral (*Montastrea annularis*) was the principal sessile-benthic taxa in terms of linear cover with a mean of 32.4 %, representing 62 % of the total cover by stony corals at this reef.

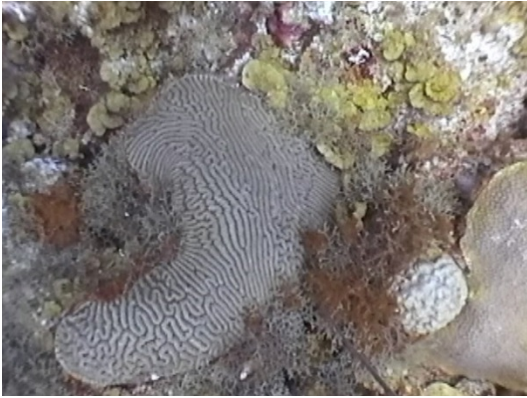


Plate 7. Reef sections not colonized by stony corals or sponges were covered by an algal turf composed of a mixed assemblage of red and brown macroalgae.



Plate 10. Green moray Eel (*Gymnothorax funebris*) and Blue Chromis (*Chromis cyanea*) at Puerto Canoas.

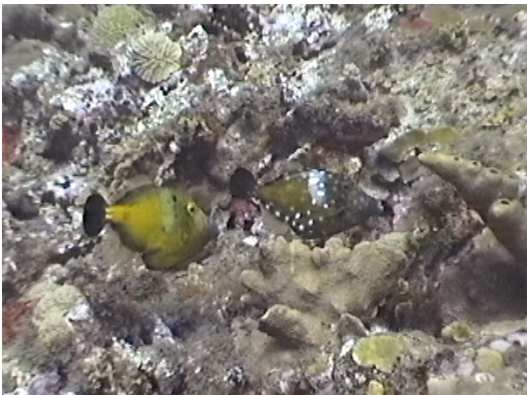


Plate 8. A total of 66 fish species were identified during our snapshot survey at Puerto Canoas Reef. Mean fish density was 208.6 individuals per 30 m², distributed over a mean of 29 species per transect.

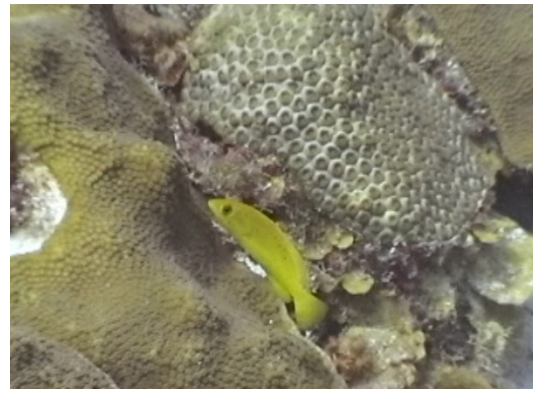


Plate 11. Post-settlement and juvenile Conies were abundant at Puerto Canoas, supporting the argument that this reef is an important nursery and recruitment site for this grouper.



Plate 9. The zooplanktivorous fish assemblage, which represented 54% of the total fish community surveyed within belt-transect areas included the Creole Wrasse, Bicolor Damselfish, Brown and Blue Chromis and Black Durgon.



Plate 12. Parrotfishes (Scaridae) were represented by a total of eight species and together with doctorfishes (Acanthuridae) comprised the main herbivorous fish assemblage.

3.3 Puerto Botes Reef – Isla Desecheo

3.3.1 Physical Description of Puerto Botes Reef

Puerto Botes Reef is located to the north of Puerto Canoas, on the northwestern shelf section of Isla Desecheo. It is part of a discontinuous fringing reef formation established at depths between 15 – 23 meters throughout most of the western island shelf. Coralline sand patches cut the reef in large sections. Permanent transects were aligned east-west, using large coral heads as anchor points for steel rod transect markers.

2.3.5 Sessile-Benthic Reef Community

The massive growth of stony corals, including colonies of very large size, was the most prominent feature of Puerto Botes Reef. Undoubtedly, the coral reef system off Puerto Botes and Puerto Canoas at Isla Desecheo rank among the best developed of Puerto Rico if live coral cover is used as the main criteria. With a mean linear cover of 48.0 % (range : 40.0 – 54.0 %), stony corals represented the dominant component of the sessile-benthic reef community at Puerto Botes (Table 33). Large, massive and branching coral colonies have grown close together to construct a highly complex and heterogeneous reef habitat. Reef overhangs, largely associated with the “mushroom type” growth of Boulder Star Coral, *Montastrea annularis* accounted for an additional 7.3% of the total linear cover at Puerto. Coral ledges extend almost to the sandy bottom in many colonies providing a high quality habitat that is used by many species of fishes. Soft corals were present in very low density at reef areas surveyed (mean : 0.2 colonies/transect). Gorgonians were observed to be more abundant at shallower depths, perhaps out-competing stony corals at reef sections where waves and surge action are intensified. Erect and encrusting sponges were present at all five transects surveyed for a mean cover of 4.1 %. Reef sections not colonized by stony corals, or sponges, were covered by a dense algal turf comprised of a mixed assemblage of red coralline and brown macroalgae. The mean cover by algal turf was 37.9 % (range : 30.1 – 49.1 %). Fleshy brown (*Padina* sp., *Lobophora* sp.) and calcareous (*Halimeda* sp.) macroalgae contributed an additional 2.4 % to the total algal cover at Puerto Botes Reef. Reef benthic community profiles are presented in Appendix 3.11 – 3.15.

TABLE 33. PERCENT LINEAR COVER BY SESSILE-BENTHIC CATEGORIES AT PUERTO BOTES REEF, ISLA DESECHEO NATURAL RESERVE, MAYAGUEZ. JUNE, 2,000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	3.25	4.52	4.35	3.72	5.89	4.35
SUBSTRATE CATEGORIES						
STONY CORALS	50.26	40.01	47.74	48.03	54.00	48.01
TURF ALGAE	38.35	49.11	34.14	30.10	37.70	37.88
REEF OVERHANG	5.21	3.99	11.98	11.30	3.90	7.28
SPONGE	2.26	5.45	3.21	5.98	3.52	4.08
FLESHY ALGAE	3.92	0.48	2.93	4.59		2.38
HOLE		0.96				0.19
SAND					0.88	0.18
GORGONIANS (# col.)	0	0	0	0	1	0

A total of 20 scleractinian corals and two hydrocorals (*Millepora alcicornis*, *Stylaster roseus*) were identified during our snapshot survey at Puerto Botes Reef, Isla Desecheo (Table 34). The Boulder Star Coral, (*Montastrea annularis*) was the dominant coral species in terms of linear cover with a mean of 26.6 % (range: 10.8 – 37.8 %), representing 55 % of the total cover by stony corals at Puerto Botes Reef. Lettuce Coral (*Agaricia agaricites*), Boulder Brain Coral (*Colpophyllia natans*), and Finger Coral (*Porites porites*) were also part of the main stony coral assemblage in terms of linear cover at Puerto Botes Reef. Mustard Hill Coral (*Porites astreoides*) and Maze Coral (*Meandrina meandrites*) contributed slightly to the percent linear cover by stony corals but small encrusting colonies were present in four out of the five transects surveyed.

TABLE 34. TAXONOMIC COMPOSITION AND LINEAR COVER OF STONY CORALS AT PUERTO BOTES REEF, ISLA DESECHEO NATURAL RESERVE, MAYAGUEZ. JUNE, 2,000

CORAL SPECIES	TRANSECT					MEAN
	1	2	3	4	5	
<i>Montastrea annularis</i>	37.82	18.45	36.4	10.79	29.76	26.64
<i>Agaricia agaricites</i>	4.15	9.44	3.54	1.31	15.61	6.81
<i>Porites porites</i>				21.43		4.29
<i>Colpophyllia natans</i>	6.59	9.7		4.97		4.25
<i>Montastrea cavernosa</i>			2.65		4.41	1.41
<i>Diploria labyrinthiformis</i>		0.19		6.78		1.39
<i>Eusmilia fastigiata</i>			4.24		1.7	1.19
<i>Meandrina meandrites</i>	0.85	1.65		0.82	1.07	0.88
<i>Porites astreoides</i>	0.53	0.58		1.31	1.45	0.77
<i>Millepora alcicornis</i>			0.91	0.41		0.26
<i>Stylaster roseus</i>	0.32					0.06
<i>Acropora cervicornis</i>				0.21		0.04
Outside Transects:						
<i>Millepora complanata</i>						
<i>Madracis decactis</i>						
<i>Leptoseris cucullata</i>						
<i>Isophyllia rigida</i>						
<i>Diploria strigosa</i>						
<i>Mycetophyllia ferox</i>						
<i>Mycetophyllia aliciae</i>						
<i>Dendrogyra cylindrus</i>						
<i>Siderastrea siderea</i>						
<i>Scolymia cubensis</i>						

3.3.3 Fishes and Motile Megabenthic Invertebrates

A total of 62 fish species were identified during our visual surveys at Puerto Botes Reef, 49 of which were present within belt-transect areas (Table 35). The mean number of species per transect was 25 (range 20 – 31), and the mean density of fishes was 241.4 Individuals/30 m² (range : 173 - 302 Individuals/30

m²). The density of fishes at Puerto Botes is the highest recorded from over 50 reefs surveyed in Puerto Rico (Garcia, unpublished data). Seven species represented approximately 67 % of the total individuals within transect areas. The numerically dominant fish assemblage included the Bluehead Wrasse (*Thalassoma bifasciatum*), Blue and (*Chromis cyanea*, *C. multilineata*), Bicolor and Yellow-edge Damselfishes (*Stegastes partitus*, *S. planifrons*), Creole Wrasse (*Clepticus parrae*), Royal Gramma (*Gramma loreto*) and the Peppermint Goby, (*Coryphopterus lipernes*). Seven species were present at all five transects surveyed. These included, besides the aforementioned species, the Yellowtail Damselfish (*Microspathodon chrysurus*), the French Grunt (*Haemulon flavolineatum*) and the Spanish Hogfish (*Bodianus rufus*), the latter species observed mostly as recently recruited juveniles. Bicolor Damselfishes occupied demersal territories within the reef, whereas *Chromis* spp. and the Bluehead Wrasse were distributed in schools of variable sizes and size cohorts over coral promontories in the reef. Schools of 100 plus individuals of Creole Wrasse (*Clepticus parrae*) were transient across reef survey sites, occupying mid-water depths in the water column with intermittent dives toward the reef.

The zooplanktivorous fish assemblage included four out of the five numerically dominant species at Puerto Botes, representing approximately 53% of the total fishes recorded within belt-transect areas. Such high density of zooplanktivorous fishes is perhaps indicative of the high secondary productivity associated with the sessile-benthic community, as benthic reef invertebrate populations supply planktonic larvae to the water column, which can serve as food for zooplanktivores. Otherwise, such production would depend on phytoplankton production, which is unlikely in the oligotrophic conditions surrounding Desecheo Island. Such an effective benthic-pelagic coupling enhances not only reef productivity, but biodiversity as well, since top pelagic (piscivorous) predators are attracted to the available food sources (forage species) represented by the zooplanktivorous fishes.

Opportunistic carnivores which feed on small benthic invertebrates, such as wrasses (Labridae), gobies (Gobiidae), squirrelfishes (Holocentridae), grunts (Haemulidae), goatfishes (Mullidae) and small groupers (e.g. Red Hind, Coney, Graysbe - Serranidae) represented about 36% of the total individuals within belt-transect areas (Table 35). The Bluehead Wrasse was the most abundant species in the reef with a mean density of 53.0 Individuals/30 m². Guilds of 20-plus individuals were common. The entire range of post-recruitment life stages, including adults were observed.

Herbivorous taxa included mostly parrotfishes, doctorfishes (Acanthuridae) and damselfishes (Pomacentridae). The Stop-light Parrotfish (*Sparisoma viride*) was the most abundant herbivore (mean : 1.8 Individuals/30 m²). The combined herbivorous assemblage represented approximately 5 % of the total individuals within belt-transect areas. Predators of larger reef invertebrates and small fishes included the Schoolmaster Snapper (*Lutjanus apodus*), Red Hind (*Epinephelus guttatus*) and Southern Stingray (*Dasyatis americana*). Cero Mackerel and Great Barracuda represented pelagic (piscivorous) predators identified during our snapshot survey of Puerto Botes Reef. As for other highly complex reef systems, this taxonomic characterization falls short of providing a complete list of the resident and transient ichthyofauna associated with this reef. Additional surveys are needed to construct a more comprehensive characterization of the fish community. Four Long-spined Sea Urchins (*Diadema antillarum*) and one Spider Crab (*Mithrax spinosissimus*) were observed within belt-transect areas (Table 36).

TABLE 35. TAXONOMIC COMPOSITION AND ABUNDANCE OF FISHES AT PUERTO BOTES REEF, ISLA DESECHEO, MAYAGUEZ. JUNE, 2000

DEPTH: 17.0 m

FISH SPECIES	COMMON NAME	TRANSECTS					MEAN
		1	2	3	4	5	
		(individuals/30 m ²)					
<i>Thalassoma bifasciatum</i>	Blue-head Wrasse	54	35	66	60	50	53.0
<i>Chromis cyanea</i>	Blue Chromis	45	16	58	60	67	49.2
<i>Stegastes partitus</i>	Bicolor Damselfish	34	27	35	47	44	37.4
<i>Clepticus parrae</i>	Creole Wrasse	0	18	40	19	48	25.0
<i>Chromis multilineata</i>	Brown Chromis	0	10	30	1	43	16.8
<i>Gramma loreto</i>	Royal Gramma	0	30	12	5	8	11.0
<i>Coryphopterus lipernes</i>	Peppermint Goby	11	5	8	13	7	8.8
<i>Halichoeres garnoti</i>	Yellowhead Wrasse	4	10	4	7	0	5.0
<i>Gobiosoma evelynae</i>	Sharknose Goby	4	4	4	2	2	3.2
<i>Haemulon macrostomum</i>	Spanish Grunt	3	4	4	3	0	2.8
<i>Myripristis jacobus</i>	Black-bar Souldierfish	0	0	5	3	5	2.6
<i>Petrometopon cruentatus</i>	Graysbe	0	1	2	5	3	2.2
<i>Sparisoma viride</i>	Stoplight Parrotfish	0	2	0	3	4	1.8
<i>Cephalopholis fulva</i>	Coney	3	0	3	0	2	1.6
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish	1	2	1	1	3	1.6
<i>Bodianus rufus</i>	Spanish Hogfish	0	2	5	0	0	1.4
<i>Haemulon flavolineatum</i>	French Grunt	1	1	1	1	3	1.4
<i>Paranthias furcifer</i>	Creole Fish	0	0	0	5	1	1.2
<i>Sparisoma aurofrenatum</i>	Red-band Parrotfish	2	0	4	0	0	1.2
<i>Acanthurus coeruleus</i>	Blue Tang	1	0	2	2	0	1.0
<i>Apogon townsendi</i>	Belted Cardinalfish	0	1	0	0	4	1.0
<i>Chaetodon capistratus</i>	Four-eye Butterflyfish	1	0	2	2	0	1.0
<i>Holacanthus tricolor</i>	Rock Beauty	0	1	1	1	2	1.0
<i>Flammeo marianus</i>	Longspine Squirrelfish	1	1	1	0	1	0.8
<i>Scarus iserti</i>	Striped Parrotfish	1	0	3	0	0	0.8
<i>Sparisoma radians</i>	Bucktooth Parrotfish	2	0	0	2	0	0.8
<i>Stegastes planifrons</i>	Yellow Damselfish	1	0	1	0	2	0.8
<i>Acanthurus chirurgus</i>	Doctorfish	0	0	2	1	0	0.6
<i>Haemulon aeorlineatum</i>	Tomtate	0	0	0	0	3	0.6
<i>Lactophrys triqueter</i>	Smooth Trunkfish	1	1	1	0	0	0.6
<i>Melichthys niger</i>	Black Durgon	1	0	0	2	0	0.6
<i>Mulloides martinicus</i>	Yellowtail Goatfish	0	0	1	2	0	0.6
<i>Amblicirrhos pinnos</i>	Redspotted Hawkfish	0	0	0	2	0	0.4
<i>Carangoides ruber</i>	Black-bar Jack	0	2	0	0	0	0.4
<i>Holocentrus ascencionis</i>	Longjaw Squirrelfish	0	0	2	0	0	0.4
<i>Aulostomus maculatus</i>	Trumpetfish	0	0	1	0	0	0.2
<i>Cantherhines macrocerus</i>	Whitespotted Filefish	0	0	1	0	0	0.2
<i>Canthigaster rostrata</i>	Sharpnose Puffer	1	0	0	0	0	0.2
<i>Chaetodon aculeatus</i>	Longsnout Butterflyfish	0	0	1	0	0	0.2
<i>Chaetodon striatus</i>	Banded Butterflyfish	0	1	0	0	0	0.2
<i>Coryphopterus personatus</i>	Masked Goby	0	0	1	0	0	0.2
<i>Halichoeres radiatus</i>	Puddinwife	0	1	0	0	0	0.2

Table 35. Continued

<i>Kyphosus sp.</i>	Bermuda Chub	0	1	0	0	0	0.2
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<i>Malacoctenus triangulatus</i>	Saddled Blenny	0	1	0	0	0	0.2
<i>Ophioblennius atlanticus</i>	Redlip Blenny	0	1	0	0	0	0.2
<i>Scarus taeniopterus</i>	Princess Parrotfish	1	0	0	0	0	0.2
<i>Serranus tigrinus</i>	Harlequin Bass	0	0	0	1	0	0.2
<i>Sphyraena barracuda</i>	Great Barracuda	0	1	0	0	0	0.2
<i>Xanthichthys ringens</i>	Sargassum Triggerfish	0	0	0	1	0	0.2
	TOTAL INDIVIDUALS	173	179	302	251	302	241.4
	TOTAL SPECIES	21	28	31	26	20	25

Outside transects:

<i>Epinephelus guttatus</i>	Red Hind
<i>Caranx lugubris</i>	Black Jack
<i>Chaetodon striatus</i>	Banded Butterflyfish
<i>Lutjanus apodus</i>	Schoolmaster Snapper
<i>Scomberomorus regalis</i>	Cero
<i>Balistes vetula</i>	Queen Triggerfish
<i>Abudefduf sexatilis</i>	Sergeant Mayor
<i>Chaetodon sedentarius</i>	Reef Butterflyfish
<i>Scarus vetula</i>	Queen Parrotfish
<i>Acanthostracion quadricornis</i>	Scrawled Cowfish
<i>Dasyatis americana</i>	Southern Stingray
<i>Holacanthus ciliaris</i>	Queen Angelfish
<i>Pomacanthus arcuatus</i>	Gray Angelfish

TABLE 36. TAXONOMIC COMPOSITION AND ABUNDANCE OF MEGA-BENTHIC INVERTEBRATES AT PUERTO BOTES, ISLA DESECHEO, MAYAGUEZ. JUNE, 2000

		TRANSECTS					MEAN
Depth: 17.0 m		1	2	3	4	5	ABUNDANCE
SPECIES	COMMON NAME						(IND/30m ²)
<i>Diadema antillarum</i>	Long spided sea urchin				1	3	0.8
<i>Mithrax spinosissimus</i>	Spider crab		1				0.2
	TOTALS	0	1	0	1	3	1.0

3.3.4 Photo Album - Puerto Botes Reef, Isla Desecheo

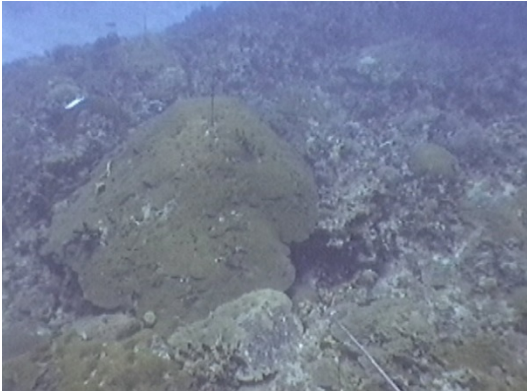


Plate 1. Puerto Botes, located north of Puerto Canoas on the western (leeward) section of Isla Desecheo, is characterized by the massive growth of stony corals, including colonies of very large size.

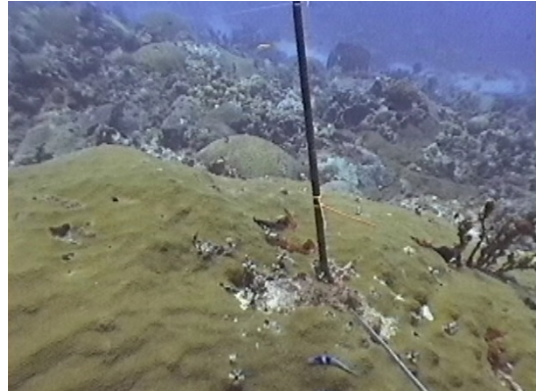


Plate 4. With a mean linear cover of 48.0 %, stony corals represented the dominant sessile-benthic reef component. Boulder Star Coral (*Montastrea annularis*) presented the highest linear cover with 26.6 %.

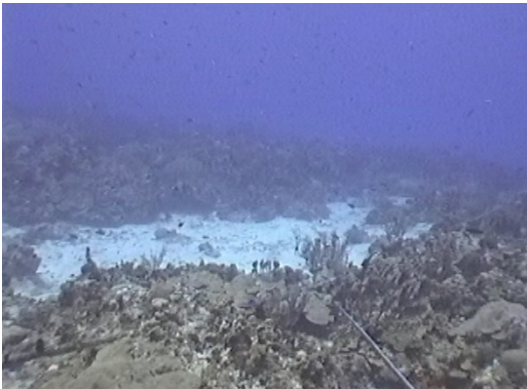
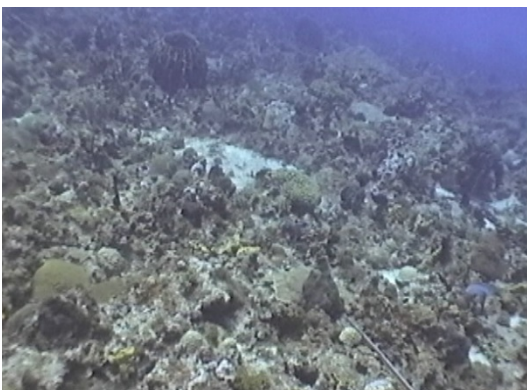


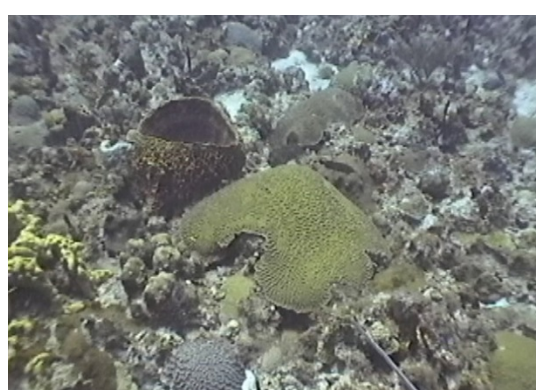
Plate 2



Plate 5



Plates 2 – 3. Puerto Botes is a submerged patch reef that has developed on top of a narrow terrace that slopes gently toward the shelf edge. The reef is found at depths between 15 – 23 meters.



Plates 4 – 6. The coral reef system at Puerto Botes features high substrate heterogeneity, provided by the combination of massive, branching and encrusting coral colonies.



Plate 7. Large colonies of Flower Coral, *Eusmilia fastigiata* were common at Puerto Botes.



Plate 10. A total of 61 fish species were identified during our snapshot survey at Puerto Botes. The mean number of fish species per transect was 25, with a mean density of 241 individuals per 30 m².



Plate 8. Lettuce Coral, *Agaricia agaricites*, ranked second in linear cover among coral taxa with a mean of 6.8 %. Several individuals of the Long Spined Sea Urchin, *Diadema antillarum* were observed.

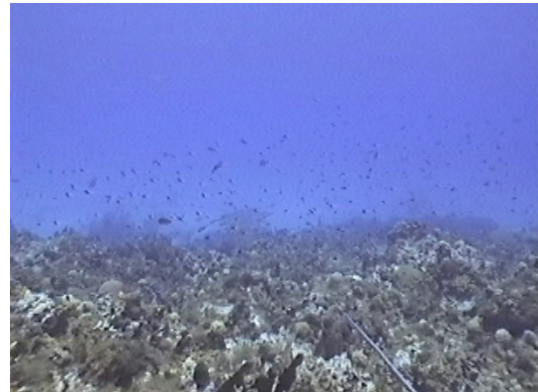


Plate 11. The zooplanktivorous fish assemblage, including juveniles and adult Blue and Brown Chromis and the Creole Wrasse formed a multispecies swarm over the reef.



Plate 9. Several diseased colonies of Boulder Star Coral, *Montastrea annularis* were observed at Puerto Botes.

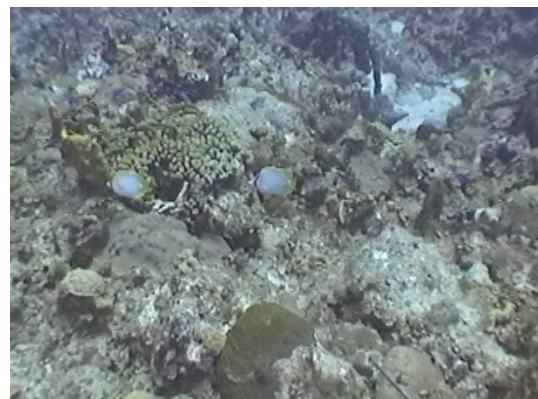


Plate 12. Five species of Butterflyfishes were identified from Puerto Botes Reef. Undoubtedly, additional surveys are needed to characterize the highly diverse ichthyofauna of this reef system.

4.0 Isla de Mona Natural Reserve

General Description

Isla de Mona and Monito are oceanic islands in the Mona Passage located between Puerto Rico and the Dominican Republic. Both of these islands were included in the designation of Isla de Mona Natural Reserve in 1986 by DNER. The total surface area of Mona Island is 54.9 km² (DNER, 1999). Mona is much larger than Monito and the only with well developed coral reefs. The north and east sections of the island are vertical walls that drop down to oceanic depths. Coral reefs develop along the south and west coasts of Isla de Mona where the insular shelf is wider. The island climate is semi-arid with no rivers and an average rainfall of 100 cm per year (Canals et al. 1981).

The first qualitative description of the coral reefs and other benthic habitats in Mona Island was prepared by Cintrón et al. (1975). Quantitative studies of the coral reef systems at Playa Pájaros, Uvero, Carabinero, Sardinera and Monito were reported by Canals et al. (1981). A marine biological survey of Mona and Monito Islands was performed by the Department of Marine Sciences in 1972. Information related to this cruise is available in Morelock's web page (<http://cima.uprm.edu/morelock/mon/htm>) along with additional reports on ship groundings, coral reef restoration and general observations on Mona's coral reefs.

Our coral community surveys were performed at Pajaros Reef in the south coast and off Playa Mujeres and Playa Carmelitas on the west and northwest coasts of the island. The location of sampling stations is shown in Figure 4. Geo-references and depths of reef surveys at Isla de Mona are presented in Table 37.

TABLE 37. GEOREFERENCES AND DEPTHS OF REEFS STUDIED AT ISLA DE MONA NATURAL RESERVE, JUNE, 2000

Reef Name	Survey Date	Depth (m)	Latitude	Longitude
Playa Pájaros Reef	6-June-00	13.6	18° 03.168' N	067° 51.995' W
Playa Mujeres Reef (T 1-3)	7-June-00	18.9	18° 04.302' N	067° 56.215' W
Playa Mujeres Reef (T 4-5)	7-June-00	16.6	18° 04.309' N	067° 56.271' W
Las Carmelitas Reef	8-June-00	8.5	18° 05.923' N	067° 56.300' W

4.1 Playa de Pájaros Reef – Isla de Mona

4.1.1 Physical Description of Playa de Pájaros Reef

Playa de Pájaros Reef is located on the south east coast of Isla de Mona (Figure 4). The are essentially two reefs off Playa de Pájaros. The one near shore consists of a cluster of barely emergent rock reefs that form a barrier to the inner shelf. Live coral on these rock reefs is mostly Fire Coral, (*Millepora spp.*) and encrusting scleractinian colonies. Within the inner lagoon environment, isolated coral colonies are interspersed among a predominantly unconsolidated sandy substrate. Knobby Brain Coral, *Diploria clivosa*, was common at the inner shelf, with mound-shaped colonies of small and moderate size distributed throughout the shallow (< 3.0 m) sandy substrate. Patchy growth of seagrass, mostly Manatee Grass, (*Syringodium filiforme*) was also found within the inner shelf.

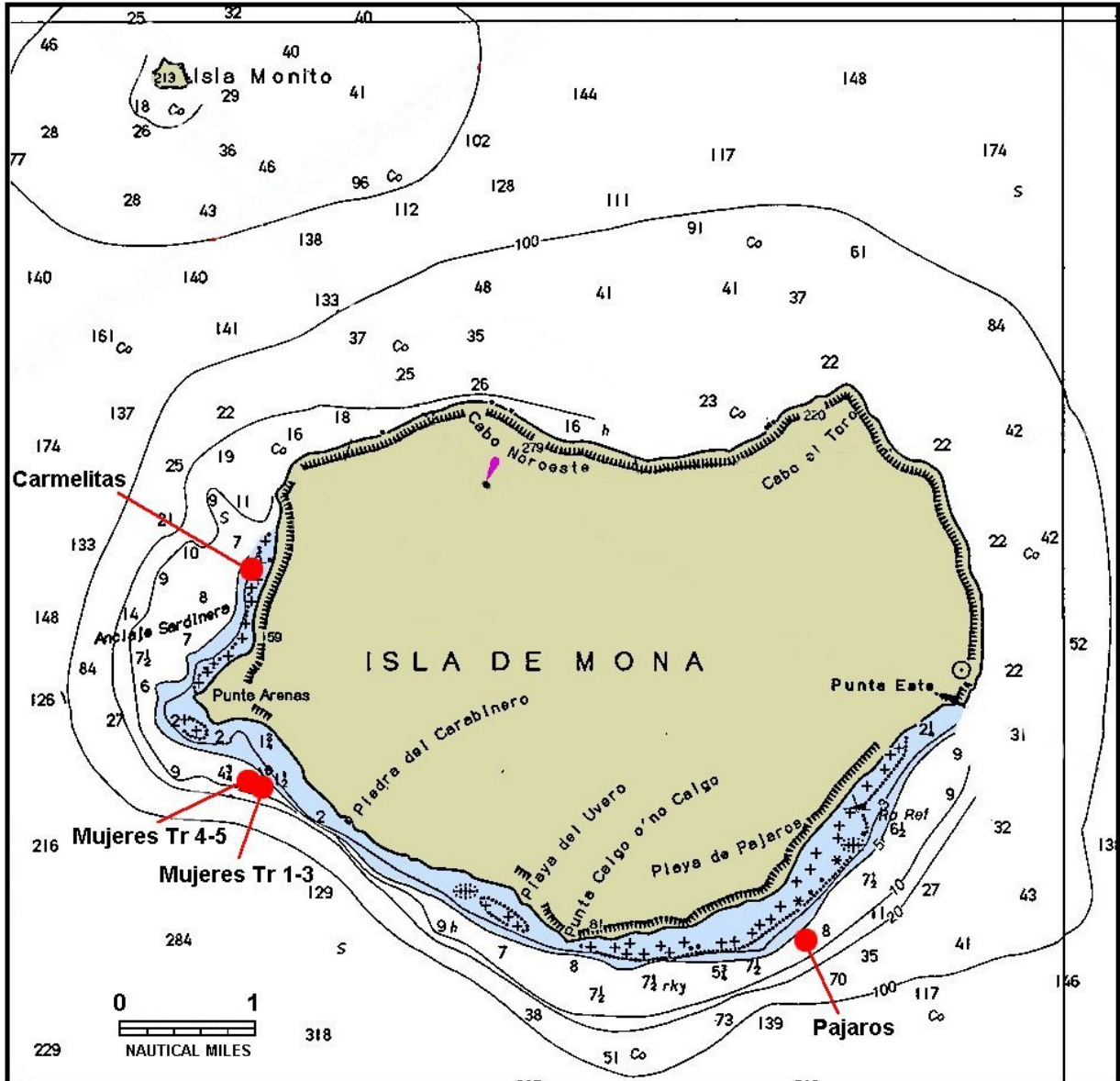


Figure 4. Location of reef sites surveyed at Isla de Mona Natural Reserve

Seaward from the inner reef barrier, the shelf slopes down to a deeper terrace where a spur-and-groove coral reef formation has developed at depths between 13 - 22 meters. The deeper range of the coral reef is associated with the shelf-edge. The spurs of the reef range in width from 7 – 10 meters and rise from the bottom approximately 3 - 4 meters. Coralline sand channels cut through the reef transporting unconsolidated sediments down the insular shelf. The top of the spurs was almost barren during our survey, with isolated, mostly encrusting coral colonies and a few gorgonians present. Most of the stony coral development was concentrated along the leeward (protected) section of the spurs. Such growth pattern appears to be associated with heavy wave action, perhaps experienced during hurricanes. Permanent transects were installed along the leeward edge of five consecutive spurs at Playa de Pájaros Reef during our survey.

4.1.2 Sessile-Benthic Reef Community

The algal turf was the dominant component of the sessile-benthic reef community in terms of surface cover at Playa de Pájaros Reef (Table 38). A mixed assemblage of short articulated red and brown macroalgae was observed growing as a thin carpet over most of the hard substrate not colonized by sessile-benthic reef invertebrates. The mean cover by the algal turf was 57.0 % (range 49.2 – 68.3 %). Reef surface cover by algal turf was visibly much higher at the top section of the spurs. Bundles of vertically projected fleshy brown macroalgae (*Dictyota sp.*) and calcareous macroalgae (*Halimeda sp.*) were intermixed in the algal turf. Also, variable sized patches of the brown macroalgae, *Lobophora sp.*, were common over the reef substrate. The combined cover by fleshy macroalgae was 9.2 % (range: 0 – 19.5 %). Thus, the combined cover by turf and fleshy macroalgae was approximately 66 %. Live stony corals ranked second in terms of reef substrate cover with a mean of 19.9 % (range: 2.0 – 31.2). The mean percent coral cover was somewhat depressed by a single transect (T – 3) with a relatively low cover (e.g. 2.0 %). Massive coral colonies prevailed along the leeward section of the reef spurs providing a high quality habitat for fishes and other reef biota. Reef overhangs, largely associated with massive coral colonies presented a mean surface cover of 4.9 %. Erect and encrusting sponges were present at all five transects surveyed with a mean surface cover of 7.3 % (range 2.4 – 11.0 %). Large individuals of the Basket Sponge, *Xestospongia muta* were observed. The gorgonian, *Erythropodium caribaeorum*, and the colonial zooanthid, *Palythoa sp.*, both encrusting colonial reef invertebrates, were recorded within transects, but represented minor components of the reef sessile-benthic biota. Reef benthic community profiles is presented in Appendix 4.1 – 4.5.

A total of 19 scleractinian corals and two hydrocorals (*Millepora alcicornis*, *Stylaster roseus*) were identified during our snapshot survey at Playa de Pájaros Reef (Table 39). The number of coral species per transect varied between one at T-3 and 11 at T-2. The Boulder Star Coral, (*Montastrea annularis*) was the dominant coral species in terms of linear cover with a mean of 9.0 % (range : 0 – 11.0 %), representing 45 % of the total cover by stony corals. No coral species were present at all five transects surveyed. Boulder Star Coral and Symmetrical Brain Coral, *Diploria strigosa* were intersected by four transects. Pillar Coral, *Dendrogyra cylindrus* was present at only two transects, but ranked second in terms of surface cover by stony corals with a mean cover of 3.4 %. Branching corals were rare at this reef, perhaps due to the high wave action affecting this section of the Mona Island shelf.

TABLE 38. PERCENT LINEAR COVER BY SESSILE-BENTHIC CATEGORIES AT PLAYA DE PAJAROS REEF, ISLA DE MONA NATURAL RESERVE, MAYAGUEZ. JUNE, 2,000

DEPTH : 13.6 m	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	3.07	3.99	1.78	3.27	3.24	3.07

SUBSTRATE CATEGORY

TURF ALGAE	64.04	49.19	68.27	50.10	53.64	57.05
STONY CORALS	28.31	20.73	2.04	17.11	31.19	19.88
FLESHY ALGAE		11.79	11.71	19.52	2.79	9.16
SPONGES	2.45	5.93	11.04	8.82	8.38	7.32
REEF OVERHANG	5.20	12.15	0.96	2.94	3.40	4.93
SAND			5.98	1.06		1.41
ENCRUSTING GORGONIAN		0.21			0.60	0.16
ZOANTHIDS				0.45		0.09
GORGONIANS (# col)	11	8	14	9	9	10

TABLE 39. TAXONOMIC COMPOSITION AND PERCENT LINEAR COVER OF STONY CORALS AT PLAYA DE PAJAROS REEF, ISLA DE MONA NATURAL RESERVE, MAYAGUEZ. JUNE, 2,000

CORAL SPECIES	TRANSECT					MEAN (%)
	1	2	3	4	5	
<i>Montastrea annularis</i>	24.93	5.22		10.95	3.70	8.96
<i>Dendrogyra cylindrus</i>		4.63			12.6	3.45
<i>Diploria strigosa</i>	0.32	3.93		1.51	5.27	2.21
<i>Montastrea cavernosa</i>		1.50		2.95	4.22	1.73
<i>Agaricia agaricites</i>	1.90	1.11	2.04			1.01
<i>Porites astreoides</i>	0.32	1.22			2.42	0.79
<i>Siderastrea siderea</i>	0.84	1.21			1.81	0.77
<i>Agaricia sp.</i>				1.70		0.34
<i>Diploria labyrinthiformis</i>					1.17	0.23
<i>Mussa sp.</i>		1.01				0.20
<i>Meandrina meandrites</i>		0.40				0.08
<i>Isophyllastrea rigida</i>		0.30				0.06
<i>Millepora alcicornis</i>		0.20				0.04
Outside Transects:						
<i>Colpophyllia natans</i>						
<i>Madracis decactis</i>						
<i>Stylaster roseus</i>						
<i>Porites furcata</i>						
<i>Porites porites</i>						
<i>Dichocoenia stokesii</i>						
<i>Leptoseris cucullata</i>						
<i>Eusmilia fastigiata</i>						

4.1.3 Fishes and Motile Megabenthic Invertebrates

A total of 56 fish species were identified during our visual surveys at Playa de Pájaros Reef, 40 of which were present within belt-transect areas (Table 40). The mean number of species per transect was 19 (range 16 – 24), and the mean density of fishes was 89.0 Individuals/30 m² (range : 41 - 124 Individuals/30 m²). Three species represented approximately 58 % of the total individuals within transect areas. The numerically dominant fish assemblage included the Blue Chromis (*Chromis cyanea*), Bluehead Wrasse (*Thalassoma bifasciatum*) and Bicolor Damselfish (*Stegastes partitus*). The aforementioned species and the Yellowhead Wrasse (*Halichoeres garnoti*) were present within all five transects surveyed. Bicolor Damselfishes occupied demersal territories within the reef, whereas *Chromis* spp. and the Bluehead Wrasse were distributed in schools (guilds) of variable sizes and size cohorts over coral promontories in the reef. Schools of Creole Wrasse (*Clepticus parrae*), Black Durgon (*Melichthys niger*) and Bermuda Chubs (*Kyphosus* sp.) were transient across reef survey sites, occupying mid-water depths in the water column.

The zooplanktivorous fish assemblage represented approximately 42 % of the total individuals within belt-transect areas. Blue and (*C. cyanea*, *C. multilineata*) and the Bicolor Damselfish were the main components of the zooplanktivorous assemblage. In addition, juvenile stages of many reef fishes could be associated with zooplankton as their primary food source before undertaking ontogenetic shifts in their diets. Opportunistic carnivores, which feed on small benthic invertebrates, such as wrasses (Labridae), gobies (Gobiidae), squirrelfishes (Holocentridae), grunts (Haemulidae), trumpetfishes (Aulostomidae), goatfishes (Mullidae) and small groupers (e.g. Red Hind, Coney, Graysbe - Serranidae) represented about 35% of the total individuals within belt-transect areas (Table 40).

Herbivorous taxa included mostly parrotfishes, doctorfishes (Acanthuridae) and damselfishes (Pomacentridae). The Red Band Parrotfish (*Sparisoma aurofrenatum*) was the most abundant herbivore (mean: 2.4 Individuals/30 m²). The combined herbivorous assemblage represented approximately 13 % of the total individuals within belt-transect areas. Cero Mackerel (*Scomberomorus regalis*) and Great Barracuda (*Sphyraena barracuda*) represented pelagic (piscivorous) predators. Demersal fish predators of larger reef invertebrates and small fishes, such as large snappers and groupers were not observed during our snapshot survey at Playa de Pájaros Reef. The only exception was one specimen of a Nurse Shark, *Ginglytomata cirratum* observed resting near the bottom. This is a most remarkable finding since this reef was notorious for the high abundance of large snappers and groupers during the previous decade. Evidently, drastic changes in the fish community structure, highlighted by the decline of large predators have occurred in this reef. No motile megabenthic invertebrates were observed within belt-transect areas.

TABLE 40. TAXONOMIC COMPOSITION AND ABUNDANCE OF FISHES AT PLAYA DE PAJAROS REEF, ISLA DE MONA, MAYAGUEZ. JUNE, 2000

DEPTH: 13.6 m

TRANSECTS				
1	2	3	4	5

<i>FISH SPECIES</i>	<i>COMMON NAME</i>	(individuals/30 m ²)					<i>MEAN</i>
<i>Chromis cyanea</i>	Blue Chromis	30	45	7	6	26	22.8
<i>Thalassoma bifasciatum</i>	Blue-head Wrasse	16	24	7	17	20	16.8
<i>Stegastes partitus</i>	Bicolor Damselfish	12	14	9	13	11	11.8
<i>Chromis multilineata</i>	Yellow-edge Chromis	0	5	0	2	10	3.4
<i>Halichoeres garnoti</i>	Yellowhead Wrasse	3	1	2	5	3	2.8
<i>Cephalopholis fulva</i>	Coney	4	2	1	5	0	2.4
<i>Sparisoma aurofrenatum</i>	Red-band Parrotfish	5	0	1	5	1	2.4
<i>Halichoeres maculipinna</i>	Clown Wrasse	4	3	0	0	4	2.2
<i>Scarus taeniopterus</i>	Princess Parrotfish	1	2	2	5	0	2.0
<i>Stegastes planifrons</i>	Yellow Damselfish	0	0	0	10	0	2.0
<i>Melichthys niger</i>	Black Durgon	0	1	2	4	2	1.8
<i>Myripristis jacobus</i>	Black-bar Souldierfish	3	2	0	0	3	1.6
<i>Sparisoma radians</i>	Bucktooth Parrotfish	4	0	3	1	0	1.6
<i>Bodianus rufus</i>	Spanish Hogfish	1	4	1	0	1	1.4
<i>Clepticus parrae</i>	Creole Wrasse	3	4	0	0	0	1.4
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish	2	2	0	2	1	1.4
<i>Acanthurus coeruleus</i>	Blue Tang	3	0	1	0	2	1.2
<i>Grama loreto</i>	Royal Gramma	0	0	0	0	6	1.2
<i>Chaetodon capistratus</i>	Four-eye Butterflyfish	2	0	3	0	0	1.0
<i>Scarus iserti</i>	Striped Parrotfish	2	1	0	2	0	1.0
<i>Acanthurus bahianus</i>	Ocean Surgeon	2	0	1	1	0	0.8
<i>Acanthurus chirurgus</i>	Doctorfish	0	2	0	0	1	0.6
<i>Gobiosoma evelynae</i>	Sharknose Goby	2	0	1	0	0	0.6
<i>Holocentrus rufus</i>	Squirrelfish	1	1	0	0	1	0.6
<i>Haemulon flavolineatum</i>	French Grunt	0	1	0	0	1	0.4
<i>Holacanthus tricolor</i>	Rock Beauty	1	1	0	0	0	0.4
<i>Holocentrus ascensionis</i>	Longjaw Squirrelfish	0	2	0	0	0	0.4
<i>Scarus coelestinus</i>	Midnight Parrotfish	0	2	0	0	0	0.4
<i>Aulostomus maculatus</i>	Trumpetfish	0	1	0	0	0	0.2
<i>Amblicirrhitos pinnos</i>	Redspotted Hawkfish	0	1	0	0	0	0.2
<i>Cantherhines pullus</i>	Tail-light Filefish	0	0	0	1	0	0.2
<i>Carangoides ruber</i>	Black-bar Jack	0	1	0	0	0	0.2
<i>Chaetodon aculeatus</i>	Longsnout Butterflyfish	0	0	0	1	0	0.2
<i>Halichoeres radiatus</i>	Puddinwife	0	1	0	0	0	0.2
<i>Lactophrys triqueter</i>	Smooth Trunkfish	0	0	0	0	1	0.2
<i>Malacoctenus triangulatus</i>	Saddled Blenny	0	0	0	0	1	0.2
<i>Ophioblennius atlanticus</i>	Redlip Blenny	0	0	0	0	1	0.2
<i>Pseudupeneus maculatus</i>	Spotted Goatfish	0	0	0	1	0	0.2
<i>Scomberomorus regalis</i>	Cero	0	1	0	0	0	0.2
<i>Sphyrnaena barracuda</i>	Great Barracuda	0	0	0	1	0	0.2
	TOTAL INDIVIDUALS	101	124	41	82	96	89
	TOTAL SPECIES	20	24	16	18	19	19

Table 40. Continued

Outside transects:

<i>Kyphosus sp.</i>	Bermuda Chub
<i>Urolophus jamaicensis</i>	Yellowspotted Stingray
<i>Cantherhines macrocerus</i>	Whitespotted Filefish

<i>Calamus bajonao</i>	Bajonao
<i>Epinephelus guttatus</i>	Red Hind
<i>Pomacanthus paru</i>	Queen Angelfish
<i>Ginglymostoma cirratum</i>	Nurse Shark
<i>Scarus vetula</i>	Queen Parrotfish
<i>Chaetodon striatus</i>	Banded Butterflyfish
<i>Petrometopon cruentatus</i>	Graysbe
<i>Haemulon plumieri</i>	White Grunt
<i>Sparisoma rubripinne</i>	Yellowtail Parrotfish
<i>Sparisoma viride</i>	Stoplight Parrotfish
<i>Mulloides martinicus</i>	Yellowtail Goatfish
<i>Caranx hippos</i>	Horse-eye Jack
<i>Lactophrys polygonia</i>	Honeycomb Cowfish

4.1.4 Photo Album – Pájaros Reef, Isla de Mona

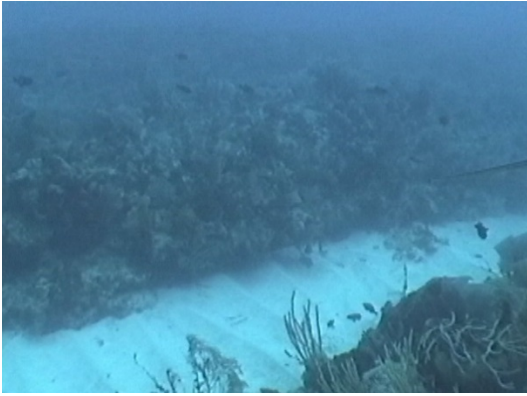


Plate 1. Pájaros Reef, located off the south east coast of Isla de Mona is a “spur and groove” formation that runs perpendicular to the shoreline and leads to the shelf edge.

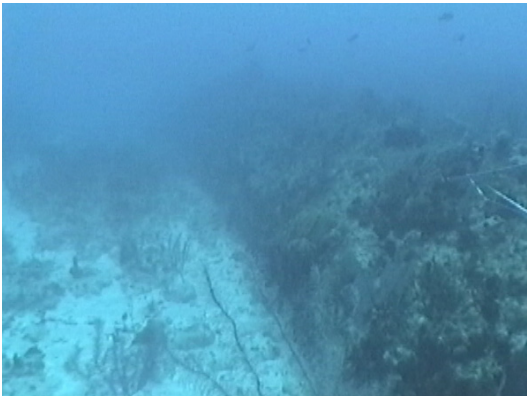
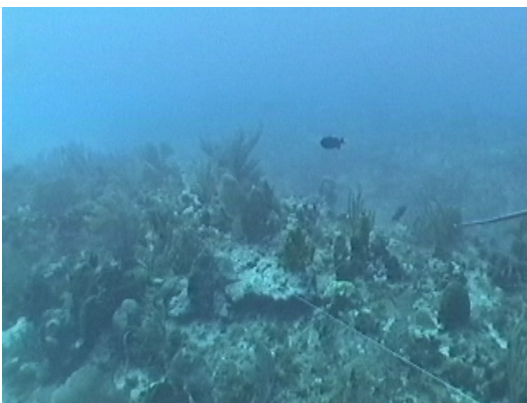


Plate 2



Plates 2 - 3. The spurs of the reef range in width from 7 – 10 m, and rise from the sandy channels approximately 3 – 4 m. Most of

the stony coral is concentrated along the leeward edge of the spurs.

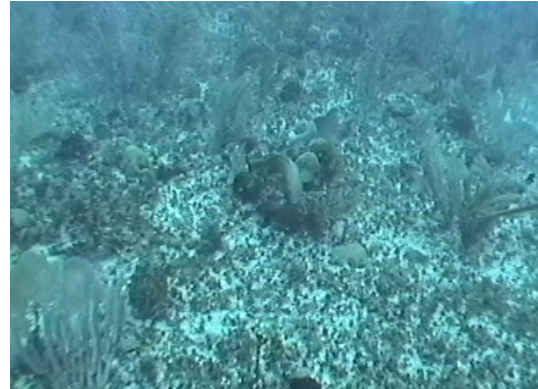


Plate 4. The top of the spurs was mostly colonized by turf algae, gorgonians and encrusting biota, including sponges, zoanthids and some corals.

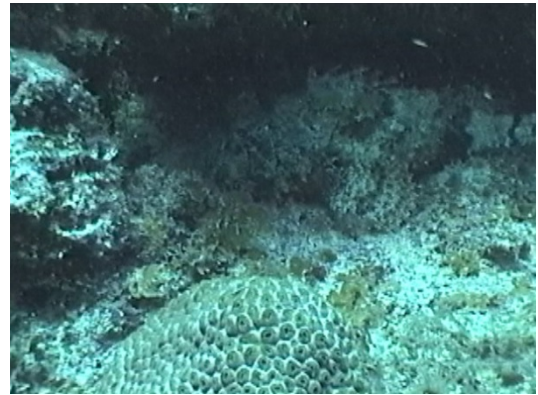


Plate 5. Scleractinian corals, with a mean linear cover of 19.9 %, were not very abundant, and mostly represented by small and medium sized encrusting colonies.



Plate 6. Soft corals were present in low abundance (mean: 10 colonies/transect) at Pájaros Reef, perhaps indicative of the

strong wave and surge action and/or the result of recent hurricane's damage.

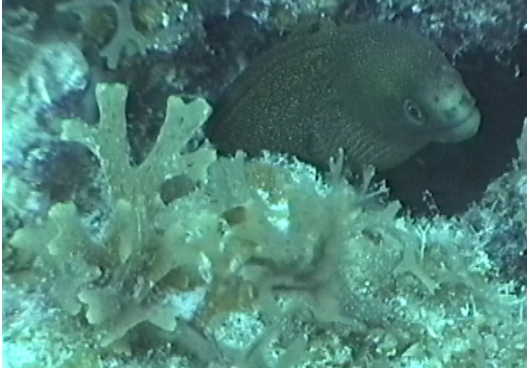


Plate 7. Turf and fleshy brown macroalgae (mostly *Dyctiota sp.*, *Lobophora sp.*) were prominent at Pájaros Reef with a combined linear cover of 66.2 %.

previously notorious for the abundance of large reef predators.



Plate 10. Schools of Bermuda Chubs (*Kyphosus sp.*) over the reef.



Plate 8. A total of 56 fish species were identified from Pájaros Reef. The mean number of species per belt-transect was 19, and the mean density was 89.0 individuals per 30m².

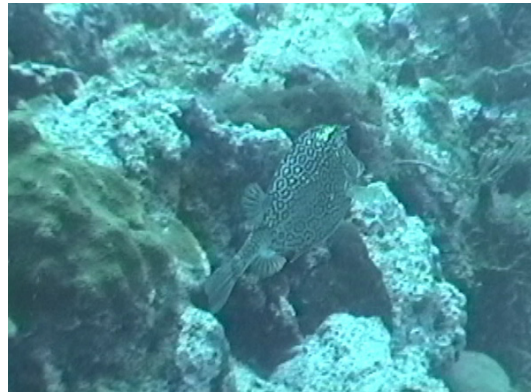


Plate 11. Honeycomb Cowfish (*Lactophrys polygonia*).



Plate 9. One Nurse Shark (*Ginglymostoma cirratum*) and a small barracuda were the only large fishes observed at Pájaros Reef,

4.2 Playa Mujeres Reef

4.2.2 Physical Description of Playa Mujeres Reef

Playa Mujeres is located on the southwest corner of Isla de Mona, between Piedra del Carabinero and Punta Arenas. Most of the shelf benthic habitat is a hard ground platform with abundant sand patches and coral rubble. Isolated massive and encrusting coral colonies are interspersed among the hard ground platform. Some erect sponges, mostly the Basket Sponge, *Xestospongia muta* are common. The coral reef system consists of a series of discontinuous patches associated with the shelf-edge. Our coral reef community survey off Playa Mujeres was performed at two separate (although adjacent) sections of the shelf where coral reef patches were found (Figure 4).

4.2.3 Sessile-Benthic Reef Community

The shelf-edge reef off Playa Mujeres is perhaps the best developed coral reef system among those surveyed from Mona Island. Stony corals grow along a rather narrow band at the drop-off and also form a series of patch reefs adjacent to the shelf edge providing substantial topographic relief and structural habitat to a diverse coral reef community. The mean surface cover by stony corals was 36.4 % (range: 26.1 – 48.2 %) at the top of patch reef formations (Table 41). Soft corals were present in low abundance at all five transects surveyed (mean: 8.0 colonies/transect). This is probably related to space limitations due to the high cover by stony corals and the strong wave action acting upon this reef. Coarse coralline sand and rubble sediments separate patch reef sections of variable size dimensions. Reef overhangs, largely associated with growth of Boulder Star Coral, *Montastrea annularis* and other stony corals accounted for 9.9 % of the total linear cover at Playa Mujeres Reef. Erect and encrusting sponges were present at all five transects surveyed for a mean cover of 7.1 % (range : 2.9 – 15.8 %). Large Basket Sponges (*Xestospongia muta*) were prominent at this reef.

Fleshy algae, mostly *Lobophora* sp. *Dyctiota* sp. and *Padina* sp. combined for a mean surface cover of 5.0 %. *Dyctiota* sp. and *Padina* sp. occurred mostly in small bundles attached to the reef hard ground, whereas *Lobophora* was found overlying dead coral sections and intermixed with other low relief algae, forming an algal mat over reef sections not colonized by stony corals or sponges. The mean surface cover by algal turf was 40.1 % (range : 24.4 – 59.5 %). Soft corals presented an extremely low density of colonies (mean: 1.0 colonies/transect) at reef areas surveyed. This is probably related to space limitations due to the high cover by stony corals. Reef benthic community profiles are presented in Appendix 4.6 – 4.10.

A total of 22 scleractinian corals and one hydrocoral (*Millepora alcicornis*) were identified during our snapshot survey at Playa Mujeres Reef, Isla de Mona (Table 42). The Boulder Star Coral, (*Montastrea annularis*) was the dominant coral species in terms of linear cover with a mean of 21.5 % (range : 13.0 – 25.0 %), representing almost 60 % of the mean cover by stony corals. In addition to the Boulder Star Coral, Mustard Hill Coral (*Porites astreoides*) and Lettuce Coral (*Agaricia agaricites*) were present at all five transects surveyed. *Colpophyllia natans* was present in three transects with massive colonies ranging second in surface cover among stony corals with a mean of 5.6 %. Branching corals were represented by Finger Coral (*Porites porites*), Ten-Ray Star Coral (*Madracis decactis*) and Staghorn Coral (*Acropora cervicornis*). Fleshy corals (*Mycetophyllia* spp) were common in vertical sections of the reef, mostly growing encrusted to walls and within holes and gaps formed by growth of other coral colonies.

TABLE 41. PERCENT LINEAR COVER BY SESSIL-BENTHIC CATEGORIES AT PLAYA MUJERES REEF, ISLA DE MONA NATURAL RESERVE, MAYAGUEZ. JUNE, 2,000

TRANSECT

	1	2	3	4	5	MEAN
Rugosity (m)	3.47	4.17	4.28	3.10	3.21	3.65
SUBSTRATE CATEGORY						
TURF ALGAE	59.47	24.42	48.78	37.56	30.27	40.10
STONY CORALS	31.03	28.93	26.14	48.17	47.77	36.41
REEF OVERHANG	5.12	7.27	13.10	11.37	12.57	9.89
SPONGE	3.86	15.81	7.50	2.90	5.53	7.12
FLESHYALGAE	0.52	23.08	1.26			4.97
SAND			3.22		3.63	1.37
HOLE		0.49			0.23	0.14
GORGONIANS (# col)	8	6	13	5	8	8

TABLE 42. TAXONOMIC COMPOSITION AND PERCENT LINEAR COVER OF STONY CORALS AT PLAYA MUJERES REEF, ISLA DE MONA NATURAL RESERVE, MAYAGUEZ. JUNE, 2,000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	3.47	4.17	4.28	3.10	3.21	3.65
CORAL SPECIES						
<i>Montastrea annularis</i>	24.29	13.04	18.86	24.96	26.27	21.48
<i>Colpophyllia natans</i>		1.39		11.37	15.22	5.60
<i>Agaricia agaricites</i>	1.78	4.57	4.35	2.06	1.81	2.91
<i>Porites astreoides</i>	2.76	2.47	1.05	3.97	1.06	2.26
<i>Diploria labyrinthiformis</i>	2.2	0.7			1.39	0.86
<i>Porites porites</i>		3.38				0.68
<i>Eusmilia fastigiata</i>				3.21		0.64
<i>Diploria strigosa</i>			0.89	1.51		0.48
<i>Siderastrea siderea</i>					1.81	0.36
<i>Mycetophyllia ferox</i>		1.79				0.36
<i>Millepora alcicornis</i>		1.19		0.23		0.28
<i>Meandrina meandrites</i>		0.4	0.99			0.28
<i>Agaricia fragilis</i>				0.43		0.09
<i>Mycetophyllia lamarckiana</i>				0.43		0.09
<i>Madracis decactis</i>					0.21	0.04
Outside Transects:						
<i>Montastrea cavernosa</i>						
<i>Dichocoenia stokesii</i>						
<i>Porites furcata</i>						
<i>Acropora cervicornis</i>						
<i>Leptoseris cucullata</i>						
<i>Mussa sp.</i>						
<i>Colpophyllia amaranthus</i>						
<i>Madracis sp.</i>						

4.2.4 Fishes and Motile Megabenthic Invertebrates

A total of 58 fish species were identified during our visual surveys at Playa Mujeres Reef, 48 of which

were present within belt-transect areas (Table 43). The mean number of species per transect was 23 (range 18 – 30), and the mean density of fishes was 133.0 Individuals/30 m² (range : 119 - 152 Individuals/30 m²). Four species represented approximately 69 % of the total individuals within belt-transect areas. The numerically dominant fish assemblage included the Blue Chromis (*Chromis cyanea*), Bicolor Damselfish (*Stegastes partitus*), Bluehead Wrasse (*Thalassoma bifasciatum*) and Brown Chromis (*C. multilineata*). These four species were present at all transects surveyed. In addition to the aforementioned species, the Yellowhead Wrasse (*Halichoeres garnoti*), and the Sharknose and Peppermint Gobies (*Gobiosoma evelynae*, *Coryphopterus lipernes*) were present within all five transects surveyed. The two later species were observed over live massive scleractinian coral colonies. Bicolor Damselfishes occupied demersal territories within the reef, whereas *Chromis* spp. and the Bluehead Wrasse were mostly aggregated in schools (guilds) over coral promontories in the reef. Schools of Creole Wrasse (*Clepticus parrae*), Black Durgon (*Melichthys niger*), Ocean Triggerfish (*Canthidermis sufflamen*) and Bermuda Chubs (*Kyphosus* sp.) were transient across reef survey sites, occupying mid-water depths in the water column. Sandy areas were the habitat of numerous individuals of the Sand Tilefish (*Malacanthus plumieri*).

The zooplanktivorous fish assemblage represented approximately 56.4 % of the total individuals within belt-transect areas. Blue and (*C. cyanea*, *C. multilineata*) and the Bicolor Damselfish were the main components of the zooplanktivorous assemblage. In addition, juvenile stages of many reef fishes could be associated with zooplankton as their primary food source before undertaking ontogenetic shifts in their diets. Opportunistic carnivores, which feed on benthic invertebrates and small fishes, such as wrasses (Labridae), gobies (Gobiidae), squirrelfishes (Holocentridae), grunts (Haemulidae), trumpetfishes (Aulostomidae) and small groupers (e.g. Coney, Red Hind, Graysbe) and snappers (Schoolmaster, Yellowtail) represented about 22% of the total individuals within belt-transect areas (Table 43).

Herbivorous taxa included mostly parrotfishes and doctorfishes (Acanthuridae). The Striped Parrotfish (*Scarus iserti*) was the most abundant herbivore (mean : 2.4 Individuals/30 m²). The combined herbivorous assemblage represented only 5 % of the total individuals within belt-transect areas. A couple of large Rainbow Parrotfishes (*Scarus guacamaia*) were the largest fish observed. The Great Barracuda (*Sphyraena barracuda*) and Black and Bar Jacks (*Caranx lugubris*, *Carangoides ruber*) represented pelagic (piscivorous) predators. Demersal fish predators of larger reef invertebrates and fishes, such as large snappers and groupers were only represented by one juvenile Tiger Grouper (*Mycteroperca tigris*) during our snapshot survey at the shelf-edge reef off Playa Mujeres. As it applies for Playa de Pájaros Reef, this reef section of the shelf-edge was notorious for the high abundance of very large snappers and groupers during the previous decade. Thus, the drastic decline of such large predators represent major shifts in reef community structure.

Motile megabenthic invertebrates were represented by one Coral Crab (*Carpilus coralinus*) observed within belt-transect areas (Table 44).

TABLE 43. TAXONOMIC COMPOSITION AND ABUNDANCE OF FISHES AT PLAYA MUJERES REEF, ISLA DE MONA, MAYAGUEZ. JUNE, 2000

DEPTH: 18.0 m

TRANSECTS				
1	2	3	4	5
(individuals/30 m ²)				

FISH SPECIES	COMMON NAME						MEAN
<i>Chromis cyanea</i>	Blue Chromis	46	48	35	39	57	45.0
<i>Stegastes partitus</i>	Bicolor Damselfish	22	21	32	30	25	25.9
<i>Thalassoma bifasciatum</i>	Blue-head Wrasse	13	7	4	30	7	12.2
<i>Chromis multilineata</i>	Yellow-edge Chromis	5	10	12	6	8	8.2
<i>Gramma loreto</i>	Royal Gramma		6	5	3	5	3.8
<i>Coryphopterus personatus</i>	Masked Goby	5	13				3.6
<i>Halichoeres garnoti</i>	Yellowhead Wrasse	2	1	3	8	4	3.6
<i>Stegastes dorsopunicans</i>	Dusky Damselfish	15			1	1	3.4
<i>Coryphopterus lipernes</i>	Peppermint Goby	1	10	1	1	1	2.8
<i>Scarus iserti</i>	Striped Parrotfish			3	3	6	2.4
<i>Clepticus parrae</i>	Creole Wrasse			10		1	2.2
<i>Sparisoma aurofrenatum</i>	Red-band Parrotfish			2	4	2	1.6
<i>Gobiosoma evelynae</i>	Sharknose Goby	1	2	2	1	1	1.4
<i>Scarus taeniopterus</i>	Princess Parrotfish	2		3	2		1.4
<i>Bodianus rufus</i>	Spanish Hogfish	3	2		1		1.2
<i>Chaetodon capistratus</i>	Four-eye Butterflyfish	2	2		2		1.2
<i>Cephalopholis cruentatus</i>	Grasysbe	1	1	2	2		1.2
<i>Halichoeres maculipinna</i>	Clown Wrasse			1	3	1	1.0
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish	1	2			2	1.0
<i>Melichthys niger</i>	Black Durgon	2			2		0.8
<i>Acanthurus coeruleus</i>	Blue Tang	1	2				0.6
<i>Flammeo marianus</i>	Longspine Squirrelfish	1	1			1	0.6
<i>Holacanthus tricolor</i>	Rock Beauty			1	1	1	0.6
<i>Holocentrus rufus</i>	Squirrelfish		1		1	1	0.6
<i>Scarus vetula</i>	Queen Parrotfish		1	1	1		0.6
<i>Stegastes planifrons</i>	Yelloweyed Damselfish		2		1		0.6
<i>Urolophus jamaicensis</i>	Yellowspotted Stingray			1	1		0.4
<i>Anisotremus virginicus</i>	Porkfish	1	1				0.4
<i>Chaetodon striatus</i>	Banded Butterflyfish				2		0.4
<i>Kyphosus sp.</i>	Bermuda Chub	1			1		0.4
<i>Acanthurus chirurgus</i>	Doctorfish	1					0.2
<i>Amblicirrhitis pinnos</i>	Redspotted Hawkfish				1		0.2
<i>Anisotremus surinamensis</i>	Black Margate		1				0.2
<i>Aulostomus maculatus</i>	Trumpetfish					1	0.2
<i>Balistes vetula</i>	Queen Triggerfish	1					0.2
<i>Canthigaster rostrata</i>	Sharpnose Puffer				1		0.2
<i>Carangoides ruber</i>	Black-bar Jack			1			0.2
<i>Caranx lugubris</i>	Black Jack				1		0.2
<i>Haemulon flavolineatum</i>	French Grunt				1		0.2
<i>Haemulon plumieri</i>	White Grunt		1				0.2
<i>Holocentrus ascensionis</i>	Longjaw Squirrelfish					1	0.2
<i>Lactophrys triqueter</i>	Smooth Trunkfish					1	0.2
<i>Lutjanus apodus</i>	Schoolmaster		1				0.2
<i>Gymnothorax miliaris</i>	moray (ck)				1		0.2
<i>Ocyurus chrysurus</i>	Yellowtail Snapper					1	0.2
<i>Pseudupeneus maculatus</i>	Spotted Goatfish	1					0.2
<i>Scarus guacamaia</i>	Rainbow Parrotfish		1				0.2
Table 43. Continued							
<i>Sparisoma sp.</i>	Juvenile Parrotfish				1		0.2
	TOTAL INDIVIDUALS	128	137	119	152	128	133.0
	TOTAL SPECIES	21	23	18	30	21	23

Outside transects:

<i>Pomacanthus arcuatus</i>	Gray Angelfish
<i>Sphyræna barracuda</i>	Great Barracuda
<i>Sparisoma viride</i>	Stoplight Parrotfish
<i>Cephalopholis fulva</i>	Coney
<i>Cantherhines pullus</i>	Tail-light Filefish
<i>Lactophrys trigonus</i>	Buffalo Trunkfish
<i>Mycteroperca tigris</i>	Tiger Grouper
<i>Epinephelus guttatus</i>	Red Hind
<i>Malacanthus plumieri</i>	Sand Tilefish
<i>Canthidermis sufflamen</i>	Ocean Triggerfish

TABLE 44. TAXONOMIC COMPOSITION AND ABUNDANCE OF MEGA-BENTHIC INVERTEBRATES AT PLAYA MUJERES REEF, ISLA DE MONA, MAYAGUEZ. JUNE, 2000

		TRANSECTS					MEAN ABUNDANCE (IND/30 m ²)
Depth: 18.9 m		1	2	3	4	5	
SPECIES	COMMON NAME						
<i>Carpilius coralinus</i>	Coral crab		1				0.2
TOTALS		0	1	0	0	0	0.2

4.2.5 Photo Album – Playa Mujeres Reef, Isla de Mona

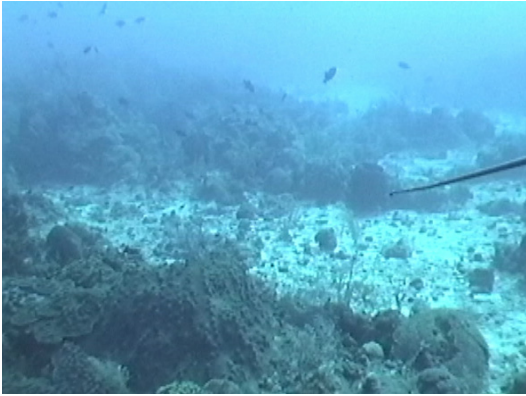


Plate 1. The coral reef system off Playa Mujeres consists of a series of discontinuous patch reefs associated with the shelf-edge.

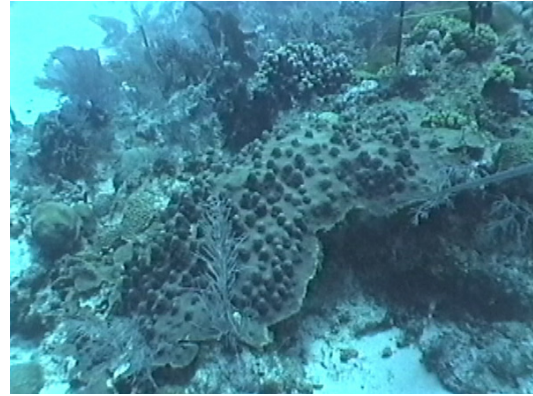


Plate 4. The mean surface cover by stony corals was 36.4 % at the top of patch reef formations.

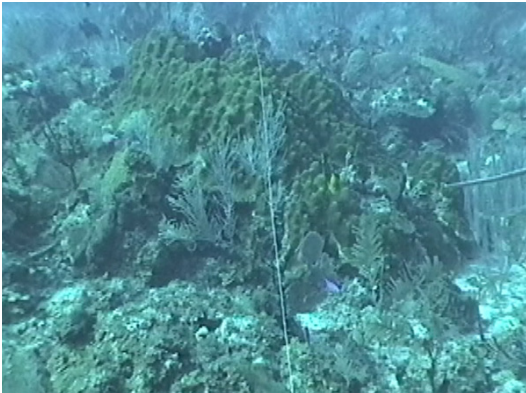
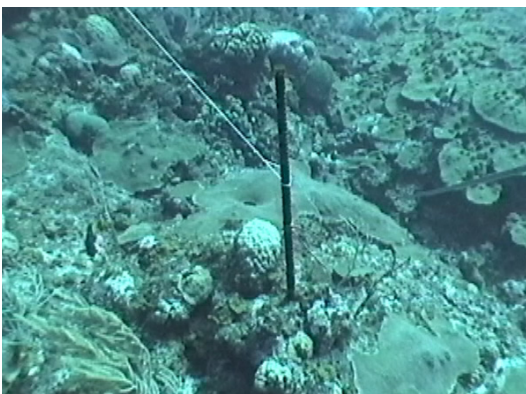


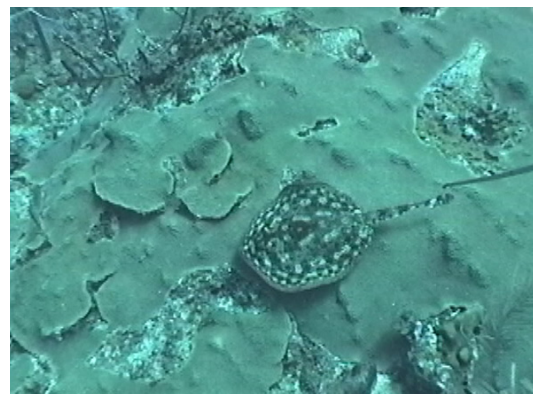
Plate 2



Plate 5



Plates 2 – 3. Stony corals grow along a rather narrow band at the drop-off interface and also form patch reefs adjacent to the shelf-edge providing substantial topographic relief and structural habitat for a diverse coral reef community.



Plates 5 - 6. A total of 23 stony corals were identified at Playa Mujeres Reef. The Boulder Star Coral, *Montastrea annularis* was the most abundant with a mean linear cover of 21.5 %.

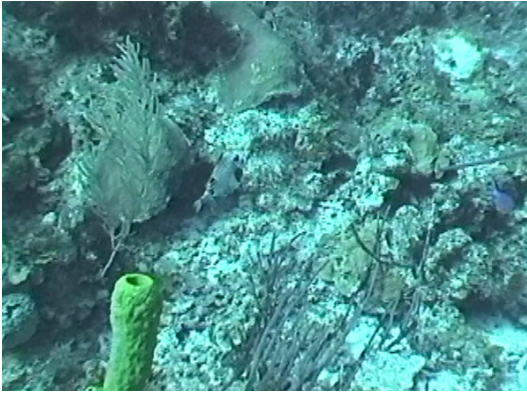


Plate 7. Soft corals, with a mean of only 8 colonies intersected per transect were not a major component of the reef community at Playa Mujeres.

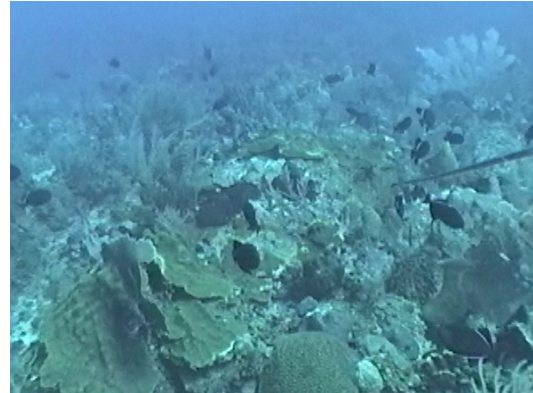


Plate 10. A total of 58 fish species were identified during our snapshot survey at Playa Mujeres Reef. The mean number of species per transect was 23, with a mean density of 133 individuals per 30m².

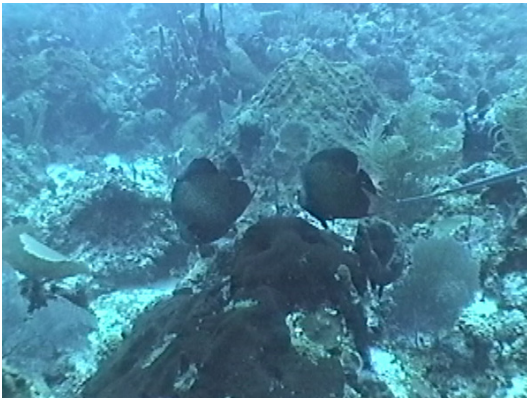


Plate 8



Plate 11



Plates 8 – 9. Erect and encrusting sponges were present at all transects surveyed and presented a combined surface cover of 7.1 %.



Plates 11 – 12. Zooplanktivorous fishes, including Black Durgons (Plate 10), *Chromis* spp., Bermuda Chubs (Plate 11), Creole Wrasse (Plate 12) represented about 54 % of the total individuals within belt-transects at Playa Mujeres Reef.

4.3 Las Carmelitas Reef

4.3.1 Physical Description of Las Carmelitas Reef

Las Carmelitas Reef is located due north of Playa Sardinera along the west coast of Isla de Mona (Figure 4). The reef extends from the shoreline to a depth of approximately 20 meters. From the shoreline, a white sand shallow backreef lagoon with isolated scattered coral heads is protected from wave action by a fringe of emergent rocks, or reef crest. Many dead colonies of Elkhorn Coral (*Acropora palmata*) are found along the margin of the backreef lagoon close to the reef crest. Bundles of fleshy algae, sea urchins (*Echinometra* sp.) and encrusting biota cover most of the rock substrate, but stony coral growth at the reef crest is minimal. Seaward from the reef crest, a series of rock outcrops is found to a depth of approximately 10 meters. This zone is exposed to heavy wave action and sand movement. Encrusting zoanthids (*Palythoa* sp.) and turf algae colonize most of the rock outcrop surface. Few scattered stony coral colonies grow encrusted to the walls of rock outcrops. Also, small mounds of the Mustard Hill Coral, *Porites astreoides* were observed within this zone. Below a depth of approximately 10 meters, the reef slope takes on a diffuse spur-and-groove pattern as wide and deep sand channels separate the gently sloping hard bottom terraces where mostly massive and encrusting stony corals grow. The reef ends into a fine sand bottom that leads to the shelf-edge. Permanent transects were installed along the edges of reef spurs at a depth of 8.5 meters.

4.3.2 Sessile-Benthic Reef Community

The widespread incidence of diseased stony corals was the most striking feature of Las Carmelitas Reef. Diseased corals included the Boulder Star Coral (*Montastrea annularis*) and the Symmetrical Brain Coral (*Diploria strigosa*). The disease showed up as white/yellowish rings (or bands) usually on top of the coral colonies, leaving the inside sections of the rings exposed to algal growth. The phenomena of infectious diseases on corals at Las Carmelitas Reef is currently under investigation (Bruckner et al; unpublished). Live coral cover averaged 25.4 % (range: 13.8- 37.6 % %) along permanent transects (Table 45). Coral growth was observed mostly along the edges of the spur walls and within crevices and other hard ground substrate depressions. This is an indication that strong wave action is probably an important factor regulating coral growth. Reef overhangs, largely associated with massive coral growth averaged 11.7 % along permanent transects and contributed to an average substrate rugosity of 4.53 meters at Las Carmelitas Reef. Sponges and fleshy algae were observed along all five transects surveyed but presented a relatively low surface cover. The algal turf assemblage averaged a surface cover of 58.1 % (range: 43.7– 78.3 %). Reef benthic community profiles are presented in Appendix 4.11 – 4.15.

A total of 19 species of scleractinian corals and one hydrocoral (*Millepora* sp) were identified from Las Carmelitas Reef (Table 46). Star Coral (*Montastrea annularis*) was the dominant species in terms of linear cover with a mean of 17.2 % (range : 4.4 – 31.6 %), representing 70.0 % of the total cover by live stony corals. Star Coral exhibited both its laminar “mushroom” shaped colonies (e.g. *faveolata* morphotype) and also its thick boulder growth (e.g. *annularis* morphotype). Laminar growth contributed to a high habitat complexity by the formation of ledges underneath the colonies. Star Coral, Lettuce Coral (*Agaricia agaricites*) and Mustard Hill Coral (*Porites astreoides*) were intersected by all five transects surveyed at Las Carmelitas Reef. The Symmetrical Brain Coral (*Diploria strigosa*) was also very common, as it was present in four of the surveyed transects. The Finger Coral (*Porites porites*) was the most abundant branching coral type, although Smooth Flower Coral (*Eusmilia fastigiata*) and Staghorn Coral (*Acropora cervicornis*) were also present.

TABLE 45. PERCENT LINEAR COVER BY SESSIL-BENTHIC CATEGORIES AT LAS CARMELITAS REEF, ISLA DE MONA NATURAL RESERVE, MAYAGUEZ. JUNE, 2,000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	5.47	5.58	6.48	2.90	2.21	4.53
SUBSTRATE CATEGORY						
TURF ALGAE	46.79	53.15	43.68	68.60	78.29	58.10
STONY CORALS	37.62	22.59	31.74	21.40	13.76	25.42
REEF OVERHANG	8.73	20.60	18.57	6.36	4.26	11.70
SPONGE	3.56	2.05	1.52	1.63	1.39	2.03
FLESHY ALGAE	3.30	0.45	2.12	1.16	1.64	1.73
HOLE			2.37		0.66	0.61
ZOANTHID		1.16				0.23
SAND				0.85		0.17
GORGONIANS (# col)	1	6	4	4	2	3

TABLE 46. TAXONOMIC COMPOSITION AND PERCENT LINEAR COVER OF STONY CORALS AT LAS CARMELITAS REEF, ISLA DE MONA NATURAL RESERVE, MAYAGUEZ. JUNE, 2,000

	TRANSECT					MEAN
	1	2	3	4	5	
Rugosity (m)	5.47	5.58	6.48	2.9	2.21	4.53
CORAL SPECIES						
<i>Montastrea annularis</i>	31.56	19.44	18.89	11.62	4.41	17.18
<i>Porites astreoides</i>	0.64	0.64	1.03	4.88	1.71	1.78
<i>Agaricia agaricites</i>	0.36	1.15	2.73	1.62	0.46	1.26
<i>Porites furcata</i>				1.09	5.00	1.22
<i>Colpophyllia natans</i>	2.98		1.64		1.37	1.20
<i>Diploria strigosa</i>		0.18	3.52	0.55	0.46	0.94
<i>Diploria labyrinthiformis</i>	1.18		2.91			0.82
<i>Montastrea cavernosa</i>		1.18	0.85	1.2		0.65
<i>Eusmilia fastigiata</i>	0.9					0.18
<i>Meandrina brasiliensis</i>				0.44		0.09
juvenile coral					0.35	0.07
<i>Madracis decactis</i>			0.17			0.03
Outside Transects:						
<i>Siderastrea siderea</i>						
<i>Mycetophyllia lamarkiana</i>						
<i>Millepora complanata</i>						
<i>Stephanocoenia michilini</i>						
<i>Isophyllia sinuosa</i>						
<i>Dichocoenia stokesii</i>						
<i>Dendrogyra cylindrus</i>						
<i>Isophyllia rigida</i>						

4.3.3 Fishes and Motile Megabenthic Invertebrates

A total of 62 fish species were identified during our visual surveys at Las Carmelitas Reef, 42 of which were present within belt-transect areas (Table 47). The mean number of species per transect was 22 (range 19 – 26), and the mean density of fishes was 86.0 Individuals/30 m² (range: 75 - 101 Individuals/30 m²). Five species represented approximately 60.2 % of the total individuals within belt-transect areas. The numerically dominant fish assemblage included the Bluehead Wrasse (*Thalassoma bifasciatum*), Bicolor Damselfish (*Stegastes partitus*), Royal Gramma (*Gramma loreto*), and the Blue and Brown Chromis (*Chromis cyanea*, *C. multilineata*). These five species were present at all transects surveyed. In addition to the aforementioned species, the Yellowhead Wrasse (*Halichoeres garnoti*), and the Saddled Blenny (*Malacoctenus triangulatus*) were also present within all five transects surveyed. Bicolor Damselfishes occupied demersal territories within the reef, whereas *Chromis* spp. and the Bluehead Wrasse were mostly aggregated in schools (guilds) over coral promontories in the reef. Royal Grammas were abundant under coral ledges at the walls of the reef spurs. Schools of Creole Wrasse (*Clepticus parrae*), Black Durgon (*Melichthys niger*), Bar Jacks (*Carangoides ruber*) and Bermuda Chubs (*Kyphosus* sp.) were transient across reef survey sites, occupying mid-water depths in the water column. Sandy areas were colonized by the Sand Tilefish (*Malacanthus plumieri*).

Opportunistic carnivores, which feed on small benthic invertebrates, such as wrasses (Labridae), gobies (Gobiidae), squirrelfishes (Holocentridae), grunts (Haemulidae), trumpetfishes (Aulostomidae) and small groupers (e.g. Coney, Red Hind, Graysbe) and snappers (Schoolmaster, Yellowtail) represented about 51.4 % of the total individuals within belt-transect areas (Table 47). The zooplanktivorous fish assemblage represented approximately 31.4 % of the total individuals within belt-transect areas. Bicolor Damselfish and the Blue and Brown Chromis were the main components of the zooplanktivorous assemblage. In addition, juvenile stages of many reef fishes use zooplankton as their primary food source before undertaking ontogenetic shifts in their diets.

Herbivorous taxa included mostly parrotfishes and doctorfishes (Acanthuridae). The combined herbivorous assemblage represented only 10 % of the total individuals within belt-transect areas. The Great Barracuda (*Sphyraena barracuda*) and the Bar Jack (*Carangoides ruber*) represented pelagic (piscivorous) predators. Demersal fish predators of larger reef invertebrates and fishes, such as large snappers and groupers were represented by one juvenile Yellowmouth Grouper (*Mycteroperca venenosa*) and an adult Rock Hind (*Epinephelus adscensionis*) during our snapshot survey at Las Carmelitas Reef. Motile megabenthic invertebrates were not observed within belt-transect areas.

TABLE 47. TAXONOMIC COMPOSITION AND ABUNDANCE OF FISHES AT LAS CARMELITAS REEF, ISLA DE MONA, MAYAGUEZ. JUNE, 2000

DEPTH: 8.5 m

FISH SPECIES	COMMON NAME	TRANSECTS					MEAN
		1	2	3	4	5	
		(individuals/30 m ²)					
<i>Thalassoma bifasciatum</i>	Blue-head Wrasse	24	13	21	16	10	16.8
<i>Stegastes partitus</i>	Bicolor Damselfish	12	8	12	17	8	11.4
<i>Chromis multilineata</i>	Yellow-edge Chromis	15	6	3	12	12	9.6
<i>Gramma loreto</i>	Royal Gramma	5	10	12	9	4	8.0
<i>Chromis cyanea</i>	Blue Chromis	7	3	4	6	10	6.0
<i>Malacoctenus triangulatus</i>	Saddled Blenny	3	4	6	4	4	4.2
<i>Halichoeres garnoti</i>	Yellowhead Wrasse	3	2	4	7	1	3.4
<i>Haemulon carbonarium</i>	Sailor's Choice		1	10			2.2
<i>Acanthurus chirurgus</i>	Doctorfish	5		1	2	2	2.0
<i>Ophioblennius atlanticus</i>	Redlip Blenny	2	3	3		2	2.0
<i>Acanthurus coeruleus</i>	Blue Tang	2	2	2		2	1.6
<i>Gobiosoma evelynae</i>	Sharknose Goby	1		2	3	2	1.6
<i>Stegastes dorsopunicans</i>	Dusky Damselfish	3		2		2	1.4
<i>Acanthurus bahianus</i>	Ocean Surgeon	1	4		1		1.2
<i>Halichoeres maculipinna</i>	Clown Wrasse				4	2	1.2
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish	1	2	1	1	1	1.2
<i>Myripristis jacobus</i>	Black-bar Souldierfish		3	2			1.0
<i>Scarus vetula</i>	Queen Parrotfish	1		4			1.0
<i>Sparisoma radians</i>	Bucktooth Parrotfish				4	1	1.0
<i>Canthigaster rostrata</i>	Sharpnose Puffer	1	2	1			0.8
<i>Haemulon macrostomum</i>	Spanish Grunt		1	3			0.8
<i>Halichoeres radiatus</i>	Puddinwife	1			2	1	0.8
<i>Sparisoma viride</i>	Stplight Parrotfish	2	2				0.8
<i>Haemulon flavolineatum</i>	French Grunt		1	1	1		0.6
<i>Stegastes leucostictus</i>	Beau Gregory	1			1	1	0.6
<i>Amblicirrhitis pinnos</i>	Redspotted Hawkfish			1		1	0.4
<i>Cephalopholis fulva</i>	Coney				1	1	0.4
<i>Halichoeres bivittatus</i>	Slippery Dick		1			1	0.4
<i>Lactophrys triqueter</i>	Smooth Trunkfish			1	1		0.4
<i>Melichthys niger</i>	Black Durgon		1	1			0.4
<i>Bodianus rufus</i>	Spanish Hogfish			1			0.2
<i>Chaetodon capistratus</i>	Four-eye Butterflyfish			1			0.2
<i>Equetus punctatus</i>	Jackknife Drum		1				0.2
<i>Lactophrys triqueter</i>	Smooth Trunkfish			1			0.2
<i>Holocentrus ascencionis</i>	Longjaw Squirrelfish		1				0.2
<i>Holocentrus rufus</i>	Squirrelfish			1			0.2
<i>Hypoplectrus sp.</i>	Hamlet		1				0.2
<i>Lutjanus apodus</i>	Schoolmaster		1				0.2
<i>Petrometopon cruentatus</i>	Grasysbe					1	0.2
<i>Scarus iserti</i>	Striped Parrotfish		1				0.2
<i>Sparisoma aurofrenatum</i>	Red-band Parrotfish				1		0.2
<i>Urolophus jamaicensis</i>	Yellowspotted Stingray		1				0.2
	TOTAL INDIVIDUALS	90	75	101	93	69	86
	TOTAL SPECIES	19	24	26	19	21	22

Table 47. Continued

Outside transects:

<i>Cantherhines macrocerus</i>	Whitespotted Filefish
<i>Malacanthus plumieri</i>	Sand Tilefish
<i>Epinephelus guttatus</i>	Red Hind
<i>Epinephelus adsensiois</i>	Rock Hind
<i>Lutjanus mahogany</i>	Mahogany Snapper
<i>Haemulon plumieri</i>	White Grunt
<i>Aulostomus maculatus</i>	Trumpetfish
<i>Sparisoma rubripinne</i>	Yellowtail Parrotfish
<i>Sphyaena barracuda</i>	Great Barracuda
<i>Caranx lugubris</i>	Black Jack
<i>Clepticus parrae</i>	Creole Wrasse
<i>Pseudupeneus maculatus</i>	Spotted Goatfish
<i>Rypticus saponaceus</i>	Soapfish
<i>Hypoplectrus chlorurus</i>	Hamlet
<i>Acanthostracion quadricornis</i>	Scrawled cowfish
<i>Mycteroperca venenosa</i>	Yellowmouth Grouper
<i>Abudefduf sexatilis</i>	Sargent Major
<i>Holacanthus tricolor</i>	Rock Beauty
<i>Carangoides ruber</i>	Black-bar Jack
<i>Kyphosus sp.</i>	Bermuda Chub

4.3.4 Photo Album – Playa Carmelitas Reef, Isla de Mona

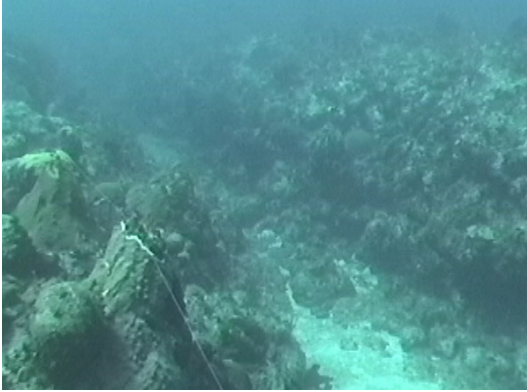


Plate 1

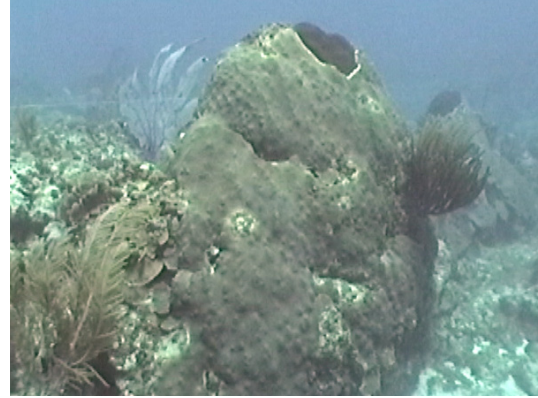


Plate 4

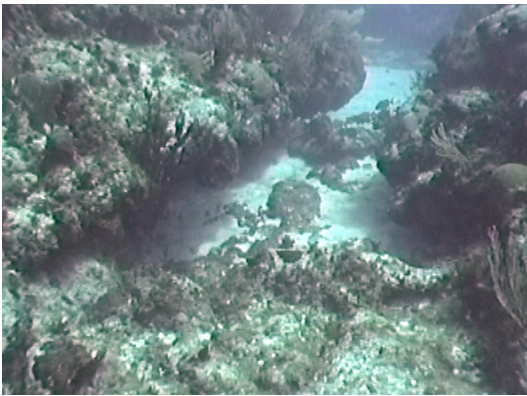
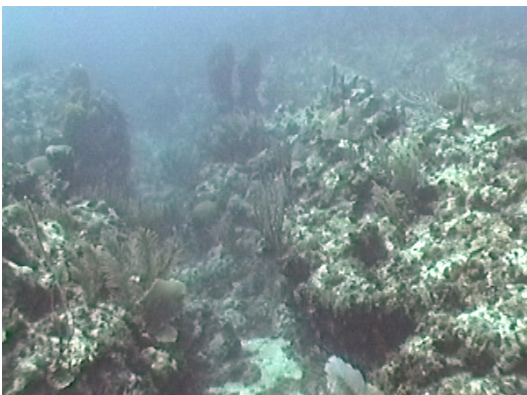


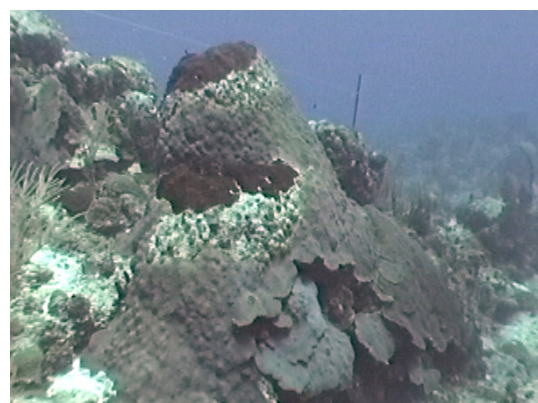
Plate 2



Plate 5



Plates 1 – 3. A “spur and groove” coral reef formation is found off Playa Las Carmelitas at depths between 10 – 20 meters.



Plates 4 – 6. The top terrace of the spurs was mostly colonized by turf algae, fleshy algae and a few soft corals. Stony coral growth was concentrated along the edges of the spurs where Boulder Star Coral, *Montastrea annularis* presented extensive surface cover with large massive and laminar colonies.

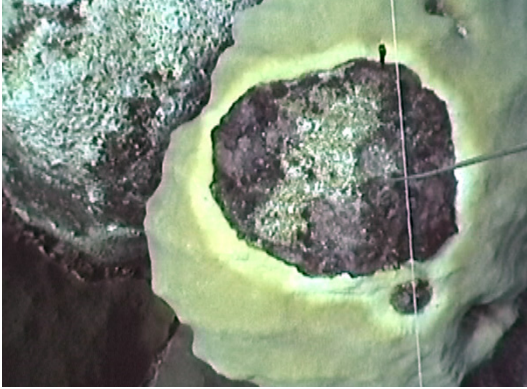


Plate 7. The widespread incidence of diseased stony corals was a most striking feature of Las Carmelitas Reef. The disease showed up as white/yellow rings (or bands) on top of coral colonies (mostly *M. annularis* and *D. strigosa*), leaving the inside sections of the rings exposed to algal growth.



Plate 9. Doctorfishes (Acanthuridae), along with parrotfishes (Scaridae) represented the main herbivorous assemblage at Las Carmelitas Reef.



Plate 8. A total of 62 fish species were identified during our survey at Las Carmelitas Reef. Opportunistic carnivores, such as wrasses, gobies, squirrelfishes, grunts, trumpetfishes, small groupers and small snappers, such as the Schoolmaster (Plate 8) represented approximately 51 % of the total individuals within belt-transects.

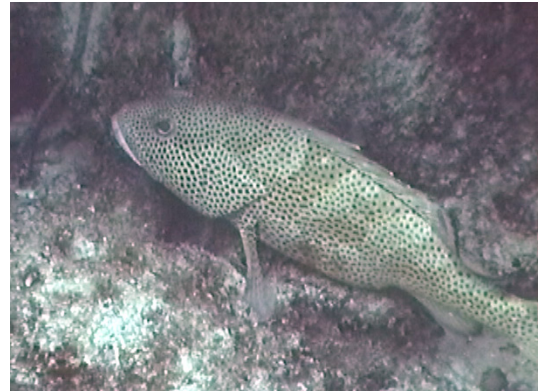


Plate 10. Commercially important species present at Las Carmelitas Reef included the Red Hind and the Yellowfin Grouper.

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Appendix A. Taxonomic codes used to identify substrate types in the field during reef community surveys

CODE	SUBSTRATE TYPE	DESCRIPTION
BRA COR	Branching coral	Stony forms with delicate or heavy branches
MAS COR	Massive coral	Stony forms with spherical or cone shapes
ENC COR	Encrusting coral	Stony forms of low vertical relief that follow bottom relief
FOL COR	Foliaceous coral	Stony forms with laminar growth
MILLE	Fire coral	Calcareous hydrozoans
GORG	Gorgonians	Erect gorgonians
ENC GOR	Gorgonians	Encrusting gorgonian; e.g. <i>Erythropodium</i>
ZOAN	Anemones/Zoanthids	Encrusting or erect without calcareous exoskeleton
ERE SPO	Erect sponge	Forms of low basal area relative to colony size
ENC SPO	Encrusting sponge	Forms of high basal area relative to colony size
TURF ALG	Algal turf	Algal assemblages forming low relief mats over the bottom
FLE ALG	Fleshy algae	Macroalgae of fleshy texture projecting vertically in water column
CAL ALG	Calcareous algae	Algae of highly calcified structure
ASCI	Ascidians	Solitary and/or colonial tunicates
SAND	Sand	Sandy substrate
SILT	Silt	Silty substrate
RUBBLE	Coral rubble	Dead coral rubble
HOLE	Holes, crevices	Depressions on reef structure
RO	Reef overhang	Vertical projections of the reef structure

**APPENDIX 1.1 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
ARRECIFE GALLARDO, CABO ROJO. May 17, 2000.**

DEPTH: 11.8 m
RUGOSITY: 3.32 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	FLE ALG	Dictyota sp.	8	0.11
1	FOL COR	Agaricia agaricites	2	0.03
2	TURF ALG	mixed assemblage	10	0.14
3	RO	reef overhang	12	0.17
4	MAS COR	Montastrea annularis	27	0.38
5	RO	reef overhang	10	0.14
6	RUBB	Porites rubble	45	0.63
7	ENC COR	Porites astreoides	12	0.17
8	RO	reef overhang	5	0.07
9	SAND	sand	23	0.32
10	FLE ALG	Dictyota sp.	10	0.14
11	RUBB	Porites rubble	80	1.13
12	FLE ALG	Dictyota sp.	5	0.07
13	RUBB	Porites rubble	58	0.82
14	ENC GOR	Erythropodium caribaeorum	10	0.14
15	RO	reef overhang	3	0.04
16	FLE ALG	Dictyota sp.	11	0.15
17	BRA COR	Porites porites	8	0.11
18	FLE ALG	Dictyota sp.	29	0.41
19	GORG	gorgonian base	6	0.08
20	RO	reef overhang	8	0.11
21	TURF ALG	mixed assemblage	6	0.08
22	BRA COR	Porites porites	3	0.04
23	FLE ALG	Dictyota sp.	6	0.08
24	MAS COR	Siderastrea siderea	4	0.06
25	RUBB	Porites rubble	18	0.25
26	BRA COR	Porites porites	5	0.07
27	RO	reef overhang	13	0.18
28	MAS COR	Montastrea annularis	13	0.18
29	TURF ALG	mixed assemblage	6	0.08
30	RO	reef overhang	19	0.27
31	MAS COR	Montastrea annularis	33	0.46
32	FLE ALG	Dictyota sp.	14	0.20
33	RO	reef overhang	6	0.08
34	RUBB	Porites rubble	13	0.18
35	ENC GOR	Erythropodium caribaeorum	5	0.07
36	FLE ALG	Dictyota sp.	10	0.14
37	RUBB	Porites rubble	50	0.70
38	RO	reef overhang	9	0.13
39	MAS COR	Meandrina meandrites	11	0.15
40	RO	reef overhang	10	0.14
41	BRA COR	Porites porites	2	0.03
42	RUBB	Porites rubble	23	0.32
43	FLE ALG	Dictyota sp.	13	0.18
44	RUBB	Porites rubble	30	0.42
45	TURF ALG	mixed assemblage	8	0.11
46	FLE ALG	Dictyota sp.	4	0.06

47	MAS COR	Montastrea annularis	3	0.04
48	RO	reef overhang	10	0.14
49	MAS COR	Montastrea annularis	28	0.39
50	MAS COR	Diploria labyrinthiformis	5	0.07
51	TURF ALG	mixed assemblage	10	0.14
52	GORG	gorgonian base	2	0.03
53	ENC COR	Porites astreoides	3	0.04
54	TURF ALG	mixed assemblage	13	0.18
55	FLE ALG	Dictyota sp.	12	0.17
56	RO	reef overhang	6	0.08
57	FLE ALG	Dictyota sp.	15	0.21
58	FOL COR	Agaricia agaricites	2	0.03
59	ENC COR	Porites astreoides	2	0.03
60	RUBB	Porites rubble	20	0.28
61	FOL COR	Agaricia agaricites	3	0.04
62	FLE ALG	Dictyota sp.	3	0.04
63	FOL COR	Agaricia agaricites	1	0.01
64	FLE ALG	Dictyota sp.	15	0.21
65	RUBB	Porites rubble	35	0.49
66	GORG	gorgonian base	2	0.03
67	RUBB	Porites rubble	40	0.56

Gorgonians = 11

Note: TUF ALG composed of short filamentous algae and fine sediment

**APPENDIX 1.2 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
ARRECIFE GALLARDO, CABO ROJO. May 17, 2000.**

DEPTH: 11.8 m
RUGOSITY: 5.03 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	FLE ALG	Dictyota sp.	8	0.11
1	FOL COR	Agaricia agaricites	10	0.14
2	FLE ALG	Dictyota sp.	15	0.21
3	TURF ALG	mixed assemblage	5	0.07
4	ENC GOR	Erythropodium caribaeorum	3	0.04
5	TURF ALG	mixed assemblage	7	0.10
6	FLE ALG	Dictyota sp.	25	0.35
7	ERE SPO	erect sponge	3	0.04
8	TURF ALG	mixed assemblage	4	0.06
9	FOL COR	Agaricia agaricites	3	0.04
10	FLE ALG	Dictyota sp.	16	0.23
11	RUBB	Porites rubble	13	0.18
12	FLE ALG	Dictyota sp.	10	0.14
13	TURF ALG	mixed assemblage	41	0.58
14	CAL ALG	Halimeda sp.	4	0.06
15	RO	reef overhang	11	0.15
16	FLE ALG	Dictyota sp.	8	0.11
17	FOL COR	Agaricia agaricites	8	0.11
18	TURF ALG	mixed assemblage	6	0.08
19	MAS COR	Montastrea annularis	5	0.07
20	RO	reef overhang	10	0.14
21	TURF ALG	mixed assemblage	22	0.31
22	MAS COR	Montastrea annularis	2	0.03
23	RO	reef overhang	11	0.15
24	TURF ALG	mixed assemblage	4	0.06
25	RO	reef overhang	13	0.18
26	FOL COR	Agaricia agaricites	5	0.07
27	TURF ALG	mixed assemblage	24	0.34
28	FOL COR	Agaricia agaricites	2	0.03
29	TURF ALG	mixed assemblage	22	0.31
30	BRA COR	Porites porites	18	0.25
31	MILLE	Millepora alvicornis	10	0.14
32	FLE ALG	Dictyota sp.	31	0.44
33	GORG	gorgonian base	3	0.04
34	TURF ALG	mixed assemblage	29	0.41
35	ENC GOR	Erythropodium caribaeorum	3	0.04
36	TURF ALG	mixed assemblage	23	0.32
37	FOL COR	Leptoseris cucullata	5	0.07
38	ENC COR	Porites astreoides	3	0.04
39	TURF ALG	mixed assemblage	17	0.24
40	FLE ALG	Dictyota sp.	4	0.06
41	RO	reef overhang	8	0.11
42	TURF ALG	mixed assemblage	15	0.21
43	MAS COR	Montastrea annularis	5	0.07
44	FLE ALG	Dictyota sp.	13	0.18

45	TURF ALG	mixed assemblage	4	0.06
46	MAS COR	Montastrea annularis	5	0.07
47	RO	reef overhang	11	0.15
48	TURF ALG	mixed assemblage	49	0.69
49	MAS COR	Meandrina meandrites	6	0.08
50	TURF ALG	mixed assemblage	2	0.03
51	BRA COR	Porites porites	2	0.03
52	TURF ALG	mixed assemblage	28	0.39
53	RO	reef overhang	9	0.13
54	TURF ALG	mixed assemblage	57	0.80
55	RO	reef overhang	5	0.07
56	FLE ALG	Dictyota sp.	8	0.11
57	ERE SPO	erect sponge	10	0.14
58	RO	reef overhang	9	0.13
59	MAS COR	Montastrea annularis	39	0.55
60	RO	reef overhang	5	0.07
61	TURF ALG	mixed assemblage	11	0.15
62	BRA COR	Porites porites	2	0.03
63	TURF ALG	mixed assemblage	38	0.54
64	RO	reef overhang	32	0.45
65	TURF ALG	mixed assemblage	13	0.18
66	MAS COR	Montastrea annularis	17	0.24
67	FLE ALG	Dictyota sp.	9	0.13
68	MAS COR	Montastrea annularis	3	0.04
69	TURF ALG	mixed assemblage	59	0.83
70	MAS COR	Siderastrea siderea	3	0.04
71	TURF ALG	mixed assemblage	7	0.10
72	RO	reef overhang	13	0.18
73	TURF ALG	mixed assemblage	36	0.51
74	MAS COR	Montastrea annularis	3	0.04
75	TURF ALG	mixed assemblage	6	0.08
76	MAS COR	Montastrea annularis	4	0.06
77	RO	reef overhang	6	0.08
78	TURF ALG	mixed assemblage	15	0.21
79	MAS COR	Montastrea annularis	6	0.08
80	TURF ALG	mixed assemblage	3	0.04
81	MAS COR	Montastrea annularis	25	0.35

Gorgonians = 13

Note: TURF ALG composed of short filamentous algae and fine sediment

**APPENDIX 1.3 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
ARRECIFE GALLARDO, CABO ROJO. May 17, 2000.**

DEPTH: 11.8 m
RUGOSITY: 6.2 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	FOL COR	Agaricia agaricites	9	0.13
1	CAL ALG	Halimeda sp.	13	0.18
2	MAS COR	Montastrea annularis	18	0.25
3	RO	reef overhang	21	0.30
4	TURF ALG	mixed assemblage	45	0.63
5	FLE ALG	Dictyota sp.	5	0.07
6	RO	reef overhang	5	0.07
7	TURF ALG	mixed assemblage	38	0.54
8	FOL COR	Agaricia fragilis	2	0.03
9	TURF ALG	mixed assemblage	19	0.27
10	MAS COR	Montastrea annularis	14	0.20
11	TURF ALG	mixed assemblage	12	0.17
12	RUBB	Porites rubble	75	1.06
13	RO	reef overhang	11	0.15
14	TURF ALG	mixed assemblage	17	0.24
15	FOL COR	Agaricia agaricites	6	0.08
16	RO	reef overhang	27	0.38
17	RUBB	Porites rubble	33	0.46
18	TURF ALG	mixed assemblage	25	0.35
19	RO	reef overhang	10	0.14
20	RUBB	Porites rubble	33	0.46
21	RO	reef overhang	27	0.38
22	CAL ALG	Halimeda sp.	7	0.10
23	MAS COR	Montastrea annularis	20	0.28
24	TURF ALG	mixed assemblage	7	0.10
25	MAS COR	Montastrea annularis	11	0.15
26	TURF ALG	mixed assemblage	14	0.20
27	ENC GOR	Erythropodium caribaeorum	4	0.06
28	MAS COR	Montastrea annularis	14	0.20
29	RO	reef overhang	10	0.14
30	FLE ALG	Dictyota sp.	10	0.14
31	RO	reef overhang	9	0.13
32	MAS COR	Montastrea annularis	23	0.32
33	TURF ALG	mixed assemblage	10	0.14
34	MAS COR	Montastrea annularis	4	0.06
35	RUBB	Porites rubble	50	0.70
36	ENC COR	Porites astreoides	9	0.13
37	RO	reef overhang	5	0.07
38	ENC COR	Porites astreoides	2	0.03
39	ENC COR	Porites astreoides	5	0.07
40	RO	reef overhang	5	0.07
41	FLE ALG	Dictyota sp.	32	0.45
42	RO	reef overhang	28	0.39
43	MAS COR	Montastrea annularis	31	0.44
44	RO	reef overhang	20	0.28
45	RUBB	Porites rubble	32	0.45

46	MAS COR	Montastrea annularis	3	0.04
47	RO	reef overhang	8	0.11
48	MAS COR	Montastrea annularis	32	0.45
49	RO	reef overhang	13	0.18
50	FLE ALG	Dictyota sp.	25	0.35
51	MAS COR	Montastrea annularis	5	0.07
52	RO	reef overhang	10	0.14
53	MAS COR	Montastrea annularis	28	0.39
54	RO	reef overhang	23	0.32
55	MAS COR	Montastrea annularis	60	0.85
56	RO	reef overhang	40	0.56
57	RUBB	Porites rubble	21	0.30
58	ENC SPO	encrusting sponge	12	0.17
59	RO	reef overhang	7	0.10
60	TURF ALG	mixed assemblage	4	0.06
61	RO	reef overhang	6	0.08
62	ENC SPO	encrusting sponge	6	0.08
63	TURF ALG	mixed assemblage	4	0.06
64	RO	reef overhang	10	0.14
65	MAS COR	Montastrea annularis	6	0.08

Gorgonians = 14

Note: TURF ALG composed of short filamentous algae and fine sediment

**APPENDIX 1.4 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
ARRECIFE GALLARDO, CABO ROJO. May 17, 2000.**

DEPTH: 11.8 m
RUGOSITY: 14.0 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	FOL COR	Agaricia agaricites	4	0.06
1	FLE ALG	Dictyota sp.	3	0.04
2	MAS COR	Montastrea annularis	9	0.13
3	TURF ALG	mixed assemblage	10	0.14
4	MAS COR	Mycetophyllia ferox	4	0.06
5	TURF ALG	mixed assemblage	2	0.03
6	FOL COR	Agaricia agaricites	3	0.04
7	TURF ALG	mixed assemblage	7	0.10
8	FOL COR	Agaricia agaricites	3	0.04
9	BRA COR	Porites porites	4	0.06
10	TURF ALG	mixed assemblage	10	0.14
11	FLE ALG	Dictyota sp.	12	0.17
12	TURF ALG	mixed assemblage	40	0.56
13	CAL ALG	Halimeda sp.	10	0.14
14	TURF ALG	mixed assemblage	20	0.28
15	BRA COR	Porites porites	5	0.07
16	FLE ALG	Dictyota sp.	20	0.28
17	FOL COR	Agaricia agaricites	5	0.07
18	CAL ALG	Halimeda sp.	5	0.07
19	MAS COR	Montastrea annularis	36	0.51
20	FOL COR	Agaricia agaricites	7	0.10
21	FLE ALG	Dictyota sp.	30	0.42
22	GORG	gorgonian base	8	0.11
23	CAL ALG	Halimeda sp.	5	0.07
24	MAS COR	Montastrea annularis	10	0.14
25	TURF ALG	mixed assemblage	5	0.07
26	MAS COR	Montastrea annularis	9	0.13
27	FLE ALG	Dictyota sp.	60	0.85
28	TURF ALG	mixed assemblage	8	0.11
29	FLE ALG	Dictyota sp.	50	0.70
30	TURF ALG	mixed assemblage	20	0.28
31	FLE ALG	Dictyota sp.	20	0.28
32	TURF ALG	mixed assemblage	10	0.14
33	FLE ALG	Dictyota sp.	35	0.49
34	TURF ALG	mixed assemblage	113	1.59
35	MAS COR	Montastrea annularis	58	0.82
36	TURF ALG	mixed assemblage	8	0.11
37	MAS COR	Montastrea annularis	39	0.55
38	FLE ALG	Dictyota sp.	100	1.41
39	TURF ALG	mixed assemblage	70	0.99
40	FLE ALG	Dictyota sp.	20	0.28
41	TURF ALG	mixed assemblage	20	0.28
42	FLE ALG	Dictyota sp.	25	0.35
43	MAS COR	Montastrea annularis	34	0.48
44	FLE ALG	Dictyota sp.	16	0.23

Gorgonians = 10

Note: TURF ALG composed of short filamentous algae and fine sediment

**APPENDIX 1.5 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
ARRECIFE GALLARDO, CABO ROJO. May 17, 2000.**

DEPTH: 11.8 m
RUGOSITY: 13.4 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	FLE ALG	Dictyota sp.	20	0.28
1	TURF ALG	mixed assemblage	30	0.42
2	FLE ALG	Dictyota sp.	10	0.14
3	ZOAN	Erythropodium caribaeorum	6	0.08
4	TURF ALG	mixed assemblage	20	0.28
5	BRA COR	Porites porites	4	0.06
6	FOL COR	Agaricia agaricites	3	0.04
7	FLE ALG	Dictyota sp.	9	0.13
8	CAL ALG	Halimeda sp.	10	0.14
9	TURF ALG	mixed assemblage	8	0.11
10	FLE ALG	Dictyota sp.	10	0.14
11	TURF ALG	mixed assemblage	10	0.14
12	FLE ALG	Dictyota sp.	14	0.20
13	TURF ALG	mixed assemblage	22	0.31
14	FLE ALG	Dictyota sp.	26	0.37
15	TURF ALG	mixed assemblage	13	0.18
16	FLE ALG	Dictyota sp.	27	0.38
17	RO	reef overhang	9	0.13
18	ENC COR	Porites astreoides	6	0.08
19	FLE ALG	Dictyota sp.	8	0.11
20	TURF ALG	mixed assemblage	10	0.14
21	FLE ALG	Dictyota sp.	16	0.23
22	FOL COR	Agaricia agaricites	4	0.06
23	TURF ALG	mixed assemblage	5	0.07
24	MILLE	Millepora alcicornis	10	0.14
25	FOL COR	Agaricia agaricites	4	0.06
26	GORG	gorgonian base	8	0.11
27	CAL ALG	Halimeda sp.	7	0.10
28	GORG	gorgonian base	6	0.08
29	FLE ALG	Dictyota sp.	11	0.15
30	GORG	gorgonian base	9	0.13
31	ZOAN	Erythropodium caribaeorum	13	0.18
32	FLE ALG	Dictyota sp.	7	0.10
33	RO	reef overhang	22	0.31
34	TURF ALG	mixed assemblage	40	0.56
35	FLE ALG	Dictyota sp.	15	0.21
36	TURF ALG	mixed assemblage	10	0.14
37	FLE ALG	Dictyota sp.	30	0.42
38	TURF ALG	mixed assemblage	10	0.14
39	FLE ALG	Dictyota sp.	10	0.14
40	TURF ALG	mixed assemblage	10	0.14
41	FLE ALG	Dictyota sp.	15	0.21
42	TURF ALG	mixed assemblage	20	0.28
43	FLE ALG	Dictyota sp.	15	0.21
44	TURF ALG	mixed assemblage	50	0.70
45	FLE ALG	Dictyota sp.	30	0.42

46	CAL ALG	Halimeda sp.	10	0.14
47	ENC COR	Porites astreoides	12	0.17
48	TURF ALG	mixed assemblage	8	0.11
49	FLE ALG	Dictyota sp.	12	0.17
50	CAL ALG	Halimeda sp.	14	0.20
51	MAS COR	Montastrea annularis	14	0.20
52	TURF ALG	mixed assemblage	7	0.10
53	RO	reef overhang	13	0.18
54	MAS COR	Montastrea annularis	40	0.56
55	CAL ALG	Halimeda sp.	5	0.07
56	FLE ALG	Dictyota sp.	35	0.49
57	MAS COR	Diploria strigosa	11	0.15
58	BRA COR	Porites porites	18	0.25
59	MAS COR	Montastrea annularis	43	0.61
60	TURF ALG	mixed assemblage	13	0.18
61	MAS COR	Montastrea annularis	8	0.11
62	TURF ALG	mixed assemblage	25	0.35
63	MAS COR	Montastrea annularis	8	0.11

Gorgonians = 13

Note: TURF ALG composed of short filamentous algae and fine sediment

**APPENDIX 1.6 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
ARRECIFE RESUELLOS, CABO ROJO. May 15, 2000.**

DEPTH: 8.1 m

RUGOSITY: 12.3 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	9	0.13
1	ENC COR	Porites astreoides	11	0.15
2	ENC GOR	Erythropodium caribaeorum	9	0.13
3	TURF ALG	mixed assemblage	2	0.03
4	ENC SPO	encrusting sponge	7	0.10
5	TURF ALG	mixed assemblage	4	0.06
6	MAS COR	Mycetophyllia lamarckiana	11	0.15
7	TURF ALG	mixed assemblage	3	0.04
8	ENC COR	Porites astreoides	6	0.08
9	GORG	gorgonian base	7	0.10
10	TURF ALG	mixed assemblage	12	0.17
11	ENC COR	Porites astreoides	14	0.20
12	MAS COR	Siderastrea siderea	6	0.08
13	TURF ALG	mixed assemblage	8	0.11
14	MAS COR	Montastrea annularis	9	0.13
15	TURF ALG	mixed assemblage	40	0.56
16	ERE SPO	erect sponge	6	0.08
17	ENC GOR	Briareum asbestinum	7	0.10
18	HOLE	hole	12	0.17
19	TURF ALG	mixed assemblage	7	0.10
20	ERE SPO	erect sponge	2	0.03
21	RO	reef overhang	10	0.14
22	ENC COR	Porites astreoides	11	0.15
23	ENC GOR	Erythropodium caribaeorum	6	0.08
24	TURF ALG	mixed assemblage	2	0.03
25	MAS COR	Colpophyllia natans	7	0.10
26	ENC GOR	Erythropodium caribaeorum	10	0.14
27	RO	reef overhang	2	0.03
28	MAS COR	Colpophyllia natans	57	0.80
29	RO	reef overhang	6	0.08
30	FLE ALG	Caulerpa racemosa	3	0.04
31	TURF ALG	mixed assemblage	4	0.06
32	ENC GOR	Briareum asbestinum	10	0.14
33	TURF ALG	mixed assemblage	6	0.08
34	ENC SPO	encrusting sponge	3	0.04
35	TURF ALG	mixed assemblage	3	0.04
36	ERE SPO	erect sponge	5	0.07
37	MAS COR	Montastrea cavernosa	4	0.06
38	MAS COR	Montastrea annularis	15	0.21
39	TURF ALG	mixed assemblage	4	0.06
40	MAS COR	Montastrea annularis	15	0.21
41	RO	reef overhang	11	0.15
42	RUBB	Porites rubble	25	0.35
43	ENC GOR	Erythropodium caribaeorum	15	0.21
44	TURF ALG	mixed assemblage	9	0.13
45	MAS COR	Montastrea cavernosa	3	0.04

46	TURF ALG	mixed assemblage	21	0.30
47	MAS COR	Siderastrea siderea	2	0.03
48	TURF ALG	mixed assemblage	8	0.11
49	MAS COR	Colpophyllia natans	15	0.21
50	MAS COR	Montastrea annularis	5	0.07
51	TURF ALG	mixed assemblage	20	0.28
52	ZOAN	Palythoa caribaeorum	10	0.14
53	TURF ALG	mixed assemblage	5	0.07
54	ZOAN	Palythoa caribaeorum	6	0.08
55	RO	reef overhang	6	0.08
56	MAS COR	Montastrea annularis	23	0.32
57	TURF ALG	mixed assemblage	11	0.15
58	MAS COR	Siderastrea siderea	2	0.03
59	TURF ALG	mixed assemblage	8	0.11
60	MAS COR	Mycetophyllia lamarckiana	4	0.06
61	ENC SPO	encrusting sponge	5	0.07
62	TURF ALG	mixed assemblage	9	0.13
63	MAS COR	Siderastrea siderea	15	0.21
64	RO	reef overhang	11	0.15
65	TURF ALG	mixed assemblage	23	0.32
66	ENC COR	Porites astreoides	6	0.08
67	ENC SPO	encrusting sponge	5	0.07
68	GORG	gorgonian base	5	0.07
69	TURF ALG	mixed assemblage	25	0.35
70	HOLE	hole	15	0.21
71	ENC GOR	Erythropodium caribaeorum	10	0.14
72	TURF ALG	mixed assemblage	7	0.10
73	RO	reef overhang	16	0.23
74	ERE SPO	erect sponge	7	0.10
75	TURF ALG	mixed assemblage	10	0.14
76	ENC GOR	Erythropodium caribaeorum	6	0.08
77	TURF ALG	mixed assemblage	22	0.31
78	MAS COR	Montastrea annularis	6	0.08
79	ENC SPO	encrusting sponge	6	0.08
80	ENC GOR	Erythropodium caribaeorum	9	0.13
81	TURF ALG	mixed assemblage	3	0.04
82	MAS COR	Montastrea annularis	9	0.13
83	TURF ALG	mixed assemblage	23	0.32
84	ENC GOR	Erythropodium caribaeorum	7	0.10
85	TURF ALG	mixed assemblage	4	0.06
86	ENC GOR	Erythropodium caribaeorum	12	0.17
87	MAS COR	Montastrea annularis	13	0.18
88	TURF ALG	mixed assemblage	2	0.03

Gorgonians = n/d

Note: TURF ALG composed primarily of short filamentous algae

**APENDIX 1.7 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
ARRECIFE RESUELLOS, CABO ROJO. May 15, 2000.**

DEPTH: 8.1 m
RUGOSITY: 5.2 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	21	0.30
1	RO	reef overhang	21	0.30
2	TURF ALG	mixed assemblage	12	0.17
3	MAS COR	Montastrea cavernosa	5	0.07
4	RO	reef overhang	6	0.08
5	MAS COR	Montastrea annularis	13	0.18
6	RO	reef overhang	4	0.06
7	TURF ALG	mixed assemblage	3	0.04
8	RO	reef overhang	6	0.08
9	ENC GOR	Erythropodium caribaeorum	9	0.13
10	RO	reef overhang	6	0.08
11	ERE SPO	erect sponge	6	0.08
12	ERE SPO	erect sponge	6	0.08
13	TURF ALG	mixed assemblage	30	0.42
14	ENC COR	Porites astreoides	7	0.10
15	TURF ALG	mixed assemblage	5	0.07
16	MAS COR	Siderastrea siderea	19	0.27
17	TURF ALG	mixed assemblage	13	0.18
18	GORG	gorgonian base	3	0.04
19	TURF ALG	mixed assemblage	19	0.27
20	ERE SPO	erect sponge	4	0.06
21	TURF ALG	mixed assemblage	6	0.08
22	ERE SPO	erect sponge	10	0.14
23	TURF ALG	mixed assemblage	8	0.11
24	ERE SPO	erect sponge	2	0.03
25	TURF ALG	mixed assemblage	34	0.48
26	RO	reef overhang	12	0.17
27	ENC GOR	Erythropodium caribaeorum	13	0.18
28	TURF ALG	mixed assemblage	52	0.73
29	RO	reef overhang	60	0.85
30	MUD	mud	10	0.14
31	RO	reef overhang	30	0.42
32	TURF ALG	mixed assemblage	20	0.28
33	RO	reef overhang	29	0.41
34	TURF ALG	mixed assemblage	30	0.42
35	ENC SPO	encrusting sponge	7	0.10
36	RO	reef overhang	19	0.27
37	TURF ALG	mixed assemblage	25	0.35
38	ENC GOR	Erythropodium caribaeorum	5	0.07
39	FOL COR	Leptoseris cucullata	4	0.06
40	RO	reef overhang	3	0.04
41	ENC GOR	Erythropodium caribaeorum	3	0.04
42	TURF ALG	mixed assemblage	25	0.35
43	RO	reef overhang	15	0.21
44	TURF ALG	mixed assemblage	10	0.14
45	ERE SPO	erect sponge	10	0.14

46	ENC GOR	Erythropodium caribaeorum	4	0.06
47	TURF ALG	mixed assemblage	11	0.15
48	ENC GOR	Erythropodium caribaeorum	4	0.06
49	MAS COR	Montastrea annularis	10	0.14
50	TURF ALG	mixed assemblage	3	0.04
51	MAS COR	Montastrea annularis	7	0.10
52	TURF ALG	mixed assemblage	9	0.13
53	RO	reef overhang	6	0.08
54	ENC GOR	Erythropodium caribaeorum	4	0.06
55	TURF ALG	mixed assemblage	14	0.20
56	RO	reef overhang	7	0.10
57	ENC GOR	Erythropodium caribaeorum	18	0.25
58	RO	reef overhang	2	0.03
59	ENC GOR	Erythropodium caribaeorum	22	0.31
60	TURF ALG	mixed assemblage	13	0.18
61	ENC SPO	encrusting sponge	7	0.10
62	TURF ALG	mixed assemblage	17	0.24
63	ERE SPO	erect sponge	3	0.04
64	RO	reef overhang	9	0.13
65	ENC GOR	Erythropodium caribaeorum	7	0.10
66	RO	reef overhang	3	0.04
67	TURF ALG	mixed assemblage	29	0.41
68	ENC GOR	Erythropodium caribaeorum	7	0.10
69	ENC SPO	encrusting sponge	4	0.06
70	ERE SPO	erect sponge	5	0.07
71	ENC GOR	Erythropodium caribaeorum	4	0.06
72	ERE SPO	erect sponge	5	0.07
73	ENC GOR	Erythropodium caribaeorum	7	0.10
74	ERE SPO	erect sponge	4	0.06
75	ENC GOR	Erythropodium caribaeorum	8	0.11
76	MAS COR	Montastrea annularis	17	0.24
77	TURF ALG	mixed assemblage	17	0.24
78	RO	reef overhang	11	0.15
79	ENC GOR	Erythropodium caribaeorum	9	0.13
80	TURF ALG	mixed assemblage	8	0.11
81	ENC GOR	Erythropodium caribaeorum	8	0.11
82	RO	reef overhang	11	0.15
83	ERE SPO	erect sponge	5	0.07
84	RO	reef overhang	6	0.08
85	TURF ALG	mixed assemblage	30	0.42
86	MAS COR	Siderastrea siderea	9	0.13
87	ENC GOR	Erythropodium caribaeorum	12	0.17
88	RO	reef overhang	14	0.20
89	MAS COR	Montastrea cavernosa	7	0.10
90	TURF ALG	mixed assemblage	5	0.07

Gorgonians = n/d

Note: TURF ALG composed primarily of short filamentous algae

**APPENDIX 1.8 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
ARRECIFE RESUELLOS, CABO ROJO. May 15, 2000.**

DEPTH: 8.1 m

RUGOSITY: 3.37 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	8	0.11
1	MAS COR	Colpophyllia natans	50	0.70
2	RO	reef overhang	2	0.03
3	MAS COR	Colpophyllia natans	14	0.20
4	RO	reef overhang	20	0.28
5	ENC GOR	Erythropodium caribaeorum	10	0.14
6	RO	reef overhang	13	0.18
7	ENC GOR	Erythropodium caribaeorum	5	0.07
8	ERE SPO	erect sponge	4	0.06
9	TURF ALG	mixed assemblage	9	0.13
10	ENC COR	Porites astreoides	10	0.14
11	TURF ALG	mixed assemblage	8	0.11
12	HOLE	hole	20	0.28
13	MAS COR	Colpophyllia natans	8	0.11
14	ENC GOR	Erythropodium caribaeorum	13	0.18
15	MAS COR	Colpophyllia natans	10	0.14
16	HOLE	hole	19	0.27
17	ENC GOR	Erythropodium caribaeorum	12	0.17
18	ERE SPO	erect sponge	2	0.03
19	TURF ALG	mixed assemblage	11	0.15
20	ENC GOR	Erythropodium caribaeorum	3	0.04
21	TURF ALG	mixed assemblage	6	0.08
22	ERE SPO	erect sponge	6	0.08
23	ENC GOR	Erythropodium caribaeorum	10	0.14
24	TURF ALG	mixed assemblage	16	0.23
25	RO	reef overhang	6	0.08
26	MAS COR	Montastrea cavernosa	5	0.07
27	TURF ALG	mixed assemblage	86	1.21
28	ENC SPO	encrusting sponge	4	0.06
29	TURF ALG	mixed assemblage	21	0.30
30	ERE SPO	erect sponge	4	0.06
31	MAS COR	Siderastrea siderea	6	0.08
32	RO	reef overhang	22	0.31
33	TURF ALG	mixed assemblage	70	0.99
34	ENC GOR	Erythropodium caribaeorum	23	0.32
35	HOLE	hole	8	0.11
36	MAS COR	Colpophyllia natans	66	0.93
37	RO	reef overhang	3	0.04
38	ENC GOR	Erythropodium caribaeorum	11	0.15
39	TURF ALG	mixed assemblage	5	0.07
40	ENC GOR	Erythropodium caribaeorum	5	0.07
41	TURF ALG	mixed assemblage	4	0.06
42	ERE SPO	erect sponge	6	0.08
43	RO	reef overhang	20	0.28
44	TURF ALG	mixed assemblage	2	0.03
45	HOLE	hole	10	0.14

46	ENC GOR	Erythropodium caribaeorum	8	0.11
47	RO	reef overhang	19	0.27
48	ERE SPO	erect sponge	4	0.06
49	ZOAN	unident. Anemone	4	0.06
50	RO	reef overhang	19	0.27
51	ERE SPO	erect sponge	6	0.08
52	ENC GOR	Erythropodium caribaeorum	11	0.15
53	TURF ALG	mixed assemblage	6	0.08
54	ENC SPO	encrusting sponge	4	0.06
55	TURF ALG	mixed assemblage	20	0.28
56	MILLE	Millepora alcicornis	4	0.06
57	MAS COR	Montastrea annularis	26	0.37
58	ENC SPO	encrusting sponge	8	0.11
59	TURF ALG	mixed assemblage	10	0.14
60	ENC SPO	encrusting sponge	13	0.18
61	ENC GOR	Erythropodium caribaeorum	3	0.04
62	TURF ALG	mixed assemblage	6	0.08
63	MAS COR	Montastrea annularis	12	0.17
64	TURF ALG	mixed assemblage	15	0.21
65	ERE SPO	erect sponge	2	0.03
66	ENC GOR	Erythropodium caribaeorum	33	0.46
67	TURF ALG	mixed assemblage	6	0.08
68	ENC GOR	Erythropodium caribaeorum	16	0.23
69	RO	reef overhang	5	0.07
70	TURF ALG	mixed assemblage	13	0.18

Gorgonians = n/d

Note: TURF ALG composed primarily of short filamentous algae

**APPENDIX 1.9 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
ARRECIFE RESUELLOS, CABO ROJO. May 15, 2000.**

DEPTH: 8.1 m
RUGOSITY: 7.01 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	3	0.04
1	ENC SPO	encrusting sponge	17	0.24
2	TURF ALG	mixed assemblage	18	0.25
3	MAS COR	Montastrea annularis	18	0.25
4	ENC SPO	encrusting sponge	4	0.06
5	MAS COR	Montastrea annularis	7	0.10
6	ENC SPO	encrusting sponge	15	0.21
7	TURF ALG	mixed assemblage	6	0.08
8	MAS COR	Montastrea annularis	17	0.24
9	ENC GOR	Erythropodium caribaeorum	44	0.62
10	ENC SPO	encrusting sponge	3	0.04
11	TURF ALG	mixed assemblage	21	0.30
12	ENC COR	Porites astreoides	6	0.08
13	TURF ALG	mixed assemblage	5	0.07
14	RO	reef overhang	4	0.06
15	ENC COR	Porites astreoides	7	0.10
16	MAS COR	Diploria strigosa	10	0.14
17	TURF ALG	mixed assemblage	1	0.01
18	MAS COR	Montastrea annularis	15	0.21
19	TURF ALG	mixed assemblage	2	0.03
20	ENC SPO	encrusting sponge	6	0.08
21	TURF ALG	mixed assemblage	7	0.10
22	ENC SPO	encrusting sponge	6	0.08
23	TURF ALG	mixed assemblage	5	0.07
24	GORG	gorgonian base	4	0.06
25	ENC SPO	encrusting sponge	5	0.07
26	TURF ALG	mixed assemblage	13	0.18
27	MAS COR	Meandrina meandrites	30	0.42
28	TURF ALG	mixed assemblage	4	0.06
29	ENC SPO	encrusting sponge	18	0.25
30	TURF ALG	mixed assemblage	8	0.11
31	MAS COR	Montastrea annularis	21	0.30
32	TURF ALG	mixed assemblage	3	0.04
33	MAS COR	Montastrea annularis	16	0.23
34	TURF ALG	mixed assemblage	30	0.42
35	HOLE	hole	10	0.14
36	TURF ALG	mixed assemblage	46	0.65
37	ERE SPO	erect sponge	12	0.17
38	RO	reef overhang	15	0.21
39	ZOAN	unident. Anemone	10	0.14
40	TURF ALG	mixed assemblage	12	0.17
41	FOL COR	Agaricia agaricites	4	0.06
42	TURF ALG	mixed assemblage	45	0.63
43	ENC COR	Porites astreoides	12	0.17
44	ENC SPO	encrusting sponge	3	0.04
45	TURF ALG	mixed assemblage	7	0.10

46	ENC SPO	encrusting sponge	9	0.13
47	GORG	gorgonian base	4	0.06
48	ENC SPO	encrusting sponge	9	0.13
49	MILLE	Millepoa alaicornis	5	0.07
50	ZOAN	unident. Anemone	10	0.14
51	ENC GOR	Erythropodium caribaeorum	20	0.28
52	TURF ALG	mixed assemblage	50	0.70
53	FOL COR	Leptoseris cucullata	6	0.08
54	TURF ALG	mixed assemblage	13	0.18
55	ERE SPO	erect sponge	6	0.08
56	ENC GOR	Erythropodium caribaeorum	4	0.06
57	ERE SPO	erect sponge	3	0.04
58	MAS COR	Siderastrea radians	9	0.13
59	SOL COR	Mussa sp.	3	0.04
60	TURF ALG	mixed assemblage	20	0.28
61	ENC GOR	Erythropodium caribaeorum	24	0.34
62	TURF ALG	mixed assemblage	21	0.30
63	ENC GOR	Erythropodium caribaeorum	95	1.34
64	TURF ALG	mixed assemblage	18	0.25
65	MAS COR	Siderastrea radians	9	0.13
66	TURF ALG	mixed assemblage	15	0.21
67	MAS COR	Montastrea cavernosa	10	0.14
68	TURF ALG	mixed assemblage	30	0.42
69	MAS COR	Colpophyllia natans	17	0.24
70	TURF ALG	mixed assemblage	9	0.13
71	MAS COR	Colpophyllia natans	27	0.38
72	MAS COR	Montastrea annularis	33	0.46
73	TURF ALG	mixed assemblage	10	0.14
74	RO	reef overhang	5	0.07
75	ENC GOR	Erythropodium caribaeorum	12	0.17
76	TURF ALG	mixed assemblage	4	0.06
77	ENC GOR	Erythropodium caribaeorum	16	0.23
78	RO	reef overhang	33	0.46
79	SAND	sand	40	0.56
80	RO	reef overhang	20	0.28
81	ENC SPO	encrusting sponge	4	0.06
82	ENC GOR	Erythropodium caribaeorum	10	0.14

Gorgonians = n/d

Note: TURF ALG composed primarily of short filamentous algae

**APPENDIX 1.10 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
ARRECIFE RESUELLOS, CABO ROJO. May 15, 2000.**

DEPTH: 8.1 m
RUGOSITY: 1.75 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	42	0.59
1	ENC SPO	encrusting sponge	4	0.06
2	TURF ALG	mixed assemblage	11	0.15
3	ENC SPO	encrusting sponge	5	0.07
4	TURF ALG	mixed assemblage	17	0.24
5	ENC SPO	encrusting sponge	3	0.04
6	TURF ALG	mixed assemblage	2	0.03
7	ENC SPO	encrusting sponge	9	0.13
8	TURF ALG	mixed assemblage	5	0.07
9	RO	reef overhang	14	0.20
10	MAS COR	Montastrea annularis	34	0.48
11	TURF ALG	mixed assemblage	25	0.35
12	RO	reef overhang	20	0.28
13	ENC GOR	v	6	0.08
14	TURF ALG	mixed assemblage	9	0.13
15	MAS COR	Siderastrea siderea	4	0.06
16	TURF ALG	mixed assemblage	10	0.14
17	RO	reef overhang	8	0.11
18	ENC GOR	Erythropodium caribaeorum	12	0.17
19	TURF ALG	mixed assemblage	20	0.28
20	ENC GOR	Erythropodium caribaeorum	12	0.17
21	TURF ALG	mixed assemblage	14	0.20
22	RO	reef overhang	20	0.28
23	TURF ALG	mixed assemblage	90	1.27
24	ENC GOR	Erythropodium caribaeorum	23	0.32
25	TURF ALG	mixed assemblage	18	0.25
26	ZOAN	unident.anemone	6	0.08
27	SAND	sand	20	0.28
28	RO	reef overhang	32	0.45
29	HOLE	hole	4	0.06
30	ENC GOR	Erythropodium caribaeorum	16	0.23
31	TURF ALG	mixed assemblage	5	0.07
32	ENC GOR	Erythropodium caribaeorum	16	0.23
33	HOLE	hole	10	0.14
34	ENC GOR	Erythropodium caribaeorum	6	0.08
35	ENC SPO	encrusting sponge	10	0.14
36	ENC GOR	Erythropodium caribaeorum	21	0.30
37	ENC SPO	encrusting sponge	8	0.11
38	RO	reef overhang	8	0.11
39	ENC GOR	Erythropodium caribaeorum	7	0.10
40	TURF ALG	mixed assemblage	25	0.35
41	ENC SPO	encrusting sponge	4	0.06
42	TURF ALG	mixed assemblage	3	0.04
43	ENC GOR	Erythropodium caribaeorum	4	0.06
44	ENC GOR	Erythropodium caribaeorum	17	0.24
45	TURF ALG	mixed assemblage	6	0.08

46	ENC SPO	encrusting sponge	5	0.07
47	TURF ALG	mixed assemblage	10	0.14
48	MAS COR	Montastrea cavernosa	14	0.20
49	TURF ALG	mixed assemblage	30	0.42
50	HOLE	hole	10	0.14
51	TURF ALG	mixed assemblage	30	0.42
52	SAND	sand	40	0.56
53	TURF ALG	mixed assemblage	30	0.42

Gorgonians = n/d

Note: Turf Alg composed primarily of short filamentous algae and fine sediment

**APPENDIX 1.11 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
ARRECIFE EL PALO, CABO ROJO. May 17, 2000.**

DEPTH: 3.0 m

RUGOSITY: 4.80 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	22	0.31
1	MAS COR	Montastrea annularis	8	0.11
2	TURF ALG	mixed assemblage	41	0.58
3	MILLE	Millepora alcicornis	2	0.03
4	TURF ALG	mixed assemblage	31	0.44
5	RO	reef overhang	21	0.30
6	TURF ALG	mixed assemblage	11	0.15
7	RO	reef overhang	14	0.20
8	ENC GOR	Erythropodium caribaeorum	2	0.03
9	TURF ALG	mixed assemblage	15	0.21
10	ENC SPO	encrusting sponge	11	0.15
11	HOLE	hole	4	0.06
12	TURF ALG	mixed assemblage	15	0.21
13	MAS COR	Siderastrea radians	3	0.04
14	TURF ALG	mixed assemblage	4	0.06
15	MAS COR	Siderastrea radians	2	0.03
16	TURF ALG	mixed assemblage	27	0.38
17	GORG	gorgonian base	3	0.04
18	TURF ALG	mixed assemblage	9	0.13
19	ENC GOR	Erythropodium caribaeorum	2	0.03
20	TURF ALG	mixed assemblage	4	0.06
21	MAS COR	Siderastrea siderea	4	0.06
22	TURF ALG	mixed assemblage	30	0.42
23	ENC GOR	Erythropodium caribaeorum	2	0.03
24	TURF ALG	mixed assemblage	6	0.08
25	ENC GOR	Erythropodium caribaeorum	7	0.10
26	TURF ALG	mixed assemblage	29	0.41
27	ENC SPO	encrusting sponge	3	0.04
28	TURF ALG	mixed assemblage	8	0.11
29	GORG	gorgonian base	2	0.03
30	TURF ALG	mixed assemblage	10	0.14
31	MAS COR	Siderastrea siderea	3	0.04
32	TURF ALG	mixed assemblage	2	0.03
33	MAS COR	Siderastrea siderea	20	0.28
34	ERE SPO	erect sponge	2	0.03
35	MAS COR	Montastrea cavernosa	16	0.23
36	ERE SPO	erect sponge	4	0.06
37	TURF ALG	mixed assemblage	29	0.41
38	MAS COR	Montastrea cavernosa	12	0.17
39	TURF ALG	mixed assemblage	17	0.24
40	ENC COR	Porites astreoides	12	0.17
41	TURF ALG	mixed assemblage	11	0.15
42	RO	reef overhang	27	0.38
43	TURF ALG	mixed assemblage	23	0.32
44	RO	reef overhang	14	0.20
45	CAL ALG	Halimeda sp.	6	0.08

46	TURF ALG	mixed assemblage	38	0.54
47	SILT	silt	12	0.17
48	RO	reef overhang	25	0.35
49	ERE SPO	erect sponge	3	0.04
50	RO	reef overhang	8	0.11
51	ENC COR	Porites astreoides	29	0.41
52	RO	reef overhang	7	0.10
53	TURF ALG	mixed assemblage	4	0.06
54	RO	reef overhang	17	0.24
55	TURF ALG	mixed assemblage	53	0.75
56	ERE SPO	erect sponge	4	0.06
57	TURF ALG	mixed assemblage	20	0.28
58	ENC GOR	Erythropodium caribaeorum	9	0.13
59	ERE SPO	erect sponge	8	0.11
60	RO	reef overhang	8	0.11
61	MAS COR	Montastrea annularis	4	0.06
62	ENC SPO	encrusting sponge	3	0.04
63	MAS COR	Montastrea annularis	4	0.06
64	RO	reef overhang	40	0.56
65	SILT	silt	6	0.08
66	RO	reef overhang	32	0.45
67	GORG	gorgonian base	4	0.06
68	ERE SPO	erect sponge	9	0.13
69	TURF ALG	mixed assemblage	39	0.55
70	ENC GOR	Erythropodium caribaeorum	9	0.13
71	TURF ALG	mixed assemblage	106	1.49

Gorgonians = 22

Note: Turf Alg composed primarily of short filamentous algae and fine sediment

**APPENDIX 1.12 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
ARRECIFE EL PALO, CABO ROJO. May 17, 2000.**

DEPTH: 3.0 m

RUGOSITY: 5.11 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	ENC COR	Porites astreoides	4	0.06
1	RO	reef overhang	6	0.08
2	TURF ALG	mixes assemblage	9	0.13
3	ENC COR	Porites astreoides	3	0.04
4	ENC COR	Porites astreoides	10	0.14
5	TURF ALG	mixes assemblage	3	0.04
6	ENC COR	Porites astreoides	7	0.10
7	TURF ALG	mixes assemblage	13	0.18
8	ENC GOR	Erythropodium caribaeorum	13	0.18
9	RO	reef overhang	30	0.42
10	TURF ALG	mixes assemblage	9	0.13
11	ENC GOR	Erythropodium caribaeorum	3	0.04
12	TURF ALG	mixes assemblage	2	0.03
13	ENC GOR	Erythropodium caribaeorum	5	0.07
14	ENC GOR	Erythropodium caribaeorum	28	0.39
15	RO	reef overhang	6	0.08
16	TURF ALG	mixes assemblage	33	0.46
17	MAS COR	Siderastrea siderea	6	0.08
18	TURF ALG	mixes assemblage	30	0.42
19	RO	reef overhang	35	0.49
20	TURF ALG	mixes assemblage	34	0.48
21	ENC GOR	Erythropodium caribaeorum	5	0.07
22	TURF ALG	mixes assemblage	18	0.25
23	ENC GOR	Erythropodium caribaeorum	6	0.08
24	TURF ALG	mixes assemblage	3	0.04
25	ENC GOR	Erythropodium caribaeorum	3	0.04
26	TURF ALG	mixes assemblage	9	0.13
27	RO	reef overhang	7	0.10
28	TURF ALG	mixes assemblage	9	0.13
29	ENC COR	Porites astreoides	4	0.06
30	MAS COR	Siderastrea siderea	4	0.06
31	RO	reef overhang	7	0.10
32	TURF ALG	mixes assemblage	20	0.28
33	GORG	gorgonian base	10	0.14
34	TURF ALG	mixes assemblage	4	0.06
35	MAS COR	Siderastrea siderea	4	0.06
36	RO	reef overhang	7	0.10
37	MAS COR	Diploria strigosa	4	0.06
38	TURF ALG	mixes assemblage	27	0.38
39	MAS COR	Diploria strigosa	34	0.48
40	RO	reef overhang	20	0.28
41	TURF ALG	mixes assemblage	25	0.35
42	RO	reef overhang	51	0.72
43	ENC GOR	Erythropodium caribaeorum	13	0.18
44	ENC SPO	encrusting sponge	3	0.04
45	TURF ALG	mixes assemblage	5	0.07

46	ENC GOR	Erythropodium caribaeorum	5	0.07
47	RO	reef overhang	8	0.11
48	MAS COR	Colpophyllia natans	48	0.68
49	TURF ALG	mixes assemblage	32	0.45
50	RO	reef overhang	6	0.08
51	ERE SPO	erect sponge	4	0.06
52	TURF ALG	mixes assemblage	27	0.38
53	CAL ALG	calcareous red algae	6	0.08
54	MAS COR	Montastrea annularis	8	0.11
55	MILLE	Millepora alcicornis	2	0.03
56	TURF ALG	mixes assemblage	53	0.75
57	ENC SPO	encrusting sponge	5	0.07
58	TURF ALG	mixes assemblage	30	0.42
59	ERE SPO	erect sponge	5	0.07
60	RO	reef overhang	21	0.30
61	COR RUB	coral rubble	15	0.21
62	RO	reef overhang	21	0.30
63	TURF ALG	mixes assemblage	41	0.58
64	ERE SPO	erect sponge	6	0.08
65	TURF ALG	mixes assemblage	31	0.44
66	ERE SPO	erect sponge	11	0.15
67	TURF ALG	mixes assemblage	5	0.07
68	ENC GOR	Erythropodium caribaeorum	9	0.13
69	TURF ALG	mixes assemblage	83	1.17

Gorgonians = 30

Note: Turf Alg composed primarily of short filamentous algae and fine sediment

**APPENDIX 1.13 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
ARRECIFE EL PALO, CABO ROJO. May 17, 2000.**

DEPTH: 3.0 m

RUGOSITY: 6.70 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	<i>Siderastrea siderea</i>	8	0.11
1	TURF ALG	mixed assemblage	9	0.13
2	ENC COR	<i>Porites astreoides</i>	12	0.17
3	RO	reef overhang	4	0.06
4	TURF ALG	mixed assemblage	20	0.28
5	ERE SPO	erect sponge	7	0.10
6	TURF ALG	mixed assemblage	40	0.56
7	HOLE	hole	5	0.07
8	MAS COR	<i>Siderastrea siderea</i>	10	0.14
9	RO	reef overhang	77	1.08
10	TURF ALG	mixed assemblage	14	0.20
11	ENC GOR	<i>Erythropodium caribaeorum</i>	16	0.23
12	TURF ALG	mixed assemblage	25	0.35
13	RO	reef overhang	11	0.15
14	COR RUB	coral rubble	27	0.38
15	RO	reef overhang	12	0.17
16	TURF ALG	mixed assemblage	3	0.04
17	MAS COR	<i>Siderastrea siderea</i>	3	0.04
18	RO	reef overhang	72	1.01
19	ENC GOR	<i>Erythropodium caribaeorum</i>	13	0.18
20	TURF ALG	mixed assemblage	8	0.11
21	ENC COR	<i>Porites astreoides</i>	4	0.06
22	TURF ALG	mixed assemblage	16	0.23
23	ENC GOR	<i>Erythropodium caribaeorum</i>	3	0.04
24	HOLE	hole	30	0.42
25	TURF ALG	mixed assemblage	93	1.31
26	MAS COR	<i>Siderastrea siderea</i>	4	0.06
27	RO	reef overhang	33	0.46
28	COR RUB	coral rubble	15	0.21
29	RO	reef overhang	60	0.85
30	TURF ALG	mixed assemblage	6	0.08
31	ENC GOR	<i>Briareum asbestinum</i>	10	0.14
32	TURF ALG	mixed assemblage	5	0.07
33	RO	reef overhang	9	0.13
34	ZOAN	unident. Anemone	9	0.13
35	ENC GOR	<i>Erythropodium caribaeorum</i>	10	0.14
36	RO	reef overhang	30	0.42
37	TURF ALG	mixed assemblage	10	0.14
38	ZOAN	unident. Anemone	3	0.04
39	TURF ALG	mixed assemblage	55	0.77
40	RO	reef overhang	13	0.18
41	TURF ALG	mixed assemblage	4	0.06
42	MAS COR	<i>Montastrea annularis</i>	12	0.17
43	RO	reef overhang	18	0.25
44	TURF ALG	mixed assemblage	88	1.24
45	MAS COR	<i>Montastrea cavernosa</i>	15	0.21

46	RO	reef overhang	13	0.18
47	TURF ALG	mixed assemblage	55	0.77
48	MAS COR	Montastrea cavernosa	15	0.21
49	TURF ALG	mixed assemblage	10	0.14
50	RO	reef overhang	10	0.14
51	TURF ALG	mixed assemblage	50	0.70
52	RO	reef overhang	10	0.14
53	TURF ALG	mixed assemblage	50	0.70
54	RO	reef overhang	13	0.18
55	TURF ALG	mixed assemblage	9	0.13

Gorgonians = 36

Note: Turf Alg composed primarily of short filamentous algae and fine sediment

**APPENDIX 1.14 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
ARRECIFE EL PALO, CABO ROJO. May 17, 2000.**

DEPTH: 3.0 m
RUGOSITY: 4.32 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	10	0.14
1	ENC SPO	encrusting sponge	14	0.20
2	RO	reef overhang	5	0.07
3	ENC GOR	Erythropodium caribaeorum	9	0.13
4	MAS COR	Colpophyllia natans	5	0.07
5	TURF ALG	mixed assemblage	66	0.93
6	ENC GOR	Erythropodium caribaeorum	8	0.11
7	ENC SPO	encrusting sponge	3	0.04
8	ENC COR	Porites astreoides	7	0.10
9	ENC SPO	encrusting sponge	4	0.06
10	ZOAN	unident. Anemone	3	0.04
11	ENC SPO	encrusting sponge	11	0.15
12	TURF ALG	mixed assemblage	30	0.42
13	ENC SPO	encrusting sponge	6	0.08
14	TURF ALG	mixed assemblage	14	0.20
15	RO	reef overhang	8	0.11
16	TURF ALG	mixed assemblage	160	2.25
17	MAS COR	Siderastrea siderea	15	0.21
18	TURF ALG	mixed assemblage	134	1.89
19	MAS COR	Siderastrea siderea	20	0.28
20	RO	reef overhang	20	0.28
21	TURF ALG	mixed assemblage	65	0.92
22	ENC SPO	encrusting sponge	5	0.07
23	TURF ALG	mixed assemblage	10	0.14
24	MAS COR	Montastrea annularis	8	0.11
25	TURF ALG	mixed assemblage	34	0.48
26	MAS COR	Colpophyllia natans	17	0.24
27	TURF ALG	mixed assemblage	36	0.51
28	ENC SPO	encrusting sponge	6	0.08
29	TURF ALG	mixed assemblage	70	0.99
30	ENC GOR	Erythropodium caribaeorum	18	0.25
31	MAS COR	Montastrea cavernosa	3	0.04
32	TURF ALG	mixed assemblage	4	0.06
33	MAS COR	Montastrea annularis	15	0.21
34	TURF ALG	mixed assemblage	30	0.42
35	ENC GOR	Erythropodium caribaeorum	10	0.14
36	TURF ALG	mixed assemblage	10	0.14
37	ENC GOR	Erythropodium caribaeorum	14	0.20
38	TURF ALG	mixed assemblage	110	1.55

Gorgonians = 32

Note: Turf Alg composed primarily of short filamentous algae and fine sediment

**APPENDIX 1.15 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
ARRECIFE EL PALO, CABO ROJO. May 17, 2000.**

DEPTH: 3.0 m

RUGOSITY: 6.35 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	46	0.65
1	ENC COR	Porites astreoides	18	0.25
2	ERE SPO	erect sponge	6	0.08
3	ENC COR	Porites astreoides	2	0.03
4	TURF ALG	mixed assemblage	3	0.04
5	ENC COR	Porites astreoides	7	0.10
6	TURF ALG	mixed assemblage	5	0.07
7	MAS COR	Montastrea cavernosa	40	0.56
8	TURF ALG	mixed assemblage	50	0.70
9	ENC SPO	encrusting sponge	30	0.42
10	TURF ALG	mixed assemblage	10	0.14
11	ENC GOR	Erythropodium caribaeorum	6	0.08
12	ENC SPO	encrusting sponge	20	0.28
13	RO	reef overhang	30	0.42
14	TURF ALG	mixed assemblage	20	0.28
15	SAND	sand	10	0.14
16	TURF ALG	mixed assemblage	40	0.56
17	RO	reef overhang	10	0.14
18	MAS COR	Montastrea annularis	20	0.28
19	ENC SPO	encrusting sponge	10	0.14
20	TURF ALG	mixed assemblage	3	0.04
21	MAS COR	Montastrea annularis	8	0.11
22	ENC SPO	encrusting sponge	4	0.06
23	TURF ALG	mixed assemblage	34	0.48
24	ENC SPO	encrusting sponge	9	0.13
25	TURF ALG	mixed assemblage	10	0.14
26	CAL ALG	Halimeda sp.	10	0.14
27	TURF ALG	mixed assemblage	50	0.70
28	ENC GOR	Erythropodium caribaeorum	6	0.08
29	TURF ALG	mixed assemblage	44	0.62
30	TURF ALG	mixed assemblage	45	0.63
31	ENC SPO	encrusting sponge	12	0.17
32	TURF ALG	mixed assemblage	11	0.15
33	MAS COR	Montastrea annularis	18	0.25
34	TURF ALG	mixed assemblage	8	0.11
35	ENC SPO	encrusting sponge	10	0.14
36	TURF ALG	mixed assemblage	12	0.17
37	ENC SPO	encrusting sponge	9	0.13
38	TURF ALG	mixed assemblage	6	0.08
39	MAS COR	Diploria strigosa	16	0.23
40	TURF ALG	mixed assemblage	40	0.56
41	RO	reef overhang	30	0.42
42	TURF ALG	mixed assemblage	6	0.08
43	ENC GOR	Erythropodium caribaeorum	4	0.06
44	ENC COR	Porites astreoides	8	0.11
45	MAS COR	Montastrea annularis	7	0.10

46	TURF ALG	mixed assemblage	12	0.17
47	MAS COR	Montastrea annularis	9	0.13
48	TURF ALG	mixed assemblage	35	0.49
49	MAS COR	Siderastrea radians	15	0.21
50	TURF ALG	mixed assemblage	30	0.42
51	ENC COR	Porites astreoides	4	0.06
52	BRA COR	Porites porites	3	0.04
53	ENC SPO	encrusting sponge	9	0.13
54	ERE SPO	erect sponge	12	0.17
55	TURF ALG	mixed assemblage	2	0.03
56	ENC COR	Porites astreoides	3	0.04
57	MAS COR	Siderastrea radians	18	0.25
58	TURF ALG	mixed assemblage	5	0.07
59	RO	reef overhang	20	0.28
60	TURF ALG	mixed assemblage	10	0.14
61	RO	reef overhang	20	0.28
62	ENC GOR	Erythropodium caribaeorum	8	0.11
63	ERE SPO	erect sponge	25	0.35
64	ENC GOR	Erythropodium caribaeorum	11	0.15
65	TURF ALG	mixed assemblage	20	0.28
66	RO	reef overhang	24	0.34
67	TURF ALG	mixed assemblage	45	0.63
68	FLE ALG	fleshy algae	10	0.14
69	TURF ALG	mixed assemblage	8	0.11

Gorgonians = 21

Note: Turf Alg composed primarily of short filamentous algae and fine sediment

**APPENDIX 2.1 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
LA BOYA, LA PARGUERA. MAY 23, 2000.**

DEPTH: 18.2 m
RUGOSITY: 6.03 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	9	0.13
1	TURF ALG	mixed assemblage	1	0.01
2	MAS COR	Montastrea annularis	8	0.11
3	TURF ALG	mixed assemblage	2	0.03
4	MAS COR	Montastrea annularis	6	0.08
5	TURF ALG	mixed assemblage	3	0.04
6	MAS COR	Montastrea annularis	7	0.10
7	FLE ALG	Dictyota sp.	6	0.08
8	TURF ALG	mixed assemblage	4	0.06
9	BRA COR	Porites furcata	49	0.69
10	RO	reef overhang	18	0.25
11	TURF ALG	mixed assemblage	12	0.17
12	MAS COR	Dichocoenia stokesii	9	0.13
13	TURF ALG	mixed assemblage	8	0.11
14	RO	reef overhang	9	0.13
15	MAS COR	Montastrea annularis	13	0.18
16	TURF ALG	mixed assemblage	8	0.11
17	FOL COR	Agaricia agaricites	2	0.03
18	TURF ALG	mixed assemblage	2	0.03
19	BRA COR	Porites porites	10	0.14
20	RO	reef overhang	3	0.04
21	MAS COR	Montastrea annularis	11	0.15
22	TURF ALG	mixed assemblage	12	0.17
23	MAS COR	Montastrea annularis	46	0.65
24	TURF ALG	mixed assemblage	2	0.03
25	MAS COR	Montastrea annularis	6	0.08
26	TURF ALG	mixed assemblage	40	0.56
27	MAS COR	Siderastrea siderea	3	0.04
28	RO	reef overhang	2	0.03
29	MAS COR	Montastrea annularis	13	0.18
30	TURF ALG	mixed assemblage	2	0.03
31	MAS COR	Montastrea annularis	5	0.07
32	TURF ALG	mixed assemblage	18	0.25
33	MAS COR	Montastrea annularis	18	0.25
34	TURF ALG	mixed assemblage	2	0.03
35	ENC COR	Porites astreoides	20	0.28
36	RO	reef overhang	22	0.31
37	ENC COR	Porites astreoides	8	0.11
38	TURF ALG	mixed assemblage	26	0.37
39	ENC COR	Porites astreoides	3	0.04
40	RO	reef overhang	4	0.06
41	FOL COR	Agaricia agaricites	9	0.13
42	RO	reef overhang	6	0.08
43	MAS COR	Montastrea annularis	3	0.04
44	RO	reef overhang	15	0.21
45	MAS COR	Montastrea annularis	4	0.06

46	RO	reef overhang	9	0.13
47	TURF ALG	mixed assemblage	16	0.23
48	FLE ALG	Dictyota sp.	5	0.07
49	RO	reef overhang	14	0.20
50	FOL COR	Agaricia agaricites	17	0.24
51	RO	reef overhang	8	0.11
52	COR RUB	coral rubble	30	0.42
53	FOL COR	Agaricia agaricites	4	0.06
54	RO	reef overhang	10	0.14
55	MAS COR	Montastrea annularis	10	0.14
56	FLE ALG	Padina sp.	18	0.25
57	RO	reef overhang	5	0.07
58	FOL COR	Agaricia agaricites	7	0.10
59	TURF ALG	mixed assemblage	14	0.20
60	RO	reef overhang	10	0.14
61	TURF ALG	mixed assemblage	23	0.32
62	ENC COR	Porites astreoides	3	0.04
63	TURF ALG	mixed assemblage	4	0.06
64	FOL COR	Agaricia agaricites	2	0.03
65	FLE ALG	Dictyota sp.	5	0.07
66	TURF ALG	mixed assemblage	14	0.20
67	ERE SPO	erect sponge	2	0.03
68	FLE ALG	Dictyota sp.	8	0.11
69	RO	reef overhang	9	0.13
70	ENC GOR	Erythropodium caribaeorum	6	0.08
71	FOL COR	Agaricia agaricites	3	0.04
72	RO	reef overhang	7	0.10
73	FOL COR	Agaricia agaricites	3	0.04
74	ENC SPO	encrusting sponge	4	0.06
75	TURF ALG	mixed assemblage	21	0.30
76	RO	reef overhang	4	0.06
77	FLE ALG	Dictyota sp.	6	0.08
78	TURF ALG	mixed assemblage	12	0.17
79	RO	reef overhang	8	0.11
80	MAS COR	Montastrea annularis	12	0.17
81	TURF ALG	mixed assemblage	13	0.18
82	ERE SPO	erect sponge	4	0.06
83	TURF ALG	mixed assemblage	48	0.68
84	ENC COR	Porites astreoides	10	0.14
85	TURF ALG	mixed assemblage	23	0.32
86	MAS COR	Montastrea cavernosa	6	0.08
87	RO	reef overhang	3	0.04
88	MAS COR	Meandrina meandrites	5	0.07
89	TURF ALG	mixed assemblage	13	0.18
90	MAS COR	Meandrina meandrites	5	0.07
91	TURF ALG	mixed assemblage	5	0.07
92	MAS COR	Montastrea annularis	10	0.14
93	TURF ALG	mixed assemblage	12	0.17
94	MAS COR	Montastrea annularis	22	0.31
95	RO	reef overhang	10	0.14
96	TURF ALG	mixed assemblage	11	0.15
97	SOL COR	Scolymia sp.	3	0.04
98	RO	reef overhang	3	0.04
99	TURF ALG	mixed assemblage	5	0.07
100	RO	reef overhang	7	0.10
101	ERE SPO	erect sponge	5	0.07

102	TURF ALG	mixed assemblage	33	0.46
103	MAS COR	Mycetophyllia lamarckiana	8	0.11
104	RO	reef overhang	12	0.17
105	MAS COR	Montastrea annularis	16	0.23
106	MAS COR	Montastrea annularis	14	0.20
107	TURF ALG	mixed assemblage	3	0.04
108	GORG	gorgonian base	7	0.10

Gorgonians = 17

Note: Turf Alg composed primarily of short filamentous algae, *Lobophora varigata*, *Dictyota* sp. and fine sediment

**APPENDIX 2.2 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
LA BOYA, LA PARGUERA. MAY 23, 2000.**

DEPTH: 18.2 m
RUGOSITY: 3.83 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	12	0.17
1	MAS COR	Siderastrea siderea	3	0.04
2	MAS COR	Montastrea cavernosa	5	0.07
3	TURF ALG	mixes assemblage	6	0.08
4	MAS COR	Montastrea annularis	14	0.20
5	MAS COR	Diploria labyrinthiformis	4	0.06
6	MAS COR	Montastrea annularis	10	0.14
7	TURF ALG	mixes assemblage	9	0.13
8	TURF ALG	mixes assemblage	82	1.15
9	RO	reef overhang	15	0.21
10	TURF ALG	mixes assemblage	20	0.28
11	RO	reef overhang	8	0.11
12	MAS COR	Montastrea annularis	8	0.11
13	RO	reef overhang	10	0.14
14	TURF ALG	mixes assemblage	20	0.28
15	BRA COR	Porites porites	4	0.06
16	TURF ALG	mixes assemblage	5	0.07
17	ENC COR	Porites astreoides	10	0.14
18	TURF ALG	mixes assemblage	12	0.17
19	MAS COR	Montastrea annularis	4	0.06
20	ENC GOR	Erythropodium caribaeorum	18	0.25
21	TURF ALG	mixes assemblage	7	0.10
22	MAS COR	Montastrea annularis	23	0.32
23	RO	reef overhang	15	0.21
24	TURF ALG	mixes assemblage	30	0.42
25	BRA COR	Acropora cervicornis	15	0.21
26	MAS COR	Montastrea annularis	39	0.55
27	TURF ALG	mixes assemblage	20	0.28
28	CAL ALG	Halimeda sp.	10	0.14
29	MAS COR	Montastrea annularis	8	0.11
30	TURF ALG	mixes assemblage	4	0.06
31	MAS COR	Montastrea annularis	3	0.04
32	TURF ALG	mixes assemblage	10	0.14
33	MAS COR	Montastrea annularis	25	0.35
34	RO	reef overhang	5	0.07
35	SAND	sand	60	0.85
36	RO	reef overhang	13	0.18
37	ENC SPO	encrusting sponge	3	0.04
38	TURF ALG	mixes assemblage	9	0.13
39	MAS COR	Montastrea annularis	22	0.31
40	TURF ALG	mixes assemblage	23	0.32
41	MAS COR	Montastrea annularis	9	0.13
42	TURF ALG	mixes assemblage	3	0.04
43	FOL COR	Agaricia agaricites	6	0.08
44	MAS COR	Montastrea annularis	6	0.08
45	FLE ALG	Padina sp.	13	0.18

46	MAS COR	Diploria labyrinthiformis	23	0.32
47	FLE ALG	Padina sp.	16	0.23
48	FOL COR	Agaricia agaricites	3	0.04
49	ERE SPO	Xestospongia muta	29	0.41
50	TURF ALG	mixes assemblage	7	0.10
51	MAS COR	Montastrea annularis	13	0.18
52	TURF ALG	mixes assemblage	14	0.20
53	MAS COR	Montastrea annularis	5	0.07
54	TURF ALG	mixes assemblage	4	0.06
55	MAS COR	Montastrea annularis	3	0.04
56	TURF ALG	mixes assemblage	23	0.32
57	MAS COR	Montastrea annularis	24	0.34
58	ZOAN	Palythoa caribaeorum	5	0.07
59	TURF ALG	mixes assemblage	2	0.03
60	ENC COR	Porites astreoides	3	0.04
61	TURF ALG	mixes assemblage	23	0.32
62	RO	reef overhang	8	0.11
63	TURF ALG	mixes assemblage	6	0.08
64	MAS COR	Montastrea annularis	14	0.20
65	MAS COR	Montastrea cavernosa	12	0.17
66	HOLE	hole	2	0.03
67	MAS COR	Montastrea annularis	9	0.13
68	ENC GOR	Erythropodium caribaeorum	16	0.23
69	MAS COR	Montastrea annularis	14	0.20
70	ENC GOR	Erythropodium caribaeorum	36	0.51
71	TURF ALG	mixes assemblage	8	0.11

Gorgonians = 7

Note: Turf Alg composed primarily of short filamentous algae, *Lobophora varigata*, *Dictyota* sp. and fine sediment

**APPENDIX 2.3 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
LA BOYA, LA PARGUERA. MAY 23, 2000.**

DEPTH: 18.2 m
RUGOSITY: 5.94 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	10	0.14
1	TURF ALG	mixed assemblage	22	0.31
2	MAS COR	Montastrea cavernosa	2	0.03
3	TURF ALG	mixed assemblage	5	0.07
4	BRA COR	Porites porites	4	0.06
5	TURF ALG	mixed assemblage	10	0.14
6	MAS COR	Siderastrea siderea	4	0.06
7	TURF ALG	mixed assemblage	20	0.28
8	RO	reef overhang	9	0.13
9	ERE SPO	erect sponge	2	0.03
10	TURF ALG	mixed assemblage	8	0.11
11	RO	reef overhang	5	0.07
12	ENC GOR	Erythropodium caribaeorum	3	0.04
13	TURF ALG	mixed assemblage	8	0.11
14	ENC SPO	encrusting sponge	12	0.17
15	TURF ALG	mixed assemblage	2	0.03
16	MAS COR	Montastrea annularis	6	0.08
17	MAS COR	Montastrea annularis	45	0.63
18	RO	reef overhang	15	0.21
19	TURF ALG	mixed assemblage	4	0.06
20	RO	reef overhang	9	0.13
21	TURF ALG	mixed assemblage	23	0.32
22	FLE ALG	Dictyota sp.	5	0.07
23	RO	reef overhang	5	0.07
24	FOL COR	Agaricia agaricites	5	0.07
25	RO	reef overhang	4	0.06
26	TURF ALG	mixed assemblage	4	0.06
27	RO	reef overhang	2	0.03
28	FOL COR	Agaricia agaricites	9	0.13
29	TURF ALG	mixed assemblage	5	0.07
30	FLE ALG	Dictyota sp.	6	0.08
31	RO	reef overhang	5	0.07
32	TURF ALG	mixed assemblage	5	0.07
33	RO	reef overhang	11	0.15
34	FOL COR	Agaricia agaricites	4	0.06
35	TURF ALG	mixed assemblage	7	0.10
36	MAS COR	Diploria strigosa	18	0.25
37	TURF ALG	mixed assemblage	35	0.49
38	MAS COR	Montastrea annularis	9	0.13
39	HOLE	hole	7	0.10
40	TURF ALG	mixed assemblage	4	0.06
41	RO	reef overhang	11	0.15
42	ENC SPO	encrusting sponge	21	0.30
43	ERE SPO	erect sponge	3	0.04
44	FLE ALG	Dictyota sp.	8	0.11
45	ERE SPO	erect sponge	3	0.04

46	RO	reef overhang	4	0.06
47	ENC GOR	Erythropodium caribaeorum	6	0.08
48	ENC COR	Porites astreoides	5	0.07
49	RO	reef overhang	8	0.11
50	ENC COR	Porites astreoides	8	0.11
51	TURF ALG	mixed assemblage	9	0.13
52	FOL COR	Agaricia agaricites	5	0.07
53	TURF ALG	mixed assemblage	2	0.03
54	MAS COR	Montastrea annularis	3	0.04
55	TURF ALG	mixed assemblage	4	0.06
56	MAS COR	Montastrea annularis	10	0.14
57	TURF ALG	mixed assemblage	3	0.04
58	MAS COR	Montastrea annularis	9	0.13
59	MAS COR	Montastrea annularis	6	0.08
60	MAS COR	Montastrea annularis	19	0.27
61	TURF ALG	mixed assemblage	23	0.32
62	MAS COR	Montastrea annularis	8	0.11
63	RO	reef overhang	5	0.07
64	TURF ALG	mixed assemblage	22	0.31
65	MAS COR	Siderastrea siderea	2	0.03
66	RO	reef overhang	16	0.23
67	FOL COR	Agaricia agaricites	5	0.07
68	ERE SPO	erect sponge	2	0.03
69	MILLE	Millepora alcicornis	6	0.08
70	RO	reef overhang	6	0.08
71	TURF ALG	mixed assemblage	7	0.10
72	MAS COR	Montastrea annularis	3	0.04
73	TURF ALG	mixed assemblage	10	0.14
74	MAS COR	Montastrea annularis	12	0.17
75	RO	reef overhang	18	0.25
76	TURF ALG	mixed assemblage	15	0.21
77	ERE SPO	Xestospongia muta	79	1.11
78	RO	reef overhang	17	0.24
79	FOL COR	Agaricia agaricites	5	0.07
80	MAS COR	Montastrea annularis	38	0.54
81	RO	reef overhang	20	0.28
82	MAS COR	Siderastrea siderea	5	0.07
83	TURF ALG	mixed assemblage	25	0.35
84	RO	reef overhang	15	0.21
85	MAS COR	Montastrea annularis	15	0.21
86	RO	reef overhang	4	0.06
87	ENC SPO	encrusting sponge	10	0.14
88	FLE ALG	Dictyota sp.	4	0.06
89	MAS COR	Meandrina meandrites	8	0.11
90	TURF ALG	mixed assemblage	4	0.06
91	MAS COR	Montastrea cavernosa	16	0.23
92	TURF ALG	mixed assemblage	10	0.14
93	MAS COR	Montastrea cavernosa	12	0.17
94	TURF ALG	mixed assemblage	11	0.15
95	MAS COR	Montastrea annularis	3	0.04
96	RO	reef overhang	5	0.07
97	MAS COR	Montastrea annularis	19	0.27
98	FOL COR	Agaricia agaricites	3	0.04
99	MAS COR	Montastrea annularis	3	0.04
100	TURF ALG	mixed assemblage	23	0.32
101	FOL COR	Agaricia agaricites	4	0.06

102	BRA COR	Porites porites	11	0.15
103	TURF ALG	mixed assemblage	13	0.18
104	RO	reef overhang	7	0.10
105	TURF ALG	mixed assemblage	9	0.13
106	MAS COR	Meandrina meandrites	4	0.06
107	MAS COR	Meandrina meandrites	10	0.14
108	TURF ALG	mixed assemblage	3	0.04
109	MAS COR	Montastrea annularis	13	0.18
110	TURF ALG	mixed assemblage	19	0.27

Gorgonians = 10

Note: Turf Alg composed primarily of short filamentous algae, *Lobophora varigata*, *Dictyota* sp. and fine sediment

**APPENDIX 2.4 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
LA BOYA, LA PARGUERA. MAY 23, 2000.**

DEPTH: 18.2 m
RUGOSITY: 4.87 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	8	0.11
1	ENC GOR	Erythropodium caribaeorum	19	0.27
2	FOL COR	Agaricia agaricites	11	0.15
3	ENC COR	Porites astreoides	11	0.15
4	TURF ALG	mixed assemblage	12	0.17
5	ENC SPO	encrusting sponge	9	0.13
6	TURF ALG	mixed assemblage	10	0.14
7	RO	reef overhang	7	0.10
8	TURF ALG	mixed assemblage	6	0.08
9	FOL COR	Agaricia agaricites	6	0.08
10	TURF ALG	mixed assemblage	20	0.28
11	FOL COR	Agaricia agaricites	3	0.04
12	TURF ALG	mixed assemblage	10	0.14
13	FOL COR	Agaricia agaricites	18	0.25
14	MAS COR	Montastrea annularis	11	0.15
15	RO	reef overhang	4	0.06
16	MAS COR	Montastrea annularis	20	0.28
17	TURF ALG	mixed assemblage	10	0.14
18	MAS COR	Montastrea annularis	27	0.38
19	ENC SPO	encrusting sponge	4	0.06
20	TURF ALG	mixed assemblage	2	0.03
21	MAS COR	Montastrea annularis	5	0.07
22	ENC SPO	encrusting sponge	2	0.03
23	TURF ALG	mixed assemblage	2	0.03
24	MAS COR	Montastrea annularis	10	0.14
25	GORG	gorgonian base	8	0.11
26	TURF ALG	mixed assemblage	50	0.70
27	MAS COR	Montastrea cavernosa	5	0.07
28	TURF ALG	mixed assemblage	8	0.11
29	BRA COR	Porites porites	3	0.04
30	TURF ALG	mixed assemblage	27	0.38
31	ENC SPO	encrusting sponge	6	0.08
32	TURF ALG	mixed assemblage	25	0.35
33	FOL COR	Agaricia agaricites	6	0.08
34	RO	reef overhang	8	0.11
35	TURF ALG	mixed assemblage	15	0.21
36	ENC SPO	encrusting sponge	12	0.17
37	ENC SPO	encrusting sponge	3	0.04
38	CAL ALG	Halimeda sp.	3	0.04
39	ENC SPO	encrusting sponge	10	0.14
40	TURF ALG	mixed assemblage	4	0.06
41	MAS COR	Montastrea annularis	14	0.20
42	CAL ALG	Halimeda sp.	8	0.11
43	TURF ALG	mixed assemblage	2	0.03
44	MAS COR	Diploria labyrinthiformis	28	0.39
45	FLE ALG	Padina sp.	6	0.08

46	MAS COR	Montastrea annularis	24	0.34
47	TURF ALG	mixed assemblage	5	0.07
48	MAS COR	Montastrea annularis	73	1.03
49	TURF ALG	mixed assemblage	10	0.14
50	ERE SPO	erect sponge	16	0.23
51	BRA COR	Porites porites	10	0.14
52	FOL COR	Agaricia agaricites	9	0.13
53	RO	reef overhang	6	0.08
54	FOL COR	Agaricia agaricites	5	0.07
55	MAS COR	Montastrea cavernosa	31	0.44
56	TURF ALG	mixed assemblage	7	0.10
57	MAS COR	Montastrea annularis	4	0.06
58	TURF ALG	mixed assemblage	7	0.10
59	MAS COR	Montastrea annularis	18	0.25
60	TURF ALG	mixed assemblage	3	0.04
61	MAS COR	Montastrea annularis	6	0.08
62	TURF ALG	mixed assemblage	2	0.03
63	MAS COR	Montastrea annularis	9	0.13
64	TURF ALG	mixed assemblage	8	0.11
65	MAS COR	Montastrea annularis	3	0.04
66	TURF ALG	mixed assemblage	3	0.04
67	MAS COR	Montastrea annularis	45	0.63
68	ENC COR	Porites astreoides	2	0.03
69	MAS COR	Diploria labyrinthiformis	10	0.14
70	FLE ALG	Lobophora sp.	9	0.13
71	TURF ALG	mixed assemblage	3	0.04
72	FOL COR	Agaricia agaricites	5	0.07
73	TURF ALG	mixed assemblage	13	0.18
74	MAS COR	Montastrea annularis	16	0.23
75	TURF ALG	mixed assemblage	3	0.04
76	ENC GOR	Erythropodium caribaeorum	3	0.04
77	ENC SPO	encrusting sponge	3	0.04
78	MAS COR	Diploria labyrinthiformis	4	0.06
79	MAS COR	Montastrea annularis	12	0.17
80	FLE ALG	Dictyota sp.	4	0.06
81	MAS COR	Montastrea annularis	2	0.03
82	FOL COR	Agaricia agaricites	4	0.06
83	TURF ALG	mixed assemblage	13	0.18
84	ENC COR	Porites astreoides	8	0.11
85	TURF ALG	mixed assemblage	16	0.23
86	MAS COR	Montastrea annularis	18	0.25
87	RO	reef overhang	20	0.28
88	ENC COR	Porites astreoides	16	0.23
89	TURF ALG	mixed assemblage	8	0.11
90	FLE ALG	Dictyota sp.	5	0.07
91	GORG	gorgonian base	3	0.04
92	TURF ALG	mixed assemblage	10	0.14
93	BRA COR	Eusmilia fastigiata	20	0.28
94	BRA COR	Porites porites	5	0.07
95	BRA COR	Eusmilia fastigiata	5	0.07
96	ENC GOR	Erythropodium caribaeorum	3	0.04
97	FLE ALG	Lobophora sp.	11	0.15

Gorgonians = 17

Note: Turf Alg composed primarily of short filamentous algae, *Lobophora varigata*, *Dictyota* sp. and fine sediment

**APPENDIX 2.5 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
LA BOYA, LA PARGUERA. MAY 23, 2000.**

DEPTH: 18.2 m
RUGOSITY: 4.93 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	12	0.17
1	MAS COR	Montastrea annularis	6	0.08
2	MAS COR	Montastrea annularis	16	0.23
3	RO	reef overhang	10	0.14
4	TURF ALG	mixed assemblage	9	0.13
5	ERE SPO	erect sponge	3	0.04
6	TURF ALG	mixed assemblage	6	0.08
7	FOL COR	Agaricia agaricites	8	0.11
8	TURF ALG	mixed assemblage	3	0.04
9	ENC SPO	encrusting sponge	5	0.07
10	TURF ALG	mixed assemblage	11	0.15
11	RO	reef overhang	9	0.13
12	COR RUB	coral rubble	9	0.13
13	FOL COR	Agaricia agaricites	7	0.10
14	ENC COR	Porites astreoides	6	0.08
15	RO	reef overhang	4	0.06
16	MAS COR	Montastrea cavernosa	12	0.17
17	RO	reef overhang	6	0.08
18	MAS COR	Meandrina meandrites	7	0.10
19	MAS COR	Colpophyllia natans	8	0.11
20	TURF ALG	mixed assemblage	1	0.01
21	MAS COR	Montastrea annularis	18	0.25
22	TURF ALG	mixed assemblage	4	0.06
23	RO	reef overhang	10	0.14
24	MAS COR	Montastrea annularis	4	0.06
25	TURF ALG	mixed assemblage	11	0.15
26	MAS COR	Montastrea annularis	5	0.07
27	RO	reef overhang	5	0.07
28	MAS COR	Montastrea annularis	7	0.10
29	TURF ALG	mixed assemblage	2	0.03
30	MAS COR	Montastrea annularis	19	0.27
31	TURF ALG	mixed assemblage	2	0.03
32	MAS COR	Montastrea annularis	2	0.03
33	TURF ALG	mixed assemblage	2	0.03
34	MAS COR	Montastrea annularis	7	0.10
35	TURF ALG	mixed assemblage	25	0.35
36	MAS COR	Montastrea annularis	57	0.80
37	TURF ALG	mixed assemblage	7	0.10
38	BRA COR	Porites furcata	2	0.03
39	RO	reef overhang	7	0.10
40	MAS COR	Montastrea annularis	20	0.28
41	TURF ALG	mixed assemblage	13	0.18
42	MAS COR	Colpophyllia natans	16	0.23
43	RO	reef overhang	4	0.06
44	TURF ALG	mixed assemblage	6	0.08
45	MAS COR	Montastrea annularis	7	0.10

46	TURF ALG	mixed assemblage	7	0.10
47	MAS COR	Montastrea annularis	5	0.07
48	TURF ALG	mixed assemblage	7	0.10
49	RO	reef overhang	6	0.08
50	ENC COR	Porites astreoides	8	0.11
51	RO	reef overhang	9	0.13
52	MAS COR	Montastrea annularis	8	0.11
53	TURF ALG	mixed assemblage	11	0.15
54	MAS COR	Montastrea annularis	3	0.04
55	RO	reef overhang	5	0.07
56	MAS COR	Diploria labyrinthiformis	2	0.03
57	FLE ALG	Dictyota sp.	14	0.20
58	ENC COR	Porites astreoides	3	0.04
59	TURF ALG	mixed assemblage	5	0.07
60	FOL COR	Agaricia agaricites	6	0.08
61	TURF ALG	mixed assemblage	10	0.14
62	MAS COR	Montastrea annularis	10	0.14
63	TURF ALG	mixed assemblage	5	0.07
64	RO	reef overhang	3	0.04
65	CAL ALG	Halimeda sp.	8	0.11
66	TURF ALG	mixed assemblage	13	0.18
67	CAL ALG	Halimeda sp.	3	0.04
68	TURF ALG	mixed assemblage	15	0.21
69	RO	reef overhang	5	0.07
70	TURF ALG	mixed assemblage	6	0.08
71	COR RUB	coral rubble	5	0.07
72	RO	reef overhang	6	0.08
73	TURF ALG	mixed assemblage	19	0.27
74	ENC SPO	encrusting sponge	2	0.03
75	MAS COR	Montastrea annularis	15	0.21
76	MAS COR	Colpophyllia natans	5	0.07
77	RO	reef overhang	2	0.03
78	MAS COR	Montastrea cavernosa	5	0.07
79	TURF ALG	mixed assemblage	13	0.18
80	RO	reef overhang	17	0.24
81	MAS COR	Montastrea annularis	26	0.37
82	SAND	sand	2	0.03
83	FOL COR	Agaricia agaricites	3	0.04
84	RO	reef overhang	4	0.06
85	MAS COR	Montastrea annularis	12	0.17
86	TURF ALG	mixed assemblage	1	0.01
87	MAS COR	Montastrea annularis	12	0.17
88	TURF ALG	mixed assemblage	39	0.55
89	FOL COR	Aagaricia agaricites	15	0.21
90	RO	reef overhang	7	0.10
91	FLE ALG	Padina sp.	8	0.11
92	MAS COR	Montastrea annularis	17	0.24
93	TURF ALG	mixed assemblage	3	0.04
94	MAS COR	Montastrea annularis	8	0.11
95	ENC SPO	encrusting sponge	4	0.06
96	FLE ALG	Padina sp.	10	0.14
97	BRA COR	Madracis decactis	2	0.03
98	RO	reef overhang	12	0.17
99	TURF ALG	mixed assemblage	9	0.13
100	RO	reef overhang	5	0.07
101	TURF ALG	mixed assemblage	9	0.13

102	MAS COR	Montastrea annularis	3	0.04
103	RO	reef overhang	4	0.06
104	ENC COR	Porites astreoides	10	0.14
105	TURF ALG	mixed assemblage	2	0.03
106	ERE SPO	erect sponge	6	0.08
107	RO	reef overhang	15	0.21
108	TURF ALG	mixed assemblage	18	0.25
109	RO	reef overhang	11	0.15
110	MAS COR	Montastrea annularis	25	0.35
111	FLE ALG	Dictyota sp.	5	0.07
112	MAS COR	Montastrea annularis	24	0.34
113	MAS COR	Montastrea annularis	43	0.61

Gorgonians = 7

Note: Turf Alg composed primarily of short filamentous algae, *Lobophora varigata*, *Dictyota* sp. and fine sediment

**APPENDIX 2.6 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
MARGARITA HARD GROUND REEF, LA PARGUERA. MAY 24, 2000.**

DEPTH: 14.5 m
RUGOSITY: 1.83 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	14	0.20
1	RO	reef overhang	10	0.14
2	TURF ALG	mixed assemblage	15	0.21
3	MAS COR	Montastrea annularis	9	0.13
4	FLE ALG	Dictyota sp.	6	0.08
5	ENC COR	Stephanocoenia michilini	6	0.08
6	TURF ALG	mixed assemblage	22	0.31
7	MAS COR	Diploria strigosa	7	0.10
8	TURF ALG	mixed assemblage	18	0.25
9	ERE SPO	Xestospongia muta	58	0.82
10	TURF ALG	mixed assemblage	23	0.32
11	RO	reef overhang	6	0.08
12	TURF ALG	mixed assemblage	33	0.46
13	ERE SPO	erect sponge	5	0.07
14	FLE ALG	Dictyota sp.	3	0.04
15	RO	reef overhang	5	0.07
16	TURF ALG	mixed assemblage	47	0.66
17	RO	reef overhang	6	0.08
18	FLE ALG	Dictyota sp.	6	0.08
19	FOL COR	Agaricia agaricites	5	0.07
20	RO	reef overhang	6	0.08
21	TURF ALG	mixed assemblage	15	0.21
22	FLE ALG	Dictyota sp.	10	0.14
23	TURF ALG	mixed assemblage	75	1.06
24	ERE SPO	erect sponge	2	0.03
25	RO	reef overhang	8	0.11
26	TURF ALG	mixed assemblage	10	0.14
27	FOL COR	Agaricia agaricites	2	0.03
28	FLE ALG	Dictyota sp.	7	0.10
29	RO	reef overhang	8	0.11
30	TURF ALG	mixed assemblage	65	0.92
31	FLE ALG	Dictyota sp.	22	0.31
32	GORG	gorgonian base	2	0.03
33	TURF ALG	mixed assemblage	48	0.68
34	ENC COR	Porites astreoides	6	0.08
35	ERE SPO	erect sponge	3	0.04
36	TURF ALG	mixed assemblage	2	0.03
37	MAS COR	Montastrea annularis	27	0.38
38	TURF ALG	mixed assemblage	2	0.03
39	MAS COR	Montastrea annularis	2	0.03
40	TURF ALG	mixed assemblage	33	0.46
41	GORG	gorgonian base	4	0.06
42	TURF ALG	mixed assemblage	70	0.99
43	ENC COR	Stephanocoenia michilini	6	0.08
44	TURF ALG	mixed assemblage	23	0.32
45	ENC SPO	encrusting sponge	4	0.06
46	MAS COR	Montastrea annularis	20	0.28
47	TURF ALG	mixed assemblage	4	0.06

48	RO	reef overhang	8	0.11
49	FLE ALG	Dictyota sp.	42	0.59

Gorgonians = 41

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* spp. and fine sediment

**APPENDIX 2.7 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
MARGARITA HARD GROUND REEF, LA PARGUERA. MAY 24, 2000.**

DEPTH: 14.5 m
RUGOSITY: 1.65 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER R (m)
0	TURF ALG	mixed assemblage	32	0.45
1	RO	reef overhang	3	0.04
2	MAS COR	Montastrea cavernosa	4	0.06
3	RO	reef overhang	10	0.14
4	FLE ALG	Dictyota sp.	13	0.18
5	ERE SPO	erect sponge	3	0.04
6	TURF ALG	mixed assemblage	94	1.32
7	ERE SPO	erect sponge	2	0.03
8	TURF ALG	mixed assemblage	21	0.30
9	ERE SPO	erect sponge	2	0.03
10	TURF ALG	mixed assemblage	3	0.04
11	ERE SPO	erect sponge	4	0.06
12	TURF ALG	mixed assemblage	43	0.61
13	RO	reef overhang	3	0.04
14	BRA COR	Madracis decactis	2	0.03
15	FLE ALG	Dictyota sp.	10	0.14
16	MAS COR	Montastrea annularis	10	0.14
17	RO	reef overhang	5	0.07
18	MAS COR	Diploria strigosa	2	0.03
19	TURF ALG	mixed assemblage	101	1.42
20	FLE ALG	Dictyota sp.	10	0.14
21	TURF ALG	mixed assemblage	120	1.69
22	ERE SPO	Xestospongia muta	13	0.18
23	TURF ALG	mixed assemblage	28	0.39
24	MAS COR	Siderastrea siderea	5	0.07
25	TURF ALG	mixed assemblage	104	1.46
26	SAND	sand	8	0.11
27	TURF ALG	mixed assemblage	105	1.48
28	MAS COR	Diploria labyrinthiformis	6	0.08
29	TURF ALG	mixed assemblage	30	0.42
30	RO	reef overhang	16	0.23
31	FOL COR	Agaricia agaricites	5	0.07
32	TURF ALG	mixed assemblage	5	0.07
33	FLE ALG	Dictyota sp.	5	0.07

Gorgonians = 37

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* spp. and fine sediment

**APPENDIX 2.8 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
MARGARITA HARD GROUND REEF, LA PARGUERA. MAY 24, 2000.**

DEPTH: 14.5 m
RUGOSITY: 1.75 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	SAND	sand	14	0.20
1	MAS COR	<i>Siderastrea siderea</i>	3	0.04
2	TURF ALG	mixed assemblage	22	0.31
3	FOL COR	<i>Agaricia agaricites</i>	3	0.04
4	TURF ALG	mixed assemblage	10	0.14
5	FOL COR	<i>Agaricia agaricites</i>	7	0.10
6	TURF ALG	mixed assemblage	40	0.56
7	FLE ALG	<i>Dictyota</i> sp.	10	0.14
8	TURF ALG	mixed assemblage	46	0.65
9	FLE ALG	<i>Dictyota</i> sp.	4	0.06
10	TURF ALG	mixed assemblage	35	0.49
11	RO	reef overhang	4	0.06
12	MAS COR	<i>Dichocoenia stokesii</i>	9	0.13
13	TURF ALG	mixed assemblage	42	0.59
14	MAS COR	<i>Diploria labyrinthiformis</i>	3	0.04
15	TURF ALG	mixed assemblage	89	1.25
16	FOL COR	<i>Agaricia agaricites</i>	5	0.07
17	TURF ALG	mixed assemblage	13	0.18
18	FLE ALG	<i>Dictyota</i> sp.	6	0.08
19	TURF ALG	mixed assemblage	3	0.04
20	ERE SPO	erect sponge	2	0.03
21	TURF ALG	mixed assemblage	9	0.13
22	BRA COR	<i>Madracis decactis</i>	2	0.03
23	ERE SPO	erect sponge	3	0.04
24	TURF ALG	mixed assemblage	6	0.08
25	ENC COR	<i>Porites astreoides</i>	3	0.04
26	TURF ALG	mixed assemblage	26	0.37
27	RO	reef overhang	4	0.06
28	TURF ALG	mixed assemblage	24	0.34
29	ENC SPO	encrusting sponge	7	0.10
30	FLE ALG	<i>Dictyota</i> sp.	11	0.15
31	TURF ALG	mixed assemblage	62	0.87
32	RO	reef overhang	8	0.11
33	TURF ALG	mixed assemblage	26	0.37
34	ERE SPO	erect sponge	4	0.06
35	RO	reef overhang	3	0.04
36	MAS COR	<i>Dichocoenia stokesii</i>	10	0.14
37	TURF ALG	mixed assemblage	6	0.08
38	ERE SPO	erect sponge	3	0.04
39	TURF ALG	mixed assemblage	6	0.08
40	RO	reef overhang	4	0.06
41	MAS COR	<i>Siderastrea radians</i>	4	0.06
42	ERE SPO	erect sponge	2	0.03
43	FOL COR	<i>Agaricia agaricites</i>	8	0.11
44	TURF ALG	mixed assemblage	7	0.10
45	RO	reef overhang	10	0.14
46	SILT	silt	4	0.06

47	RO	reef overhang	14	0.20
48	FOL COR	Agaricia agaricites	4	0.06
49	ERE SPO	erect sponge	2	0.03
50	TURF ALG	mixed assemblage	5	0.07
51	ERE SPO	erect sponge	3	0.04
52	MAS COR	Montastrea annularis	13	0.18
53	RO	reef overhang	8	0.11
54	TURF ALG	mixed assemblage	98	1.38
55	MAS COR	Montastrea annularis	17	0.24
56	TURF ALG	mixed assemblage	3	0.04
57	MAS COR	Montastrea annularis	4	0.06
58	TURF ALG	mixed assemblage	8	0.11
59	MAS COR	Montastrea annularis	4	0.06
60	TURF ALG	mixed assemblage	15	0.21
61	MAS COR	Dichocoenia stokesii	4	0.06

Gorgonians = 44

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* spp. and fine sediment

**APPENDIX 2.9 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
MARGARITA HARD GROUND REEF, LA PARGUERA. MAY 24, 2000.**

DEPTH: 14.5 m
RUGOSITY: 1.17 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	90	1.27
1	MAS COR	Montastrea annularis	20	0.28
2	TURF ALG	mixed assemblage	33	0.46
3	MAS COR	Montastrea annularis	29	0.41
4	TURF ALG	mixed assemblage	32	0.45
5	MAS COR	Montastrea annularis	5	0.07
6	TURF ALG	mixed assemblage	160	2.25
7	ENC SPO	encrusting sponge	5	0.07
8	TURF ALG	mixed assemblage	32	0.45
9	FLE ALG	Dictyota sp.	5	0.07
10	TURF ALG	mixed assemblage	15	0.21
11	RO	reef overhang	7	0.10
12	TURF ALG	mixed assemblage	7	0.10
13	MAS COR	Diploria strigosa	6	0.08
14	TURF ALG	mixed assemblage	66	0.93
15	MAS COR	Montastrea annularis	40	0.56
16	TURF ALG	mixed assemblage	160	2.25
17	MAS COR	Isophyllastrea rigida	11	0.15
18	TURF ALG	mixed assemblage	16	0.23
19	ENC SPO	encrusting sponge	3	0.04
20	TURF ALG	mixed assemblage	51	0.72

Gorgonians = 37

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* spp. and fine sediment

**APPENDIX 2.10 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
MARGARITA HARD GROUND REEF, LA PARGUERA. MAY 24, 2000.**

DEPTH: 14.5 m
RUGOSITY: 0.99 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	30	0.42
1	FLE ALG	Dictyota sp.	10	0.14
2	TURF ALG	mixed assemblage	53	0.75
3	ERE SPO	Xestospongia muta	50	0.70
4	TURF ALG	mixed assemblage	18	0.25
5	MAS COR	Siderastrea sp.	4	0.06
6	TURF ALG	mixed assemblage	28	0.39
7	ENC SPO	encrusting sponge	2	0.03
8	TURF ALG	mixed assemblage	61	0.86
9	ERE SPO	Xestospongia muta	40	0.56
10	TURF ALG	mixed assemblage	74	1.04
11	FLE ALG	Dictyota sp.	20	0.28
12	TURF ALG	mixed assemblage	27	0.38
13	FOL COR	Agaricia agaricites	10	0.14
14	TURF ALG	mixed assemblage	30	0.42
15	FLE ALG	Dictyota sp.	5	0.07
16	MAS COR	Dichocoenia stokesii	5	0.07
17	MAS COR	Montastrea annularis	6	0.08
18	FLE ALG	Dictyota sp.	10	0.14
19	MAS COR	Montastrea annularis	3	0.04
20	TURF ALG	mixed assemblage	47	0.66
21	MAS COR	Diploria strigosa	6	0.08
22	TURF ALG	mixed assemblage	177	2.49
23	ENC SPO	encrusting sponge	2	0.03
24	TURF ALG	mixed assemblage	17	0.24
25	ERE SPO	erect sponge	23	0.32
26	TURF ALG	mixed assemblage	16	0.23
27	ENC COR	Porites astreoides	6	0.08

Gorgonians = 35

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* spp. and fine sediment

**APPENDIX 2.11 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
CANJILONES REEF, LA PARGUERA. JUN 30, 2000.**

DEPTH: 15.0 m
RUGOSITY: 2.30 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	FLE ALG	Dictyota sp.	7	0.10
1	MAS COR	Diploria labyrinthiformis	12	0.17
2	FLE ALG	Dictyota sp.	2	0.03
3	ENC COR	Porites astreoides	7	0.10
4	TURF ALG	mixed assemblage	2	0.03
5	ENC SPO	encrusting sponge	5	0.07
6	TURF ALG	mixed assemblage	8	0.11
7	ENC SPO	encrusting sponge	11	0.15
8	TURF ALG	mixed assemblage	6	0.08
9	MAS COR	Montastrea annularis	5	0.07
10	TURF ALG	mixed assemblage	3	0.04
11	BRA COR	Madracis decactis	3	0.04
12	TURF ALG	mixed assemblage	17	0.24
13	RO	reef overhang	8	0.11
14	MAS COR	Diploria strigosa	24	0.34
15	RO	reef overhang	19	0.27
16	TURF ALG	mixed assemblage	5	0.07
17	ENC SPO	encrusting sponge	6	0.08
18	TURF ALG	mixed assemblage	9	0.13
19	FOL COR	Agaricia agaricites	9	0.13
20	TURF ALG	mixed assemblage	10	0.14
21	FOL COR	Agaricia agaricites	9	0.13
22	TURF ALG	mixed assemblage	4	0.06
23	FOL COR	Agaricia agaricites	19	0.27
24	MAS COR	Montastrea annularis	5	0.07
25	RO	reef overhang	7	0.10
26	TURF ALG	mixed assemblage	99	1.39
27	MAS COR	Montastrea annularis	11	0.15
28	RO	reef overhang	8	0.11
29	TURF ALG	mixed assemblage	6	0.08
30	MAS COR	Siderastrea siderea	25	0.35
31	RO	reef overhang	4	0.06
32	TURF ALG	mixed assemblage	74	1.04
33	MAS COR	Siderastrea siderea	5	0.07
34	TURF ALG	mixed assemblage	8	0.11
35	MAS COR	Diploria strigosa	10	0.14
36	TURF ALG	mixed assemblage	47	0.66
37	FOL COR	Agaricia agaricites	12	0.17
38	TURF ALG	mixed assemblage	3	0.04
39	BRA COR	Madracis decactis	2	0.03
40	TURF ALG	mixed assemblage	10	0.14
41	MAS COR	Siderastrea siderea	4	0.06
42	TURF ALG	mixed assemblage	67	0.94
43	RO	reef overhang	5	0.07
44	ZOAN	Palythoa caribaeorum	5	0.07
45	TURF ALG	mixed assemblage	48	0.68
46	GGORG	gorgonian base	2	0.03

47	TURF ALG	mixed assemblage	10	0.14
48	MAS COR	Diploria strigosa	3	0.04
49	TURF ALG	mixed assemblage	1	0.01
50	MAS COR	Siderastrea siderea	3	0.04
51	TURF ALG	mixed assemblage	24	0.34
52	FOL COR	Agaricia agaricites	5	0.07
53	RO	reef overhang	6	0.08
54	TURF ALG	mixed assemblage	3	0.04
55	FOL COR	Agaricia agaricites	4	0.06
56	TURF ALG	mixed assemblage	8	0.11
57	MAS COR	Montastrea annularis	6	0.08
58	TURF ALG	mixed assemblage	28	0.39
59	RO	reef overhang	10	0.14
60	TURF ALG	mixed assemblage	48	0.68
61	RO	reef overhang	8	0.11
62	MAS COR	Diploria strigosa	29	0.41

Gorgonians = 36

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp. and fine sediment

**APPENDIX 2.12 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
CANJILONES REEF, LA PARGUERA. JUN 30, 2000.**

DEPTH: 15.0 m
RUGOSITY: 2.34 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Isophyllastrea rigida	4	0.06
1	TURF ALG	mixed assemblage	8	0.11
2	FOL COR	Agaricia agaricites	4	0.06
3	TURF ALG	mixed assemblage	2	0.03
4	FOL COR	Agaricia agaricites	13	0.18
5	TURF ALG	mixed assemblage	47	0.66
6	FOL COR	Agaricia agaricites	8	0.11
7	FLE ALG	Dictyota sp.	3	0.04
8	RO	reef overhang	7	0.10
9	TURF ALG	mixed assemblage	24	0.34
10	FOL COR	Agaricia agaricites	4	0.06
11	TURF ALG	mixed assemblage	16	0.23
12	ERE SPO	erect sponge	3	0.04
13	TURF ALG	mixed assemblage	28	0.39
14	FOL COR	Agaricia agaricites	3	0.04
15	TURF ALG	mixed assemblage	16	0.23
16	GORG	Erythropodium caribaeorum	8	0.11
17	RO	reef overhang	5	0.07
18	FLE ALG	Dictyota sp.	5	0.07
19	TURF ALG	mixed assemblage	17	0.24
20	FOL COR	Agaricia agaricites	11	0.15
21	FLE ALG	Dictyota sp.	5	0.07
22	GORG	Erythropodium caribaeorum	9	0.13
23	TURF ALG	mixed assemblage	22	0.31
24	MAS COR	Montastrea annularis	21	0.30
25	ENC COR	Porites astreoides	6	0.08
26	TURF ALG	mixed assemblage	20	0.28
27	CAL ALG	Halimeda goreau	5	0.07
28	TURF ALG	mixed assemblage	10	0.14
29	MAS COR	Siderastrea siderea	6	0.08
30	BRA COR	Madracis decactis	6	0.08
31	RO	reef overhang	5	0.07
32	TURF ALG	mixed assemblage	6	0.08
33	MAS COR	Montastrea annularis	4	0.06
34	TURF ALG	mixed assemblage	42	0.59
35	MAS COR	Montastrea cavernosa	12	0.17
36	TURF ALG	mixed assemblage	8	0.11
37	RO	reef overhang	10	0.14
38	TURF ALG	mixed assemblage	39	0.55
39	GORG	Erythropodium caribaeorum	4	0.06
40	TURF ALG	mixed assemblage	14	0.20
41	RO	reef overhang	6	0.08
42	MILLE	Millepora alcicornis	4	0.06
43	ZOAN	unident.anemone	3	0.04
44	TURF ALG	mixed assemblage	4	0.06
45	ZOAN	unident.anemone	2	0.03

46	RO	reef overhang	5	0.07
47	TURF ALG	mixed assemblage	36	0.51
48	ENC SPO	encrusting sponge	5	0.07
49	FOL COR	Agaricia agaricites	2	0.03
50	TURF ALG	mixed assemblage	18	0.25
51	CAL ALG	Halimeda goreai	6	0.08
52	TURF ALG	mixed assemblage	43	0.61
53	FOL COR	Leptoseris cucullata	3	0.04
54	ZOAN	Palythoa caribaeorum	4	0.06
55	TURF ALG	mixed assemblage	45	0.63
56	RO	reef overhang	5	0.07
57	TURF ALG	mixed assemblage	12	0.17
58	MAS COR	Montastrea annularis	3	0.04
59	RO	reef overhang	9	0.13
60	MAS COR	Montastrea annularis	3	0.04
61	TURF ALG	mixed assemblage	16	0.23
62	RO	reef overhang	13	0.18
63	FLE ALG	Dictyota sp.	6	0.08
64	TURF ALG	mixed assemblage	19	0.27
65	FOL COR	Agaricia agaricites	2	0.03
66	TURF ALG	mixed assemblage	21	0.30
67	GORG	gorgonian base	2	0.03
68	TURF ALG	mixed assemblage	50	0.70
69	RO	reef overhang	5	0.07
70	TURF ALG	mixed assemblage	34	0.48

Gorgonians = 24

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp. and fine sediment

**APPENDIX 2.13 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
CANJILONES REEF, LA PARGUERA. JUL 5, 2000.**

DEPTH: 15.0 m
RUGOSITY: 2.24 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	CAL ALG	Halimeda goreau	8	0.11
1	TURF ALG	mixed assemblage	7	0.10
2	ZOAN	Palythoa caribaeorum	3	0.04
3	TURF ALG	mixed assemblage	28	0.39
4	MAS COR	Diploria strigosa	6	0.08
5	TURF ALG	mixed assemblage	57	0.80
6	FOL COR	Agaricia agaricites	5	0.07
7	TURF ALG	mixed assemblage	12	0.17
8	RO	reef overhang	4	0.06
9	BRA COR	Madracis decactis	3	0.04
10	TURF ALG	mixed assemblage	9	0.13
11	CAL ALG	Halimeda goreau	4	0.06
12	TURF ALG	mixed assemblage	37	0.52
13	MAS COR	Montastrea annularis	13	0.18
14	TURF ALG	mixed assemblage	12	0.17
15	GORG	gorgonian base	2	0.03
16	MAS COR	Meandrina meandrites	5	0.07
17	TURF ALG	mixed assemblage	13	0.18
18	ERE SPO	erect sponge	2	0.03
19	TURF ALG	mixed assemblage	42	0.59
20	MAS COR	Mycetophyllia lamarckiana	4	0.06
21	TURF ALG	mixed assemblage	10	0.14
22	RO	reef overhang	4	0.06
23	TURF ALG	mixed assemblage	18	0.25
24	RO	reef overhang	8	0.11
25	TURF ALG	mixed assemblage	47	0.66
26	FLA ALG	Dictyota sp.	3	0.04
27	ERE SPO	erect sponge	9	0.13
28	TURF ALG	mixed assemblage	26	0.37
29	MAS COR	Montastrea annularis	15	0.21
30	ERE SPO	erect sponge	2	0.03
31	TURF ALG	mixed assemblage	3	0.04
32	BRA COR	Madracis pharensis	7	0.10
33	TURF ALG	mixed assemblage	12	0.17
34	FOL COR	Agaricia agaricites	3	0.04
35	TURF ALG	mixed assemblage	15	0.21
36	ZOAN	Palythoa caribaeorum	3	0.04
37	TURF ALG	mixed assemblage	11	0.15
38	FOL COR	Agaricia agaricites	3	0.04
39	TURF ALG	mixed assemblage	4	0.06
40	GORG	Erythropodium caribaeorum	4	0.06
41	TURF ALG	mixed assemblage	20	0.28
42	RO	reef overhang	5	0.07
43	ENC COR	Porites astreoides	8	0.11
44	RO	reef overhang	4	0.06
45	TURF ALG	mixed assemblage	102	1.44

46	RO	reef overhang	2	0.03
47	TURF ALG	mixed assemblage	20	0.28
48	ENC SPO	encrusting sponge	2	0.03
49	TURF ALG	mixed assemblage	12	0.17
50	MAS COR	Montastrea annularis	1	0.01
51	RO	reef overhang	9	0.13
52	MAS COR	Siderastrea siderea	3	0.04
53	ENC COR	Porites astreoides	2	0.03
54	TURF ALG	mixed assemblage	8	0.11
55	FOL COR	Agaricia agaricites	3	0.04
56	TURF ALG	mixed assemblage	69	0.97
57	ERE SPO	erect sponge	7	0.10
58	TURF ALG	mixed assemblage	92	1.30
59	GORG	Erythropodium caribaeorum	3	0.04
60	FLA ALG	Dictyota sp.	8	0.11
61	TURF ALG	mixed assemblage	6	0.08

Gorgonians = 30

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp. and fine sediment

**APPENDIX 2.14 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
CANJILONES REEF, LA PARGUERA. JUL 5, 2000.**

DEPTH: 15.0 m
RUGOSITY: 3.72 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	FLE ALG	Dictyota sp.	4	0.06
1	MAS COR	Montastrea annularis	4	0.06
2	ERE SPO	Xestospongia muta	5	0.07
3	RO	reef overhang	3	0.04
4	MAS COR	Montastrea annularis	27	0.38
5	TURF ALG	mixed assemblage	52	0.73
6	RO	reef overhang	8	0.11
7	TURF ALG	mixed assemblage	56	0.79
8	RO	reef overhang	5	0.07
9	TURF ALG	mixed assemblage	10	0.14
10	ZOAN	Palythoa caribaeorum	8	0.11
11	GORG	gorgonian base	4	0.06
12	TURF ALG	mixed assemblage	16	0.23
13	MAS COR	Montastrea annularis	8	0.11
14	ERE SPO	erect sponge	7	0.10
15	GORG	gorgonian base	2	0.03
16	RO	reef overhang	8	0.11
17	TURF ALG	mixed assemblage	62	0.87
18	CAL ALG	Halimeda goreau	3	0.04
19	FOL COR	Agaricia agaricites	11	0.15
20	RO	reef overhang	4	0.06
21	TURF ALG	mixed assemblage	5	0.07
22	ENC COR	Porites astreoides	5	0.07
23	ENC COR	Porites astreoides	3	0.04
24	FLE ALG	Dictyota sp.	10	0.14
25	MAS COR	Isophyllastrea rigida	7	0.10
26	TURF ALG	mixed assemblage	21	0.30
27	MAS COR	Diploria strigosa	11	0.15
28	TURF ALG	mixed assemblage	16	0.23
29	RO	reef overhang	6	0.08
30	FOL COR	Agaricia sp.	12	0.17
31	TURF ALG	mixed assemblage	16	0.23
32	MILLE	Millepora alcicornis	1	0.01
33	TURF ALG	mixed assemblage	17	0.24
34	ERE SPO	erect sponge	2	0.03
35	TURF ALG	mixed assemblage	15	0.21
36	MAS COR	Montastrea annularis	17	0.24
37	FLE ALG	Dictyota sp.	2	0.03
38	ERE SPO	erect sponge	4	0.06
39	RO	reef overhang	5	0.07
40	TURF ALG	mixed assemblage	42	0.59
41	ENC SPO	encrusting sponge	7	0.10
42	TURF ALG	mixed assemblage	68	0.96
43	FOL COR	Agaricia agaricites	5	0.07
44	RO	reef overhang	14	0.20
45	TURF ALG	mixed assemblage	11	0.15

46	MAS COR	Montastrea annularis	8	0.11
47	TURF ALG	mixed assemblage	10	0.14
48	FOL COR	Agaricia sp.	10	0.14
49	TURF ALG	mixed assemblage	14	0.20
50	CAL ALG	Halimeda goreau	4	0.06
51	RO	reef overhang	11	0.15
52	TURF ALG	mixed assemblage	6	0.08
53	FOL COR	Agaricia agaricites	1	0.01
54	MAS COR	Montastrea annularis	2	0.03
55	ZOAN	Palythoa caribaeorum	4	0.06
56	FLE ALG	Dictyota sp.	13	0.18
57	RO	reef overhang	5	0.07
58	TURF ALG	mixed assemblage	8	0.11
59	MAS COR	Montastrea annularis	6	0.08
60	TURF ALG	mixed assemblage	6	0.08
61	RO	reef overhang	6	0.08
62	ERE SPO	erect sponge	3	0.04
63	TURF ALG	mixed assemblage	3	0.04
64	FOL COR	Agaricia agaricites	5	0.07
65	ENC SPO	encrusting sponge	2	0.03
66	ZOAN	unident. Anemone	2	0.03
67	RO	reef overhang	11	0.15
68	MAS COR	Montastrea annularis	5	0.07
69	TURF ALG	mixed assemblage	4	0.06
70	MAS COR	Montastrea annularis	9	0.13
71	RO	reef overhang	14	0.20
72	MAS COR	Meandrina meandrites	2	0.03
73	MAS COR	Siderastrea siderea	33	0.46
74	ENC SPO	encrusting sponge	4	0.06
75	TURF ALG	mixed assemblage	61	0.86
76	RO	reef overhang	14	0.20
77	MAS COR	Montastrea annularis	16	0.23
78	FLE ALG	Dictyota sp.	2	0.03
79	MAS COR	Montastrea annularis	4	0.06
80	MAS COR	Montastrea annularis	17	0.24
81	TURF ALG	mixed assemblage	3	0.04
82	FOL COR	Agaricia agaricites	2	0.03
83	ENC SPO	encrusting sponge	5	0.07
84	TURF ALG	mixed assemblage	4	0.06
85	FOL COR	Agaricia agaricites	3	0.04
86	TURF ALG	mixed assemblage	3	0.04
				13.72

Gorgonians = 36

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp. and fine sediment

**APPENDIX 2.15 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
CANJILONES REEF, LA PARGUERA. JUL 5, 2000.**

DEPTH: 15.0 m

RUGOSITY: 2.75 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	ZOAN	<i>Palythoa caribaeorum</i>	5	0.07
1	MAS COR	<i>Montastrea annularis</i>	12	0.17
2	TURF ALG	mixed assemblage	3	0.04
3	ENC COR	<i>Porites astreoides</i>	4	0.06
4	TURF ALG	mixed assemblage	22	0.31
5	FOL COR	<i>Agaricia agaricites</i>	8	0.11
6	TURF ALG	mixed assemblage	29	0.41
7	FOL COR	<i>Agaricia agaricites</i>	7	0.10
8	TURF ALG	mixed assemblage	23	0.32
9	FOL COR	<i>Agaricia agaricites</i>	6	0.08
10	FOL COR	<i>Agaricia</i> sp.	9	0.13
11	TURF ALG	mixed assemblage	10	0.14
12	RO	reef overhang	10	0.14
13	BRA COR	<i>Madracis decactis</i>	4	0.06
14	TURF ALG	mixed assemblage	14	0.20
15	RO	reef overhang	7	0.10
16	TURF ALG	mixed assemblage	65	0.92
17	BRA COR	<i>Madracis decactis</i>	4	0.06
18	RO	reef overhang	3	0.04
19	ENC SPO	encrusting sponge	6	0.08
20	TURF ALG	mixed assemblage	58	0.82
21	RO	reef overhang	9	0.13
22	MAS COR	<i>Montastrea annularis</i>	22	0.31
23	RO	reef overhang	11	0.15
24	PIL COR	<i>Dendrogyra cylindrus</i>	34	0.48
25	RO	reef overhang	17	0.24
26	TURF ALG	mixed assemblage	56	0.79
27	MAS COR	<i>Siderastrea siderea</i>	7	0.10
28	TURF ALG	mixed assemblage	5	0.07
29	MAS COR	<i>Siderastrea siderea</i>	15	0.21
30	RO	reef overhang	4	0.06
31	MAS COR	<i>Siderastrea siderea</i>	2	0.03
32	TURF ALG	mixed assemblage	4	0.06
33	ZOAN	<i>Palythoa caribaeorum</i>	3	0.04
34	TURF ALG	mixed assemblage	142	2.00
35	MAS COR	<i>Montastrea annularis</i>	10	0.14
36	RO	reef overhang	4	0.06
37	TURF ALG	mixed assemblage	50	0.70
38	BRA COR	<i>Madracis decactis</i>	2	0.03
39	TURF ALG	mixed assemblage	65	0.92
40	RO	reef overhang	7	0.10
41	MAS COR	<i>Montastrea annularis</i>	6	0.08
42	TURF ALG	mixed assemblage	3	0.04
43	MAS COR	<i>Montastrea annularis</i>	2	0.03
44	RO	reef overhang	2	0.03
45	FOL COR	<i>Agaricia</i> sp.	2	0.03
46	TURF ALG	mixed assemblage	49	0.69
47	CAL ALG	<i>Halimeda goreau</i>	5	0.07
48	TURF ALG	mixed assemblage	58	0.82

Gorgonians = 19

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp.
and fine sediment

**APPENDIX 3.1 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
NORTH REEF, DESECHEO ISLAND. JUNE 20, 2000.**

DEPTH: 10.6 m
RUGOSITY: 3.59 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	9	0.13
1	ENC COR	Porites astreoides	3	0.04
2	MAS COR	Montastrea cavernosa	61	0.86
3	FLE ALG	Dictyota sp.	10	0.14
4	MAS COR	Montastrea annularis	23	0.32
5	TURF ALG	mixed assemblage	13	0.18
6	OH	reef overhang	3	0.04
7	MAS COR	Diploria strigosa	49	0.69
8	FLE ALG	Dictyota sp.	8	0.11
9	MAS COR	Diploria strigosa	12	0.17
10	TURF ALG	mixed assemblage	11	0.15
11	ENC COR	Porites astreoides	3	0.04
12	MAS COR	Montastrea annularis	9	0.13
13	FLE ALG	Dictyota sp.	28	0.39
14	MAS COR	Diploria labyrinthiformis	10	0.14
15	FLE ALG	Dictyota sp.	8	0.11
16	MAS COR	Montastrea annularis	3	0.04
17	OH	reef overhang	5	0.07
18	MAS COR	Montastrea annularis	24	0.34
19	FLE ALG	Dictyota sp.	50	0.70
20	MILLE	Millepora alcicornis	3	0.04
21	FLE ALG	Dictyota sp.	16	0.23
22	ENC COR	Porites astreoides	6	0.08
23	FLE ALG	Dictyota sp.	80	1.13
24	MILLE	Millepora alcicornis	5	0.07
25	TURF ALG	mixed assemblage	9	0.13
26	MAS COR	Diploria strigosa	12	0.17
27	OH	reef overhang	9	0.13
28	FLE ALG	Dictyota sp.	14	0.20
29	MAS COR	Diploria strigosa	28	0.39
30	FLE ALG	Dictyota sp.	24	0.34
31	MAS COR	Diploria labyrinthiformis	9	0.13
32	OH	reef overhang	8	0.11
33	TURF ALG	mixed assemblage	5	0.07
34	MAS COR	Montastrea annularis	26	0.37
35	TURF ALG	mixed assemblage	10	0.14
36	OH	reef overhang	9	0.13
37	TURF ALG	mixed assemblage	21	0.30
38	MAS COR	Diploria labyrinthiformis	7	0.10
39	FLE ALG	Dictyota sp.	22	0.31
40	OH	reef overhang	10	0.14
41	FLE ALG	Dictyota sp.	38	0.54
42	MAS COR	Diploria labyrinthiformis	5	0.07
43	FLE ALG	Dictyota sp.	17	0.24
44	MILLE	Millepora alcicornis	20	0.28
45	FLE ALG	Dictyota sp.	23	0.32
46	MAS COR	Montastrea cavernosa	18	0.25

47	TURF ALG	mixed assemblage	14	0.20
48	OH	reef overhang	5	0.07
49	FLE ALG	Dictyota sp.	8	0.11
50	ENC COR	Porites astreoides	4	0.06
51	TURF ALG	mixed assemblage	2	0.03
52	MILLE	Millepora alcicornis	3	0.04
53	TURF ALG	mixed assemblage	9	0.13
54	MILLE	Millepora alcicornis	3	0.04
55	FLE ALG	Dictyota sp.	9	0.13
56	OH	reef overhang	5	0.07
57	TURF ALG	mixed assemblage	12	0.17
58	MAS COR	Diploria strigosa	5	0.07
59	TURF ALG	mixed assemblage	7	0.10
60	MILLE	Millepora alcicornis	5	0.07
61	MAS COR	Diploria strigosa	16	0.23
62	FLE ALG	Dictyota sp.	18	0.25
63	MILLE	Millepora alcicornis	4	0.06
64	TURF ALG	mixed assemblage	25	0.35
65	OH	reef overhang	10	0.14
66	TURF ALG	mixed assemblage	5	0.07

Gorgonians = 3

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp. and fine sediment

**APPENDIX 3.2 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
NORTH REEF, DESECHEO ISLAND. JUNE 20, 2000.**

DEPTH: 10.6 m
RUGOSITY: 2.94 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	CO RUB	coral rubble	10	0.14
1	OH	reef overhang	6	0.08
2	MAS COR	Montastrea annularis	7	0.10
3	TURF ALG	mixed assemblage	18	0.25
4	MAS COR	Montastrea cavernosa	42	0.59
5	TURF ALG	mixed assemblage	62	0.87
6	MAS COR	Diploria strigosa	10	0.14
7	FLE ALG	Dictyota sp.	33	0.46
8	ZOAN	Palythoa caribaeorum	9	0.13
9	TURF ALG	mixed assemblage	15	0.21
10	FOL COR	Agaricia agaricites	4	0.06
11	TURF ALG	mixed assemblage	10	0.14
12	MAS COR	Montastrea annularis	3	0.04
13	TURF ALG	mixed assemblage	8	0.11
14	OH	reef overhang	5	0.07
15	MAS COR	Diploria strigosa	25	0.35
16	TURF ALG	mixed assemblage	16	0.23
17	FOL COR	Agaricia agaricites	4	0.06
18	TURF ALG	mixed assemblage	152	2.14
19	ENC COR	Porites astreoides	4	0.06
20	OH	reef overhang	9	0.13
21	FLE ALG	Dictyota sp.	10	0.14
22	OH	reef overhang	11	0.15
23	ERE SPO	erect sponge	4	0.06
24	TURF ALG	mixed assemblage	20	0.28
25	OH	reef overhang	7	0.10
26	MAS COR	Montastrea annularis	10	0.14
27	TURF ALG	mixed assemblage	16	0.23
28	MAS COR	Diploria labyrinthiformis	4	0.06
29	TURF ALG	mixed assemblage	69	0.97
30	OH	reef overhang	6	0.08
31	TURF ALG	mixed assemblage	11	0.15
32	MAS COR	Montastrea annularis	8	0.11
33	TURF ALG	mixed assemblage	6	0.08
34	MILLE	Millepora alcicornis	5	0.07
35	FLE ALG	Dictyota sp.	81	1.14
36	MAS COR	Diploria strigosa	6	0.08
37	TURF ALG	mixed assemblage	18	0.25
38	ERE SPO	erect sponge	3	0.04
39	FOL COR	Agaricia agaricites	8	0.11
40	FLE ALG	Dictyota sp.	18	0.25
41	MAS COR	Montastrea cavernosa	3	0.04
42	TURF ALG	mixed assemblage	21	0.30
43	MAS COR	Montastrea cavernosa	10	0.14
44	TURF ALG	mixed assemblage	7	0.10
45	ENC COR	Porites astreoides	6	0.08

46	OH	reef overhang	8	0.11
47	MAS COR	Montastrea cavernosa	14	0.20
48	TURF ALG	mixed assemblage	50	0.70
49	MAS COR	Diploria strigosa	4	0.06
50	OH	reef overhang	5	0.07
51	TURF ALG	mixed assemblage	10	0.14
52	MAS COR	Diploria strigosa	4	0.06
53	TURF ALG	mixed assemblage	4	0.06

Gorgonians = 8

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp. and fine sediment

**APPENDIX 3.3 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
NORTH REEF, DESECHEO ISLAND. JUNE 20, 2000.**

DEPTH: 10.6 m
RUGOSITY: 3.14 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	5	0.07
1	MAS COR	Diploria strigosa	14	0.20
2	TURF ALG	mixed assemblage	20	0.28
3	ERE SPO	erect sponge	15	0.21
4	TURF ALG	mixed assemblage	32	0.45
5	MILLE	Millepora complanata	10	0.14
6	TURF ALG	mixed assemblage	54	0.76
7	BRA COR	Porites porites	40	0.56
8	TURF ALG	mixed assemblage	242	3.41
9	ERE SPO	erect sponge	6	0.08
10	TURF ALG	mixed assemblage	17	0.24
11	ENC COR	Porites astreoides	8	0.11
12	TURF ALG	mixed assemblage	32	0.45
13	ERE SPO	erect sponge	6	0.08
14	ENC SPO	encrusting sponge	19	0.27
15	MILLE	Millepora alcicornis	12	0.17
16	TURF ALG	mixed assemblage	10	0.14
17	FOL COR	Agaricia agaricites	3	0.04
18	FLE ALG	Dictyota sp.	3	0.04
19	MAS COR	Meandrina meandrites	14	0.20
20	TURF ALG	mixed assemblage	9	0.13
21	MAS COR	Montastrea annularis	18	0.25
22	TURF ALG	mixed assemblage	4	0.06
23	FLE ALG	Dictyota sp.	4	0.06
24	MAS COR	Montastrea annularis	5	0.07
25	TURF ALG	mixed assemblage	8	0.11
26	ERE SPO	erect sponge	10	0.14
27	ERE SPO	erect sponge	13	0.18
28	TURF ALG	mixed assemblage	20	0.28
29	MAS COR	Diploria strigosa	10	0.14
30	TURF ALG	mixed assemblage	19	0.27
31	ERE SPO	erect sponge	10	0.14
32	ENC COR	Porites astreoides	6	0.08
33	TURF ALG	mixed assemblage	4	0.06
34	ERE SPO	erect sponge	6	0.08
35	TURF ALG	mixed assemblage	5	0.07
36	FOL COR	Agaricia agaricites	7	0.10
37	TURF ALG	mixed assemblage	26	0.37
38	ENC COR	Porites astreoides	5	0.07
39	TURF ALG	mixed assemblage	17	0.24
40	ENC SPO	encrusting sponge	18	0.25
41	PIL COR	Dendrogyra cylindrus	82	1.15
42	TURF ALG	mixed assemblage	14	0.20
43	MAS COR	Diploria strigosa	5	0.07
44	TURF ALG	mixed assemblage	46	0.65

Gorgonians = 8

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp.
and fine sediment

**APPENDIX 3.4 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
NORTH REEF, DESECHEO ISLAND. JUNE 20, 2000.**

DEPTH: 10.6 m
RUGOSITY: 1.99 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Diploria strigosa	17	0.24
1	MILLE	Millepora complanata	10	0.14
2	FLE ALG	Dictyota sp.	18	0.25
3	TURF ALG	mixed assemblage	30	0.42
4	MAS COR	Diploria strigosa	10	0.14
5	TURF ALG	mixed assemblage	4	0.06
6	ERE SPO	erect sponge	26	0.37
7	TURF ALG	mixed assemblage	15	0.21
8	ENC COR	Porites astreoides	3	0.04
9	TURF ALG	mixed assemblage	27	0.38
10	MAS COR	Montastrea cavernosa	16	0.23
11	TURF ALG	mixed assemblage	70	0.99
12	MAS COR	Diploria strigosa	3	0.04
13	ERE SPO	erect sponge	16	0.23
14	TURF ALG	mixed assemblage	54	0.76
15	MILLE	Millepora complanata	10	0.14
16	ERE SPO	erect sponge	7	0.10
17	TURF ALG	mixed assemblage	36	0.51
18	FLE ALG	Dictyota sp.	12	0.17
19	TURF ALG	mixed assemblage	30	0.42
20	ERE SPO	erect sponge	6	0.08
21	TURF ALG	mixed assemblage	20	0.28
22	ENC COR	Porites astreoides	9	0.13
23	TURF ALG	mixed assemblage	35	0.49
24	FLE ALG	Dictyota sp.	10	0.14
25	TURF ALG	mixed assemblage	64	0.90
26	FLE ALG	Dictyota sp.	13	0.18
27	ERE SPO	erect sponge	9	0.13
28	TURF ALG	mixed assemblage	3	0.04
29	MAS COR	Montastrea cavernosa	42	0.59
30	SAND	sand	20	0.28
31	TURF ALG	mixed assemblage	46	0.65
32	ERE SPO	erect sponge	4	0.06
33	TURF ALG	mixed assemblage	11	0.15
34	ERE SPO	erect sponge	4	0.06
35	TURF ALG	mixed assemblage	18	0.25
36	SAND	sand	15	0.21
37	FLE ALG	Dictyota sp.	3	0.04
38	ERE SPO	erect sponge	5	0.07
39	FLE ALG	Dictyota sp.	15	0.21
40	MILLE	Millepora alcicornis	4	0.06
41	MAS COR	Montastrea cavernosa	11	0.15
42	MILLE	Millepora complanata	6	0.08
43	TURF ALG	mixed assemblage	43	0.61
44	RO	reef overhang	10	0.14
45	TURF ALG	mixed assemblage	11	0.15

Gorgonians = 8

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp.
and fine sediment

**APPENDIX 3.5 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
NORTH REEF, DESECHEO ISLAND. JUNE 20, 2000.**

DEPTH: 10.6 m
RUGOSITY: 3.39 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	23	0.32
1	TURF ALG	mixed assemblage	17	0.24
2	MAS COR	Montastrea annularis	43	0.61
3	TURF ALG	mixed assemblage	37	0.52
4	ENC SPO	encrusting sponge	4	0.06
5	MAS COR	Meandrina meandrites	6	0.08
6	TURF ALG	mixed assemblage	7	0.10
7	MAS COR	Diploria strigosa	14	0.20
8	TURF ALG	mixed assemblage	20	0.28
9	ENC COR	Porites astreoides	8	0.11
10	TURF ALG	mixed assemblage	5	0.07
11	ENC COR	Porites astreoides	5	0.07
12	TURF ALG	mixed assemblage	25	0.35
13	ROCK	bare rock	10	0.14
14	MILLE	Millepora complanata	8	0.11
15	TURF ALG	mixed assemblage	30	0.42
16	MILLE	Millepora complanata	20	0.28
17	TURF ALG	mixed assemblage	4	0.06
18	MILLE	Millepora complanata	5	0.07
19	TURF ALG	mixed assemblage	6	0.08
20	MILLE	Millepora complanata	4	0.06
21	TURF ALG	mixed assemblage	4	0.06
22	ENC COR	Porites astreoides	7	0.10
23	MAS COR	Diploria strigosa	7	0.10
24	TURF ALG	mixed assemblage	50	0.70
25	ENC COR	Porites astreoides	9	0.13
26	TURF ALG	mixed assemblage	9	0.13
27	ENC COR	Porites astreoides	8	0.11
28	TURF ALG	mixed assemblage	78	1.10
29	FOL COR	Agaricia agaricites	9	0.13
30	TURF ALG	mixed assemblage	60	0.85
31	ENC SPO	encrusting sponge	6	0.08
32	TURF ALG	mixed assemblage	30	0.42
33	ROCK	bare rock	10	0.14
34	TURF ALG	mixed assemblage	10	0.14
35	ENC COR	Porites astreoides	6	0.08
36	TURF ALG	mixed assemblage	7	0.10
37	ENC COR	Porites astreoides	4	0.06
38	TURF ALG	mixed assemblage	4	0.06
39	MAS COR	Montastrea annularis	12	0.17
40	ENC SPO	encrusting sponge	3	0.04
41	MILLE	Millepora complanata	4	0.06
42	TURF ALG	mixed assemblage	53	0.75
43	MAS COR	Diploria strigosa	10	0.14
44	TURF ALG	mixed assemblage	48	0.68
45	ENC SPO	encrusting sponge	4	0.06
46	TURF ALG	mixed assemblage	22	0.31

47	MILLE	Millepora complanata	8	0.11
48	ENC COR	Porites astreoides	4	0.06
49	TURF ALG	mixed assemblage	7	0.10
50	ENC SPO	encrusting sponge	5	0.07
51	TURF ALG	mixed assemblage	65	0.92
52	ENC SPO	encrusting sponge	9	0.13
53	TURF ALG	mixed assemblage	4	0.06
54	ENC SPO	encrusting sponge	9	0.13
55	TURF ALG	mixed assemblage	18	0.25
56	ENC COR	Porites astreoides	6	0.08
57	TURF ALG	mixed assemblage	31	0.44
58	MAS COR	Montastrea annularis	10	0.14

Gorgonians = 9

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp.
and fine sediment

**APPENDIX 3.6 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
PUERTO CANOAS, DESECHEO ISLAND. JUNE 21, 2000.**

DEPTH: 18.2 m
RUGOSITY: 2.92 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	22	0.31
1	RO	reef overhang	8	0.11
2	TURF ALG	mixed assemblage	6	0.08
3	RO	reef overhang	5	0.07
4	TURF ALG	mixed assemblage	10	0.14
5	RO	reef overhang	7	0.10
6	MAS COR	Montastrea annularis	14	0.20
7	TURF ALG	mixed assemblage	57	0.80
8	MAS COR	Montastrea annularis	36	0.51
9	RO	reef overhang	4	0.06
10	FOL COR	Agaricia agaricites	4	0.06
11	TURF ALG	mixed assemblage	7	0.10
12	FOL COR	Agaricia agaricites	4	0.06
13	RO	reef overhang	5	0.07
14	TURF ALG	mixed assemblage	28	0.39
15	RO	reef overhang	7	0.10
16	TURF ALG	mixed assemblage	7	0.10
17	MAS COR	Montastrea annularis	4	0.06
18	TURF ALG	mixed assemblage	6	0.08
19	MAS COR	Montastrea annularis	4	0.06
20	TURF ALG	mixed assemblage	2	0.03
21	BRA COR	Porites porites	3	0.04
22	MAS COR	Montastrea annularis	6	0.08
23	BRA COR	Eusmilia fastigiata	3	0.04
24	RO	reef overhang	6	0.08
25	BRA COR	Eusmilia fastigiata	41	0.58
26	RO	reef overhang	11	0.15
27	TURF ALG	mixed assemblage	15	0.21
28	FOL COR	Agaricia agaricites	5	0.07
29	TURF ALG	mixed assemblage	2	0.03
30	MAS COR	Montastrea annularis	24	0.34
31	TURF ALG	mixed assemblage	6	0.08
32	MAS COR	Montastrea annularis	22	0.31
33	TURF ALG	mixed assemblage	59	0.83
34	FOL COR	Agaricia agaricites	3	0.04
35	RO	reef overhang	6	0.08
36	FOL COR	Agaricia agaricites	7	0.10
37	TURF ALG	mixed assemblage	48	0.68
38	MAS COR	Diploria labyrinthiformis	8	0.11
39	RO	reef overhang	9	0.13
40	BRA COR	Eusmilia fastigiata	37	0.52
41	RO	reef overhang	4	0.06
42	TURF ALG	mixed assemblage	11	0.15
43	MAS COR	Colpophyllia natans	74	1.04
44	MAS COR	Montastrea annularis	4	0.06
45	TURF ALG	mixed assemblage	27	0.38
46	ENC COR	Porites astreoides	9	0.13

47	TURF ALG	mixed assemblage	2	0.03
48	ENC COR	Porites astreoides	3	0.04
49	ENC COR	Porites astreoides	4	0.06
50	ENC COR	Porites astreoides	3	0.04
51	TURF ALG	mixed assemblage	7	0.10
52	BRA COR	Eusmilia fastigiata	4	0.06
53	RO	reef overhang	5	0.07
54	BRA COR	Eusmilia fastigiata	11	0.15
55	ERE SPO	erect sponge	9	0.13
56	RO	reef overhang	6	0.08
57	MAS COR	Montastrea annularis	4	0.06
58	TURF ALG	mixed assemblage	4	0.06
59	RO	reef overhang	7	0.10
60	BRA COR	Eusmilia fastigiata	10	0.14
61	TURF ALG	mixed assemblage	4	0.06
62	BRA COR	Porites porites	3	0.04
63	TURF ALG	mixed assemblage	4	0.06
64	FOL COR	Agaricia agaricites	5	0.07
65	CAL ALG	calcareous red algae	8	0.11
66	FOL COR	Agaricia fragilis	2	0.03
67	RO	reef overhang	6	0.08
68	MAS COR	Montastrea annularis	3	0.04
69	RO	reef overhang	3	0.04
70	FOL COR	Agaricia fragilis	4	0.06
71	RO	reef overhang	13	0.18
72	TURF ALG	mixed assemblage	5	0.07
73	FOL COR	Agaricia agaricites	3	0.04
74	TURF ALG	mixed assemblage	10	0.14
75	ERE SPO	erect sponge	14	0.20
76	FLE ALG	Dictyota sp.	3	0.04
77	ERE SPO	erect sponge	5	0.07
78	FOL COR	Agaricia agaricites	8	0.11
79	RO	reef overhang	9	0.13
80	FOL COR	Agaricia agaricites	3	0.04
81	TURF ALG	mixed assemblage	4	0.06
82	BRA COR	Porites porites	5	0.07
83	TURF ALG	mixed assemblage	4	0.06
84	MAS COR	Montastrea annularis	3	0.04
85	TURF ALG	mixed assemblage	10	0.14

Gorgonians = 0

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Padina* sp. and fine sediment

**APPENDIX 3.7 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
PUERTO CANOAS, DESECHEO ISLAND. JUNE 21, 2000.**

DEPTH: 18.2 m
RUGOSITY: 3.55 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	12	0.17
1	MAS COR	Montastrea annularis	10	0.14
2	TURF ALG	mixed assemblage	13	0.18
3	MAS COR	Montastrea annularis	5	0.07
4	FLE ALG	Dictyota sp.	5	0.07
5	TURF ALG	mixed assemblage	7	0.10
6	MAS COR	Montastrea annularis	28	0.39
7	SAND	sand	2	0.03
8	MAS COR	Montastrea annularis	30	0.42
9	MAS COR	Montastrea annularis	20	0.28
10	RO	reef overhang	5	0.07
11	MAS COR	Montastrea annularis	3	0.04
12	TURF ALG	mixed assemblage	3	0.04
13	MAS COR	Montastrea annularis	5	0.07
14	TURF ALG	mixed assemblage	7	0.10
15	RO	reef overhang	5	0.07
16	MAS COR	Montastrea annularis	46	0.65
17	FOL COR	Agaricia agaricites	22	0.31
18	TURF ALG	mixed assemblage	8	0.11
19	BRA COR	Porites porites	8	0.11
20	TURF ALG	mixed assemblage	3	0.04
21	BRA COR	Madracis decactis	2	0.03
22	BRA COR	Porites porites	6	0.08
23	TURF ALG	mixed assemblage	30	0.42
24	RO	reef overhang	8	0.11
25	MAS COR	Montastrea annularis	23	0.32
26	MAS COR	Montastrea annularis	32	0.45
27	RO	reef overhang	2	0.03
28	MAS COR	Montastrea annularis	44	0.62
29	TURF ALG	mixed assemblage	9	0.13
30	MAS COR	Montastrea annularis	23	0.32
31	MAS COR	Montastrea annularis	11	0.15
32	TURF ALG	mixed assemblage	11	0.15
33	MAS COR	Montastrea annularis	8	0.11
34	FLE ALG	Dictyota sp.	5	0.07
35	TURF ALG	mixed assemblage	6	0.08
36	FLE ALG	Dictyota sp.	5	0.07
37	MAS COR	Montastrea annularis	16	0.23
38	RO	reef overhang	4	0.06
39	ENC COR	Porites astreoides	8	0.11
40	FLE ALG	Dictyota sp.	10	0.14
41	ENC COR	Porites astreoides	5	0.07
42	TURF ALG	mixed assemblage	11	0.15
43	ENC COR	Porites astreoides	15	0.21
44	RO	reef overhang	9	0.13
45	TURF ALG	mixed assemblage	34	0.48

46	ENC COR	Porites astreoides	10	0.14
47	TURF ALG	mixed assemblage	37	0.52
48	ERE SPO	erect sponge	5	0.07
49	TURF ALG	mixed assemblage	18	0.25
50	MAS COR	Colpophyllia natans	27	0.38
51	HOLE	hole	6	0.08
52	MAS COR	Colpophyllia natans	43	0.61
53	MAS COR	Montastrea annularis	55	0.77
54	TURF ALG	mixed assemblage	2	0.03
55	MAS COR	Montastrea annularis	63	0.89
56	RO	reef overhang	10	0.14
57	FLE ALG	Dictyota sp.	10	0.14
58	RO	reef overhang	8	0.11
59	TURF ALG	mixed assemblage	6	0.08
60	RO	reef overhang	5	0.07
61	MAS COR	Colpophyllia natans	4	0.06
62	RO	reef overhang	3	0.04
63	FOL COR	Agaricia agaricites	10	0.14
64	FOL COR	Agaricia agaricites	5	0.07
65	TURF ALG	mixed assemblage	3	0.04
66	FOL COR	Agaricia agaricites	5	0.07
67	RO	reef overhang	6	0.08
68	ENC COR	Porites astreoides	5	0.07
69	TURF ALG	mixed assemblage	32	0.45

Gorgonians = 0

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Padina* sp. and fine sediment

**APPENDIX 3.8 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
PUERTO CANOAS, DESECHEO ISLAND. JUNE 21, 2000.**

DEPTH: 18.2 m
RUGOSITY: 3.16 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	44	0.62
1	MAS COR	Montastrea annularis	16	0.23
2	FLE ALG	Dictyota sp.	5	0.07
3	MAS COR	Montastrea annularis	33	0.46
4	CAL ALG	calcareous red algae	3	0.04
5	MAS COR	Montastrea annularis	33	0.46
6	TURF ALG	mixed assemblage	1	0.01
7	MAS COR	Montastrea annularis	72	1.01
8	BRA COR	Eusmilia fastigiata	10	0.14
9	RO	reef overhang	8	0.11
10	TURF ALG	mixed assemblage	18	0.25
11	FOL COR	Agaricia agaricites	6	0.08
12	RO	reef overhang	5	0.07
13	MAS COR	Montastrea annularis	11	0.15
14	TURF ALG	mixed assemblage	2	0.03
15	ENC COR	Porites astreoides	18	0.25
16	SAND	sand	5	0.07
17	CAL ALG	calcareous red algae	4	0.06
18	MAS COR	Montastrea annularis	4	0.06
19	TURF ALG	mixed assemblage	19	0.27
20	MAS COR	Montastrea annularis	7	0.10
21	MAS COR	Montastrea annularis	7	0.10
22	TURF ALG	mixed assemblage	20	0.28
23	MAS COR	Montastrea annularis	29	0.41
24	TURF ALG	mixed assemblage	28	0.39
25	MAS COR	Diploria labyrinthiformis	13	0.18
26	MAS COR	Diploria labyrinthiformis	13	0.18
27	TURF ALG	mixed assemblage	4	0.06
28	MAS COR	Montastrea annularis	9	0.13
29	TURF ALG	mixed assemblage	3	0.04
30	MAS COR	Montastrea annularis	5	0.07
31	TURF ALG	mixed assemblage	2	0.03
32	MAS COR	Montastrea annularis	14	0.20
33	MAS COR	Montastrea annularis	6	0.08
34	TURF ALG	mixed assemblage	9	0.13
35	FOL COR	Agaricia agaricites	8	0.11
36	RO	reef overhang	6	0.08
37	TURF ALG	mixed assemblage	4	0.06
38	MAS COR	Colpophyllia natans	10	0.14
39	FLE ALG	Dictyota sp.	30	0.42
40	MAS COR	Diploria strigosa	5	0.07
41	TURF ALG	mixed assemblage	29	0.41
42	MAS COR	Montastrea annularis	10	0.14
43	TURF ALG	mixed assemblage	1	0.01
44	MAS COR	Montastrea annularis	5	0.07
45	TURF ALG	mixed assemblage	3	0.04

46	MAS COR	Montastrea annularis	46	0.65
47	TURF ALG	mixed assemblage	9	0.13
48	MAS COR	Montastrea annularis	12	0.17
49	MAS COR	Montastrea annularis	29	0.41
50	RO	reef overhang	7	0.10
51	TURF ALG	mixed assemblage	4	0.06
52	MAS COR	Montastrea annularis	6	0.08
53	TURF ALG	mixed assemblage	9	0.13
54	MAS COR	Montastrea annularis	14	0.20
55	TURF ALG	mixed assemblage	11	0.15
56	MAS COR	Montastrea annularis	113	1.59
57	RO	reef overhang	4	0.06
58	TURF ALG	mixed assemblage	3	0.04
59	MILLE	Millepora complanata	21	0.30
60	TURF ALG	mixed assemblage	3	0.04
61	FOL COR	Agaricia agaricites	5	0.07
62	TURF ALG	mixed assemblage	10	0.14
63	MAS COR	Diploria labyrinthiformis	11	0.15
64	TURF ALG	mixed assemblage	6	0.08
65	RO	reef overhang	9	0.13
66	BRA COR	Madracis decactis	5	0.07

Gorgonians = 1

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Padina* sp. and fine sediment

**APPENDIX 3.9 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
PUERTO CANOAS, DESECHEO ISLAND. JUNE 21, 2000.**

DEPTH: 18.2 m
RUGOSITY: 3.58 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	10	0.14
1	TURF ALG	mixed assemblage	7	0.10
2	MAS COR	Montastrea annularis	18	0.25
3	TURF ALG	mixed assemblage	4	0.06
4	MAS COR	Montastrea annularis	8	0.11
5	MILLE	Millepora complanata	13	0.18
6	TURF ALG	mixed assemblage	17	0.24
7	MAS COR	Montastrea annularis	14	0.20
8	TURF ALG	mixed assemblage	1	0.01
9	MAS COR	Montastrea annularis	11	0.15
10	TURF ALG	mixed assemblage	1	0.01
11	MAS COR	Montastrea annularis	25	0.35
12	TURF ALG	mixed assemblage	1	0.01
13	MAS COR	Colpophyllia natans	20	0.28
14	TURF ALG	mixed assemblage	12	0.17
15	ERE SPO	erect sponge	8	0.11
16	FLE ALG	Dictyota sp.	5	0.07
17	TURF ALG	mixed assemblage	7	0.10
18	ENC COR	Porites astreoides	6	0.08
19	TURF ALG	mixed assemblage	5	0.07
20	MAS COR	Meandrina meandrites	6	0.08
21	TURF ALG	mixed assemblage	34	0.48
22	BRA COR	Eusmilia fastigiata	35	0.49
23	RO	reef overhang	10	0.14
24	TURF ALG	mixed assemblage	7	0.10
25	MAS COR	Montastrea annularis	4	0.06
26	RO	reef overhang	5	0.07
27	FLE ALG	Dictyota sp.	9	0.13
28	RO	reef overhang	5	0.07
29	MAS COR	Montastrea annularis	36	0.51
30	FLE ALG	Dictyota sp.	10	0.14
31	BRA COR	Acropora cervicornis	11	0.15
32	RO	reef overhang	5	0.07
33	ENC COR	Porites astreoides	4	0.06
34	TURF ALG	mixed assemblage	21	0.30
35	ENC COR	Porites astreoides	3	0.04
36	TURF ALG	mixed assemblage	2	0.03
37	MAS COR	Diploria strigosa	13	0.18
38	TURF ALG	mixed assemblage	7	0.10
39	FOL COR	Agaricia agaricites	6	0.08
40	TURF ALG	mixed assemblage	16	0.23
41	RO	reef overhang	10	0.14
42	MAS COR	Montastrea annularis	32	0.45
43	TURF ALG	mixed assemblage	30	0.42
44	RO	reef overhang	10	0.14
45	FOL COR	Agaricia agaricites	4	0.06

46	TURF ALG	mixed assemblage	15	0.21
47	MAS COR	Meandrina meandrites	5	0.07
48	TURF ALG	mixed assemblage	12	0.17
49	RO	reef overhang	3	0.04
50	FOL COR	Agaricia agaricites	17	0.24
51	TURF ALG	mixed assemblage	18	0.25
52	MAS COR	Meandrina meandrites	4	0.06
53	RO	reef overhang	5	0.07
54	TURF ALG	mixed assemblage	40	0.56
55	RO	reef overhang	7	0.10
56	TURF ALG	mixed assemblage	10	0.14
57	RO	reef overhang	5	0.07
58	TURF ALG	mixed assemblage	29	0.41
59	RO	reef overhang	5	0.07
60	TURF ALG	mixed assemblage	19	0.27
61	RO	reef overhang	4	0.06
62	ENC COR	Porites astreoides	4	0.06
63	TURF ALG	mixed assemblage	10	0.14
64	ENC COR	Porites astreoides	4	0.06
65	TURF ALG	mixed assemblage	5	0.07
66	ENC COR	Porites astreoides	5	0.07
67	RO	reef overhang	6	0.08
68	MAS COR	Montastrea annularis	3	0.04
69	FOL COR	Leptoseris cucullata	3	0.04
70	FLE ALG	Dictyota sp.	15	0.21
71	FOL COR	Agaricia fragilis	7	0.10
72	TURF ALG	mixed assemblage	63	0.89
73	MAS COR	Montastrea annularis	11	0.15
74	TURF ALG	mixed assemblage	2	0.03
75	MAS COR	Montastrea annularis	4	0.06
76	TURF ALG	mixed assemblage	8	0.11
77	ERE SPO	erect sponge	3	0.04
78	MAS COR	Montastrea annularis	19	0.27
79	RO	reef overhang	3	0.04
80	MAS COR	Montastrea annularis	5	0.07
81	TURF ALG	mixed assemblage	10	0.14
82	MAS COR	Montastrea annularis	27	0.38
83	MAS COR	Montastrea annularis	11	0.15
84	TURF ALG	mixed assemblage	10	0.14

Gorgonians = 2

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Padina* sp.
Lobophora variegata and fine sediment

**APPENDIX 3.10 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
PUERTO CANOAS, DESECHEO ISLAND. JUNE 21, 2000.**

DEPTH: 18.2 m
RUGOSITY: 3.61 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	10	0.14
1	BRA COR	Eusmilia fastigiata	10	0.14
2	FOL COR	Agaricia agaricites	13	0.18
3	TURF ALG	mixed assemblage	12	0.17
4	MAS COR	Montastrea cavernosa	23	0.32
5	FOL COR	Agaricia agaricites	12	0.17
6	TURF ALG	mixed assemblage	27	0.38
7	FOL COR	Agaricia agaricites	7	0.10
8	TURF ALG	mixed assemblage	4	0.06
9	FOL COR	Agaricia agaricites	5	0.07
10	TURF ALG	mixed assemblage	9	0.13
11	FOL COR	Agaricia agaricites	11	0.15
12	TURF ALG	mixed assemblage	3	0.04
13	ENC COR	Porites astreoides	6	0.08
14	MAS COR	Montastrea annularis	8	0.11
15	TURF ALG	mixed assemblage	12	0.17
16	FOL COR	Agaricia agaricites	9	0.13
17	MAS COR	Colpophyllia natans	10	0.14
18	TURF ALG	mixed assemblage	65	0.92
19	ENC COR	Porites astreoides	9	0.13
20	TURF ALG	mixed assemblage	3	0.04
21	MAS COR	Montastrea annularis	26	0.37
22	TURF ALG	mixed assemblage	20	0.28
23	MAS COR	Meandrina meandrites	5	0.07
24	RO	reef overhang	8	0.11
25	MAS COR	Montastrea annularis	43	0.61
26	TURF ALG	mixed assemblage	25	0.35
27	MAS COR	Montastrea annularis	15	0.21
28	TURF ALG	mixed assemblage	30	0.42
29	MAS COR	Montastrea annularis	110	1.55
30	TURF ALG	mixed assemblage	15	0.21
31	MAS COR	Montastrea annularis	5	0.07
32	FOL COR	Agaricia agaricites	14	0.20
33	TURF ALG	mixed assemblage	10	0.14
34	BRA COR	Eusmilia fastigiata	13	0.18
35	TURF ALG	mixed assemblage	8	0.11
36	BRA COR	Eusmilia fastigiata	6	0.08
37	TURF ALG	mixed assemblage	12	0.17
38	FOL COR	Agaricia agaricites	27	0.38
39	TURF ALG	mixed assemblage	6	0.08
40	BRA COR	Eusmilia fastigiata	2	0.03
41	TURF ALG	mixed assemblage	30	0.42
42	SAND	sand	12	0.17
43	MAS COR	Montastrea annularis	22	0.31
44	TURF ALG	mixed assemblage	20	0.28
45	SAND	sand	10	0.14

46	FLE ALG	Dictyoya sp.	7	0.10
47	MAS COR	Montastrea annularis	12	0.17
48	SAND	sand	5	0.07
49	TURF ALG	mixed assemblage	13	0.18
50	HOLE	hole	4	0.06
51	FLE ALG	Dictyoya sp.	10	0.14
52	FOL COR	Agaricia agaricites	9	0.13
53	SAND	sand	30	0.42
54	FLE ALG	Dictyoya sp.	23	0.32
55	RO	reef overhang	30	0.42
56	FLE ALG	Dictyoya sp.	23	0.32
57	TURF ALG	mixed assemblage	6	0.08
58	FLE ALG	Dictyoya sp.	12	0.17
59	TURF ALG	mixed assemblage	4	0.06
60	MAS COR	Diploria strigosa	7	0.10
61	TURF ALG	mixed assemblage	9	0.13

Gorgonians = 0

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Padina* sp. and fine sediment

**APPENDIX 3.11 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
PUERTO BOTES, DESECHEO ISLAND. JUNE 22, 2000.**

DEPTH: 17.0 m
RUGOSITY: 3.25 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	43	0.61
1	TURF ALG	mixed assemblage	2	0.03
2	ENC SPO	encrusting sponge	21	0.30
3	TURF ALG	mixed assemblage	9	0.13
4	FOL COR	Agaricia agaricites	5	0.07
5	MAS COR	Montastrea annularis	28	0.39
6	RO	reef overhang	23	0.32
7	TURF ALG	mixed assemblage	29	0.41
8	MAS COR	Montastrea annularis	9	0.13
9	TURF ALG	mixed assemblage	4	0.06
10	MAS COR	Montastrea annularis	29	0.41
11	TURF ALG	mixed assemblage	6	0.08
12	FOL COR	Agaricia agaricites	6	0.08
13	TURF ALG	mixed assemblage	89	1.25
14	MAS COR	Meandrina meandrites	8	0.11
15	TURF ALG	mixed assemblage	11	0.15
16	ENC COR	Porites astreoides	5	0.07
17	TURF ALG	mixed assemblage	45	0.63
18	FLE ALG	Dictyota sp.	6	0.08
19	TURF ALG	mixed assemblage	30	0.42
20	MAS COR	Colpophyllia natans	62	0.87
21	TURF ALG	mixed assemblage	18	0.25
22	MAS COR	Montastrea annularis	19	0.27
23	TURF ALG	mixed assemblage	4	0.06
24	MAS COR	Montastrea annularis	4	0.06
25	RO	reef overhang	5	0.07
26	TURF ALG	mixed assemblage	3	0.04
27	MAS COR	Montastrea annularis	17	0.24
28	RO	reef overhang	9	0.13
29	TURF ALG	mixed assemblage	45	0.63
30	STYLA	Stylaster roseus	3	0.04
31	RO	reef overhang	5	0.07
32	TURF ALG	mixed assemblage	21	0.30
33	FOL COR	Agaricia agaricites	24	0.34
34	TURF ALG	mixed assemblage	14	0.20
35	FOL COR	Agaricia agaricites	4	0.06
36	FLE ALG	Dictyota sp.	6	0.08
37	TURF ALG	mixed assemblage	13	0.18
38	RO	reef overhang	4	0.06
39	MAS COR	Montastrea annularis	66	0.93
40	TURF ALG	mixed assemblage	18	0.25
41	MAS COR	Montastrea annularis	71	1.00
42	FLE ALG	Lobophora variegata	25	0.35
43	RO	reef overhang	3	0.04
44	MAS COR	Montastrea annularis	70	0.99

Gorgonians = 0

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Lobophora variegata* and fine sediment

**APPENDIX 3.12 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
PUERTO BOTES, DESECHEO ISLAND. JUNE 22, 2000.**

DEPTH: 17.0 m
RUGOSITY: 4.52 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	58	0.82
1	ERE SPO	erect sponge	3	0.04
2	MAS COR	Montastrea annularis	40	0.56
3	RO	reef overhang	6	0.08
4	MAS COR	Montastrea annularis	3	0.04
5	ERE SPO	erect sponge	21	0.30
6	TURF ALG	mixed assemblage	5	0.07
7	MAS COR	Meandrina meandrites	10	0.14
8	TURF ALG	mixed assemblage	41	0.58
9	MAS COR	Diploria labyrinthiformis	2	0.03
10	TURF ALG	mixed assemblage	17	0.24
11	FOL COR	Agaricia agaricites	3	0.04
12	FOL COR	Agaricia agaricites	4	0.06
13	TURF ALG	mixed assemblage	9	0.13
14	RO	reef overhang	4	0.06
15	FOL COR	Agaricia agaricites	4	0.06
16	TURF ALG	mixed assemblage	21	0.30
17	MAS COR	Montastrea annularis	8	0.11
18	ENC COR	Porites astreoides	6	0.08
19	TURF ALG	mixed assemblage	6	0.08
20	RO	reef overhang	8	0.11
21	FOL COR	Agaricia agaricites	9	0.13
22	TURF ALG	mixed assemblage	9	0.13
23	FOL COR	Agaricia agaricites	8	0.11
24	CAL ALG	calcareous red algae	5	0.07
25	TURF ALG	mixed assemblage	14	0.20
26	MAS COR	Montastrea annularis	5	0.07
27	TURF ALG	mixed assemblage	17	0.24
28	FOL COR	Agaricia agaricites	23	0.32
29	TURF ALG	mixed assemblage	14	0.20
30	ERE SPO	erect sponge	3	0.04
31	TURF ALG	mixed assemblage	31	0.44
32	ERE SPO	erect sponge	9	0.13
33	RO	reef overhang	6	0.08
34	TURF ALG	mixed assemblage	11	0.15
35	ERE SPO	erect sponge	8	0.11
36	TURF ALG	mixed assemblage	20	0.28
37	HOLE	hole	10	0.14
38	MAS COR	Montastrea annularis	50	0.70
39	TURF ALG	mixed assemblage	10	0.14
40	MAS COR	Montastrea annularis	5	0.07
41	TURF ALG	mixed assemblage	4	0.06
42	ENC SPO	encrusting sponge	3	0.04
43	RO	reef overhang	3	0.04
44	FOL COR	Agaricia agaricites	46	0.65
45	TURF ALG	mixed assemblage	16	0.23
46	MAS COR	Montastrea annularis	7	0.10

47	TURF ALG	mixed assemblage	10	0.14
48	MAS COR	Montastrea annularis	4	0.06
49	ERE SPO	erect sponge	4	0.06
50	TURF ALG	mixed assemblage	4	0.06
51	MAS COR	Montastrea annularis	11	0.15
52	RO	reef overhang	5	0.07
53	TURF ALG	mixed assemblage	57	0.80
54	RO	reef overhang	9	0.13
55	MAS COR	Colpophyllia natans	24	0.34
56	TURF ALG	mixed assemblage	9	0.13
57	ENC SPO	encrusting sponge	5	0.07
58	TURF ALG	mixed assemblage	16	0.23
59	MAS COR	Colpophyllia natans	6	0.08
60	TURF ALG	mixed assemblage	61	0.86
61	MAS COR	Meandrina meandrites	7	0.10
62	TURF ALG	mixed assemblage	104	1.46
63	MAS COR	Colpophyllia natans	70	0.99

Gorgonians = 0

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Lobophora variegata* and fine sediment

**APPENDIX 3.13 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
PUERTO BOTES, DESECHEO ISLAND. JUNE 22, 2000.**

DEPTH: 17.0 m
RUGOSITY: 4.35 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	52	0.73
1	TURF ALG	mixed assemblage	2	0.03
2	MAS COR	Montastrea annularis	28	0.39
3	RO	reef overhang	2	0.03
4	TURF ALG	mixed assemblage	21	0.30
5	MAS COR	Montastrea annularis	2	0.03
6	RO	reef overhang	8	0.11
7	BRA COR	Eusmilia fastigiata	8	0.11
8	ERE SPO	erect sponge	11	0.15
9	TURF ALG	mixed assemblage	15	0.21
10	MAS COR	Montastrea annularis	27	0.38
11	TURF ALG	mixed assemblage	15	0.21
12	FOL COR	Agaricia agaricites	5	0.07
13	TURF ALG	mixed assemblage	2	0.03
14	MAS COR	Montastrea annularis	4	0.06
15	TURF ALG	mixed assemblage	13	0.18
16	MAS COR	Montastrea annularis	5	0.07
17	ERE SPO	erect sponge	5	0.07
18	BRA COR	Eusmilia fastigiata	14	0.20
19	BRA COR	Eusmilia fastigiata	21	0.30
20	MAS COR	Montastrea annularis	3	0.04
21	TURF ALG	mixed assemblage	10	0.14
22	MAS COR	Montastrea annularis	3	0.04
23	TURF ALG	mixed assemblage	2	0.03
24	ERE SPO	erect sponge	9	0.13
25	MAS COR	Montastrea annularis	6	0.08
26	TURF ALG	mixed assemblage	5	0.07
27	ERE SPO	erect sponge	4	0.06
28	TURF ALG	mixed assemblage	4	0.06
29	RO	reef overhang	43	0.61
30	MAS COR	Montastrea annularis	9	0.13
31	TURF ALG	mixed assemblage	14	0.20
32	RO	reef overhang	11	0.15
33	MAS COR	Montastrea annularis	43	0.61
34	RO	reef overhang	15	0.21
35	TURF ALG	mixed assemblage	80	1.13
36	MAS COR	Montastrea annularis	27	0.38
37	TURF ALG	mixed assemblage	6	0.08
38	RO	reef overhang	11	0.15
39	MAS COR	Montastrea annularis	34	0.48
40	RO	reef overhang	9	0.13
41	MAS COR	Montastrea annularis	102	1.44
42	TURF ALG	mixed assemblage	4	0.06
43	FOL COR	Agaricia agaricites	6	0.08
44	FLE ALG	Dictyota sp.	11	0.15
45	RO	reef overhang	4	0.06

46	FOL COR	Agaricia agaricites	18	0.25
47	FLE ALG	Dictyota sp.	19	0.27
48	MAS COR	Montastrea annularis	22	0.31
49	TURF ALG	mixed assemblage	8	0.11
50	RO	reef overhang	6	0.08
51	TURF ALG	mixed assemblage	7	0.10
52	FOL COR	Agaricia agaricites	7	0.10
53	TURF ALG	mixed assemblage	25	0.35
54	MILLE	Millepora alcicornis	3	0.04
55	TURF ALG	mixed assemblage	8	0.11
56	MAS COR	Montastrea cavernosa	18	0.25
57	TURF ALG	mixed assemblage	10	0.14
58	MAS COR	Montastrea cavernosa	9	0.13
59	TURF ALG	mixed assemblage	3	0.04
60	BRA COR	Millepora alcicornis	6	0.08
61	MAS COR	Montastrea annularis	4	0.06
62	TURF ALG	mixed assemblage	6	0.08
63	TURF ALG	mixed assemblage	62	0.87
64	ERE SPO	erect sponge	4	0.06
65	TURF ALG	mixed assemblage (cable)	4	0.06
66	RO	reef overhang	13	0.18
67	TURF ALG	mixed assemblage	22	0.31

Gorgonians = 0

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Lobophora variegata* and fine sediment

**APPENDIX 3.14 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
PUERTO BOTES, DESECHEO ISLAND. JUNE 22, 2000.**

DEPTH: 17.0 m
RUGOSITY: 3.72 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	16	0.23
1	MAS COR	Diploria labyrinthiformis	24	0.34
2	RO	reef overhang	6	0.08
3	TURF ALG	mixed assemblage	4	0.06
4	MAS COR	Montastrea annularis	4	0.06
5	RO	reef overhang	6	0.08
6	TURF ALG	mixed assemblage	6	0.08
7	RO	reef overhang	5	0.07
8	MAS COR	Montastrea annularis	45	0.63
9	ERE SPO	erect sponge	6	0.08
10	MAS COR	Montastrea annularis	5	0.07
11	RO	reef overhang	30	0.42
12	TURF ALG	mixed assemblage	14	0.20
13	ENC COR	Porites astreoides	5	0.07
14	TURF ALG	mixed assemblage	6	0.08
15	RO	reef overhang	3	0.04
16	MAS COR	Montastrea annularis	24	0.34
17	TURF ALG	mixed assemblage	53	0.75
18	MAS COR	Diploria labyrinthiformis	8	0.11
19	TURF ALG	mixed assemblage	2	0.03
20	MAS COR	Colpophyllia natans	38	0.54
21	FLE ALG	Dictyota sp.	5	0.07
22	TURF ALG	mixed assemblage	30	0.42
23	RO	reef overhang	7	0.10
24	TURF ALG	mixed assemblage	9	0.13
25	RO	reef overhang	4	0.06
26	BRA COR	Porites porites	4	0.06
27	TURF ALG	mixed assemblage	26	0.37
28	RO	reef overhang	8	0.11
29	BRA COR	Porites porites	205	2.89
30	FOL COR	Agaricia agaricites	4	0.06
31	TURF ALG	mixed assemblage	6	0.08
32	FOL COR	Agaricia agaricites	2	0.03
33	TURF ALG	mixed assemblage	28	0.39
34	ERE SPO	erect sponge	46	0.65
35	MAS COR	Montastrea annularis	11	0.15
36	TURF ALG	mixed assemblage	32	0.45
37	ENC COR	Porites astreoides	3	0.04
38	RO	reef overhang	5	0.07
39	TURF ALG	mixed assemblage	10	0.14
40	FLE ALG	Dictyota sp.	5	0.07
41	MAS COR	Meandrina meandrites	8	0.11
42	TURF ALG	mixed assemblage	3	0.04
43	MILLE	Millepora alcicornis	4	0.06
44	RO	reef overhang	10	0.14
45	TURF ALG	mixed assemblage	22	0.31

46	RO	reef overhang	6	0.08
47	FOL COR	Agaricia agaricites	7	0.10
48	TURF ALG	mixed assemblage	5	0.07
49	BRA COR	Acropora cervicornis	2	0.03
50	TURF ALG	mixed assemblage	22	0.31
51	ENC COR	Porites astreoides	5	0.07
52	RO	reef overhang	10	0.14
53	TURF ALG	mixed assemblage	4	0.06
54	RO	reef overhang	5	0.07
55	MAS COR	Diploria labyrinthiformis	34	0.48
56	TURF ALG	mixed assemblage	3	0.04
57	MAS COR	Colpophyllia natans	10	0.14
58	TURF ALG	mixed assemblage	8	0.11
59	FLE ALG	Dictyota sp.	5	0.07
60	ERE SPO	erect sponge	6	0.08
61	RO	reef overhang	5	0.07
62	FLE ALG	Dictyota sp., Lobophora variegata	30	0.42

Gorgonians = 0

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Lobophora variegata* and fine sediment

**APPENDIX 3.15 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
PUERTO BOTES, DESECHEO ISLAND. JUNE 22, 2000.**

DEPTH: 17.0 m
RUGOSITY: 5.89 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	19	0.27
1	FOL COR	Agaricia agaricites	7	0.10
2	TURF ALG	mixed assemblage	4	0.06
3	FOL COR	Agaricia agaricites	4	0.06
4	TURF ALG	mixed assemblage	44	0.62
5	BRA COR	Eusmilia fastigiata	8	0.11
6	ERE SPO	erect sponge	13	0.18
7	TURF ALG	mixed assemblage	50	0.70
8	FOL COR	Agaricia agaricites	10	0.14
9	TURF ALG	mixed assemblage	20	0.28
10	FOL COR	Agaricia agaricites	5	0.07
11	TURF ALG	mixed assemblage	8	0.11
12	FOL COR	Agaricia agaricites	15	0.21
13	TURF ALG	mixed assemblage	6	0.08
14	FOL COR	Agaricia agaricites	14	0.20
15	TURF ALG	mixed assemblage	6	0.08
16	FOL COR	Agaricia agaricites	95	1.34
17	TURF ALG	mixed assemblage	12	0.17
18	MAS COR	Montastrea annularis	78	1.10
19	TURF ALG	mixed assemblage	8	0.11
20	MAS COR	Montastrea annularis	10	0.14
21	TURF ALG	mixed assemblage	21	0.30
22	MAS COR	Montastrea annularis	16	0.23
23	TURF ALG	mixed assemblage	8	0.11
24	MAS COR	Montastrea annularis	29	0.41
25	TURF ALG	mixed assemblage	13	0.18
26	MAS COR	Montastrea annularis	20	0.28
27	TURF ALG	mixed assemblage	16	0.23
28	MAS COR	Montastrea annularis	15	0.21
29	TURF ALG	mixed assemblage	3	0.04
30	MAS COR	Montastrea cavernosa	14	0.20
31	TURF ALG	mixed assemblage	3	0.04
32	MAS COR	Montastrea annularis	15	0.21
33	TURF ALG	mixed assemblage	10	0.14
34	MAS COR	Montastrea cavernosa	36	0.51
35	TURF ALG	mixed assemblage	5	0.07
36	ENC COR	Porites astreoides	6	0.08
37	ENC SPO	encrusting sponge	5	0.07
38	TURF ALG	mixed assemblage	26	0.37
39	MAS COR	Montastrea annularis	40	0.56
40	TURF ALG	mixed assemblage	7	0.10
41	MAS COR	Montastrea annularis	58	0.82
42	TURF ALG	mixed assemblage	12	0.17
43	ENC SPO	encrusting sponge	16	0.23
44	BRA COR	Eusmilia fastigiata	11	0.15
45	ENC COR	Porites astreoides	7	0.10

46	TURF ALG	mixed assemblage	16	0.23
47	FOL COR	Agaricia agaricites	26	0.37
48	TURF ALG	mixed assemblage	80	1.13
49	RO	reef overhang	15	0.21
50	SAND	sand	10	0.14
51	RO	reef overhang	25	0.35
52	MAS COR	Montastrea annularis	23	0.32
53	RO	reef overhang	4	0.06
54	MAS COR	Montastrea annularis	21	0.30
55	TURF ALG	mixed assemblage	5	0.07
56	ENC COR	Porites astreoides	3	0.04
57	ENC SPO	encrusting sponge	4	0.06
58	MAS COR	Meandrina meandrites	4	0.06
59	ENC SPO	encrusting sponge	2	0.03
60	MAS COR	Meandrina meandrites	8	0.11
61	TURF ALG	mixed assemblage	2	0.03
62	MAS COR	Montastrea annularis	6	0.08
63	TURF ALG	mixed assemblage	3	0.04
64	MAS COR	Montastrea annularis	5	0.07
65	TURF ALG	mixed assemblage	18	0.25

Gorgonians = 1

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Lobophora variegata* and fine sediment

**APPENDIX 4.1 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
PLAYA PAJAROS, MONA ISLAND. JUN 6, 2000.**

DEPTH: 13.6 m
RUGOSITY: 3.07 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	10	0.14
1	MAS COR	Montastrea annularis	73	1.03
2	TURF ALG	mixed assemblage	84	1.18
3	MAS COR	Montastrea annularis	12	0.17
4	TURF ALG	mixed assemblage	14	0.20
5	MAS COR	Montastrea annularis	16	0.23
6	MAS COR	Montastrea annularis	7	0.10
7	TURF ALG	mixed assemblage	17	0.24
8	FOL COR	Agaricia agaricites	7	0.10
9	TURF ALG	mixed assemblage	10	0.14
10	FOL COR	Agaricia agaricites	4	0.06
11	TURF ALG	mixed assemblage	22	0.31
12	FOL COR	Agaricia agaricites	3	0.04
13	TURF ALG	mixed assemblage	4	0.06
14	MAS COR	Siderastrea siderea	5	0.07
15	FOL COR	Agaricia agaricites	4	0.06
16	TURF ALG	mixed assemblage	18	0.25
17	MAS COR	Siderastrea siderea	3	0.04
18	TURF ALG	mixed assemblage	92	1.30
19	ENC COR	Porites astreoides	3	0.04
20	MAS COR	Diploria strigosa	3	0.04
21	RO	reef overhang	7	0.10
22	ERE SPO	erect sponge	7	0.10
23	MAS COR	Montastrea annularis	45	0.63
24	TURF ALG	mixed assemblage	263	3.70
25	RO	reef overhang	10	0.14
26	MAS COR	Montastrea annularis	5	0.07
27	ERE SPO	erect sponge	5	0.07
28	RO	reef overhang	4	0.06
29	ERE SPO	erect sponge	11	0.15
30	MAS COR	Montastrea annularis	29	0.41
31	TURF ALG	mixed assemblage	24	0.34
32	RO	reef overhang	9	0.13
33	MAS COR	Montastrea annularis	36	0.51
34	TURF ALG	mixed assemblage	3	0.04
35	MAS COR	Montastrea annularis	3	0.04
36	RO	reef overhang	18	0.25
37	TURF ALG	mixed assemblage	22	0.31
38	MAS COR	Montastrea annularis	5	0.07
39	TURF ALG	mixed assemblage	11	0.15

Gorgonians = 11

Note: Turf Alg composed primarily of short filamentous algae, *Lobophora variegata*, *Dictyota* sp.,

Halimeda sp. and fine sediment

**APPENDIX 4.2 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
PLAYA PAJAROS, MONA ISLAND. JUN 6, 2000.**

DEPTH: 13.6 m

RUGOSITY: 3.99 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	13	0.18
1	FOL COR	Agaricia agaricites	11	0.15
2	TURF ALG	mixed assemblage	33	0.46
3	ENC SPO	encrusting sponge	11	0.15
4	PIL COR	Dendrogyra cylindrus	46	0.65
5	ENC SPO	encrusting sponge	2	0.03
6	FLE ALG	Dictyota sp.	6	0.08
7	MAS COR	Montastrea annularis	4	0.06
8	SOL COR	Mussa sp.	10	0.14
9	TURF ALG	mixed assemblage	36	0.51
10	MAS COR	Diploria strigosa	33	0.46
11	FLE ALG	Dictyota sp.	20	0.28
12	ENC COR	Porites astreoides	4	0.06
13	TURF ALG	mixed assemblage	27	0.38
14	MAS COR	Siderastrea siderea	12	0.17
15	TURF ALG	mixed assemblage	33	0.46
16	MAS COR	Meandrina meandrites	4	0.06
17	TURF ALG	mixed assemblage	38	0.54
18	ENC SPO	encrusting sponge	42	0.59
19	RO	reef overhang	15	0.21
20	TURF ALG	mixed assemblage	10	0.14
21	MAS COR	Montastrea cavernosa	4	0.06
22	MAS COR	Montastrea annularis	48	0.68
23	TURF ALG	mixed assemblage	34	0.48
24	ERE SPO	erect sponge	4	0.06
25	TURF ALG	mixed assemblage	67	0.94
26	ENC COR	Porites astreoides	8	0.11
27	RO	reef overhang	36	0.51
28	TURF ALG	mixed assemblage	5	0.07
29	GORG	gorgonian base	2	0.03
30	TURF ALG	mixed assemblage	33	0.46
31	RO	reef overhang	11	0.15
32	TURF ALG	mixed assemblage	10	0.14
33	RO	reef overhang	21	0.30
34	TURF ALG	mixed assemblage	17	0.24
35	MILLE	Millepora alcicornis	2	0.03
36	TURF ALG	mixed assemblage	19	0.27
37	MAS COR	Montastrea cavernosa	11	0.15
38	RO	reef overhang	8	0.11
39	TURF ALG	mixed assemblage	24	0.34
40	MAS COR	Isophyllastrea rigida	3	0.04
41	TURF ALG	mixed assemblage	41	0.58
42	RO	reef overhang	13	0.18
43	TURF ALG	mixed assemblage	18	0.25
44	RO	reef overhang	17	0.24
45	FLE ALG	Dictyota sp.	25	0.35
46	TURF ALG	mixed assemblage	30	0.42
47	FLE ALG	Dictyota sp.	38	0.54
48	MAS COR	Diploria strigosa	6	0.08
49	FLE ALG	Dictyota sp.	28	0.39

Gorgonians = 8

Note: Turf Alg composed primarily of short filamentous algae, *Lobophora variegata*, *Dictyota* sp. *Halimeda* sp. and fine sediment

**APPENDIX 4.3 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
PLAYA PAJAROS, MONA ISLAND. JUN 6, 2000.**

DEPTH: 13.6 m
RUGOSITY: 1.78 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	63	0.89
1	ENC SPO	encrusting sponge	8	0.11
2	TURF ALG	mixed assemblage	10	0.14
3	CAL ALG	Halimeda sp.	6	0.08
4	RO	reef overhang	8	0.11
5	TURF ALG	mixed assemblage	9	0.13
6	FOL COR	Agaricia agaricites	9	0.13
7	TURF ALG	mixed assemblage	70	0.99
8	FLE ALG	Lobophora variegata	30	0.42
9	TURF ALG	mixed assemblage	15	0.21
10	FLE ALG	Lobophora variegata	7	0.10
11	FOL COR	Agaricia agaricites	8	0.11
12	FLE ALG	Lobophora variegata	6	0.08
13	TURF ALG	mixed assemblage	40	0.56
14	ENC SPO	Xestospongia muta	57	0.80
15	TURF ALG	mixed assemblage	60	0.85
16	SAND	sand	50	0.70
17	TURF ALG	mixed assemblage	10	0.14
18	ENC SPO	encrusting sponge	14	0.20
19	TURF ALG	mixed assemblage	30	0.42
20	ENC SPO	encrusting sponge	9	0.13
21	TURF ALG	mixed assemblage	77	1.08
22	ENC SPO	encrusting sponge	4	0.06
23	TURF ALG	mixed assemblage	70	0.99
24	FLE ALG	Lobophora variegata	18	0.25
25	TURF ALG	mixed assemblage	35	0.49
26	FLE ALG	Lobophora variegata	8	0.11
27	TURF ALG	mixed assemblage	60	0.85
28	FLE ALG	Lobophora variegata	15	0.21
29	TURF ALG	mixed assemblage	22	0.31
30	CAL ALG	Halimeda sp.	8	0.11

Gorgonians = 14

Note: Turf Alg composed primarily of short filamentous algae, *Lobophora variegata*, *Dictyota* sp. *Halimeda* sp. and fine sediment

**APPENDIX 4.4 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
PLAYA PAJAROS, MONA ISLAND. JUN 6, 2000.**

DEPTH: 13.6 m

RUGOSITY: 3.27 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	28	0.39
1	TURF ALG	mixed assemblage	12	0.17
2	MAS COR	Montastrea annularis	4	0.06
3	TURF ALG	mixed assemblage	15	0.21
4	FLE ALG	Lobophora variegata	20	0.28
5	TURF ALG	mixed assemblage	33	0.47
6	MAS COR	Montastrea annularis	25	0.35
7	CAL ALG	Halimeda sp.	10	0.14
8	TURF ALG	mixed assemblage	13	0.18
9	MAS COR	Montastrea annularis	46	0.65
10	TURF ALG	mixed assemblage	30	0.42
11	RO	reef overhang	14	0.20
12	SAND	sand	10	0.14
13	CAL ALG	Halimeda sp.	14	0.20
14	FLE ALG	Lobophora variegata	30	0.42
15	TURF ALG	mixed assemblage	25	0.35
16	ENC SPO	encrusting sponge	8	0.11
17	TURF ALG	mixed assemblage	24	0.34
18	FLE ALG	Lobophora variegata	12	0.17
19	TURF ALG	mixed assemblage	35	0.49
20	RO	reef overhang	14	0.20
21	TURF ALG	mixed assemblage	70	0.99
22	ENC SPO	encrusting sponge	9	0.13
23	TURF ALG	mixed assemblage	21	0.30
24	ENC SPO	encrusting sponge	13	0.18
25	CAL ALG	Halimeda sp.	9	0.13
26	MAS COR	Montastrea cavernosa	17	0.24
27	TURF ALG	mixed assemblage	11	0.15
28	ZOAN	Palythoa caribaeorum	4	0.06
29	TURF ALG	mixed assemblage	7	0.10
30	FOL COR	Agaricia sp.	16	0.23
31	TURF ALG	mixed assemblage	14	0.20
32	ENC SPO	encrusting sponge	3	0.04
33	TURF ALG	mixed assemblage	62	0.87
34	FLE ALG	Lobophora variegata	15	0.21
35	TURF ALG	mixed assemblage	16	0.23
36	ENC SPO	encrusting sponge	4	0.06
37	FLE ALG	Lobophora variegata	10	0.14
38	TURF ALG	mixed assemblage	6	0.08
39	CAL ALG	Halimeda sp.	7	0.10
40	ENC SPO	encrusting sponge	5	0.07
41	TURF ALG	mixed assemblage	17	0.24
42	MAS COR	Diploria strigosa	14	0.20
43	FLE ALG	Lobophora variegata	12	0.17
44	ENC SPO	encrusting sponge	32	0.45
45	CAL ALG	Halimeda sp.	15	0.21
46	TURF ALG	mixed assemblage	31	0.44
47	MAS COR	Montastrea cavernosa	11	0.15
48	ENC SPO	encrusting sponge	9	0.13
49	TURF ALG	mixed assemblage	20	0.28
50	FLE ALG	Lobophora variegata	30	0.42
51	TURF ALG	mixed assemblage	10	0.14

Gorgonians = 9

**APPENDIX 4.5 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
PLAYA PAJAROS, MONA ISLAND. JUN 6, 2000.**

DEPTH: 13.6 m
RUGOSITY: 3.24 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	ENC SPO	encrusting sponge	31	0.44
1	ENC SPO	encrusting sponge	9	0.13
2	RO	reef overhang	6	0.08
3	MAS COR	Montastrea annularis	4	0.06
4	TURF ALG	mixed assemblage	22	0.31
5	MAS COR	Montastrea annularis	14	0.20
6	MAS COR	Diploria labyrinthiformis	11	0.15
7	TURF ALG	mixed assemblage	45	0.63
8	MAS COR	Montastrea cavernosa	7	0.10
9	TURF ALG	mixed assemblage	21	0.30
10	MAS COR	Diploria strigosa	10	0.14
11	TURF ALG	mixed assemblage	4	0.06
12	MAS COR	Diploria strigosa	10	0.14
13	TURF ALG	mixed assemblage	6	0.08
14	MAS COR	Diploria strigosa	30	0.42
15	TURF ALG	mixed assemblage	28	0.39
16	RO	reef overhang	5	0.07
17	TURF ALG	mixed assemblage	19	0.27
18	GORG	gorgonian base	6	0.08
19	TURF ALG	mixed assemblage	14	0.20
20	MAS COR	Montastrea annularis	8	0.11
21	TURF ALG	mixed assemblage	6	0.08
22	PIL COR	Dendrogyra cylindrus	109	1.54
23	TURF ALG	mixed assemblage	10	0.14
24	PIL COR	Dendrogyra cylindrus	9	0.13
25	TURF ALG	mixed assemblage	74	1.04
26	ENC COR	Porites astreoides	10	0.14
27	TURF ALG	mixed assemblage	22	0.31
28	RO	reef overhang	21	0.30
29	TURF ALG	mixed assemblage	19	0.27
30	MAS COR	Montastrea annularis	9	0.13
31	TURF ALG	mixed assemblage	22	0.31
32	MAS COR	Siderastrea siderea	17	0.24
33	TURF ALG	mixed assemblage	11	0.15
34	MAS COR	Montastrea cavernosa	32	0.45
35	TURF ALG	mixed assemblage	58	0.82
36	ENC COR	Porites astreoides	5	0.07
37	FLE ALG	Dictyota sp.	5	0.07
38	ENC SPO	encrusting sponge	39	0.55
39	TURF ALG	mixed assemblage	68	0.96
40	ENC COR	Porites astreoides	4	0.06
41	TURF ALG	mixed assemblage	30	0.42
42	ENC COR	Porites astreoides	4	0.06
43	FLE ALG	Dictyota sp.	21	0.30
44	TURF ALG	mixed assemblage	25	0.35

Gorgonians = 9

Note: Turf Alg composed primarily of short filamentous algae, *Lobophora variegata*, *Dictyota* sp. *Halimeda* sp. and fine sediment

**APPENDIX 4.6 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
PLAYA LAS MUJERES, MONA ISLAND. JUN 7, 2000.**

DEPTH: 18.8 m
RUGOSITY: 3.47 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	34	0.48
1	ERE SPO	erect sponge	3	0.04
2	MAS COR	Diploria labyrinthiformis	21	0.30
3	TURF ALG	mixed assemblage	2	0.03
4	MAS COR	Montastrea annularis	59	0.83
5	TURF ALG	mixed assemblage	46	0.65
6	RO	reef overhang	10	0.14
7	TURF ALG	mixed assemblage	20	0.28
8	RO	reef overhang	13	0.18
9	TURF ALG	mixed assemblage	36	0.51
10	RO	reef overhang	11	0.15
11	TURF ALG	mixed assemblage	20	0.28
12	MAS COR	Montastrea annularis	50	0.70
13	TURF ALG	mixed assemblage	9	0.13
14	ERE SPO	erect sponge	8	0.11
15	MAS COR	Montastrea annularis	95	1.34
16	TURF ALG	mixed assemblage	60	0.85
17	ENC COR	Porites astreoides	18	0.25
18	TURF ALG	mixed assemblage	66	0.93
19	MAS COR	Montastrea annularis	6	0.08
20	TURF ALG	mixed assemblage	68	0.96
21	FOL COR	Agaricia agaricites	10	0.14
22	FLE ALG	Dictyota sp.	5	0.07
23	TURF ALG	mixed assemblage	49	0.69
24	ENC COR	Porites astreoides	8	0.11
25	TURF ALG	mixed assemblage	4	0.06
26	FOL COR	Agaricia agaricites	3	0.04
27	TURF ALG	mixed assemblage	71	1.00
28	MAS COR	Montastrea annularis	9	0.13
29	TURF ALG	mixed assemblage	15	0.21
30	MAS COR	Montastrea annularis	13	0.18
31	RO	reef overhang	10	0.14
32	TURF ALG	mixed assemblage	20	0.28
33	RO	reef overhang	5	0.07
34	ERE SPO	erect sponge	26	0.37
35	TURF ALG	mixed assemblage	31	0.44
36	FOL COR	Agaricia agaricites	4	0.06
37	TURF ALG	mixed assemblage	18	0.25

Gorgonians = 8

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Padina* sp. and fine sediment

**APPENDIX 4.7 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
PLAYA LAS MUJERES, MONA ISLAND. JUNE 7, 2000.**

DEPTH: 18.8 m
RUGOSITY: 4.17 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	FLE ALG	Lobophora variegata	3	0.04
1	ENC COR	Porites astreoides	10	0.14
2	FLE ALG	Lobophora variegata	3	0.04
3	TURF ALG	mixed assemblage	5	0.07
4	FLE ALG	Lobophora variegata	8	0.11
5	TURF ALG	mixed assemblage	10	0.14
6	FLE ALG	Lobophora variegata	30	0.42
7	TURF ALG	mixed assemblage	6	0.08
8	ENC COR	Porites astreoides	7	0.10
9	TURF ALG	mixed assemblage	10	0.14
10	FLE ALG	Lobophora variegata	4	0.06
11	MAS COR	Meandrina meandrites	4	0.06
12	TURF ALG	mixed assemblage	10	0.14
13	FLE ALG	Lobophora variegata	26	0.37
14	TURF ALG	mixed assemblage	8	0.11
15	MAS COR	Montastrea annularis	24	0.34
16	ENC SPO	Xestospongia muta	105	1.48
17	MAS COR	Montastrea annularis	23	0.32
18	MAS COR	Colpophyllia natans	14	0.20
19	FLE ALG	Lobophora variegata	15	0.21
20	BRA COR	Porites porites	23	0.32
21	FLE ALG	Lobophora variegata	6	0.08
22	HOLE	hole	5	0.07
23	MAS COR	Mycetophyllia ferox	18	0.25
24	ENC COR	Porites astreoides	8	0.11
25	FOL COR	Agaricia agaricites	3	0.04
26	FLE ALG	Lobophora variegata	25	0.35
27	TURF ALG	mixed assemblage	5	0.07
28	MAS COR	Montastrea annularis	22	0.31
29	TURF ALG	mixed assemblage	30	0.42
30	MAS COR	Montastrea annularis	27	0.38
31	TURF ALG	mixed assemblage	12	0.17
32	ENC SPO	encrusting sponge	10	0.14
33	TURF ALG	mixed assemblage	8	0.11
34	FLE ALG	Lobophora variegata	26	0.37
35	TURF ALG	mixed assemblage	20	0.28
36	MAS COR	Montastrea annularis	25	0.35
37	RO	reef overhang	24	0.34
38	MAS COR	Montastrea annularis	10	0.14
39	FOL COR	Agaricia agaricites	4	0.06
40	RO	reef overhang	20	0.28
41	TURF ALG	mixed assemblage	20	0.28
42	ERE SPO	erect sponge	12	0.17
43	ENC SPO	encrusting sponge	18	0.25
44	FLE ALG	Lobophora variegata	15	0.21
45	RO	reef overhang	9	0.13
46	TURF ALG	mixed assemblage	18	0.25

47	FOL COR	Agaricia agaricites	13	0.18
48	TURF ALG	mixed assemblage	14	0.20
49	MILLE	Millepoa alcornis	12	0.17
50	ENC SPO	encrusting sponge	7	0.10
51	TURF ALG	mixed assemblage	9	0.13
52	BRA COR	Porites porites	8	0.11
53	TURF ALG	mixed assemblage	10	0.14
54	FLE ALG	Lobophora variegata	12	0.17
55	TURF ALG	mixed assemblage	15	0.21
56	FOL COR	Agaricia agaricites	6	0.08
57	ENC SPO	encrusting sponge	7	0.10
58	TURF ALG	mixed assemblage	4	0.06
59	TURF ALG	mixed assemblage	6	0.08
60	BRA COR	Porites porites	3	0.04
61	RO	reef overhang	13	0.18
62	TURF ALG	mixed assemblage	20	0.28
63	FLE ALG	Dictyota sp.	59	0.83
64	TURF ALG	mixed assemblage	6	0.08
65	FOL COR	Agaricia agaricites	20	0.28
66	RO	reef overhang	7	0.10
67	MAS COR	Diploria labyrinthiformis	7	0.10

Gorgonians = 6

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Padina* sp. and fine sediment

**APPENDIX 4.8 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
PLAYA LAS MUJERES, MONA ISLAND. JUN 7, 2000.**

DEPTH: 18.8 m
RUGOSITY: 4.28 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	23	0.32
1	TURF ALG	mixed assemblage	3	0.04
2	MAS COR	Montastrea annularis	2	0.03
3	TURF ALG	mixed assemblage	7	0.10
4	MAS COR	Montastrea annularis	7	0.10
5	TURF ALG	mixed assemblage	4	0.06
6	RO	reef overhang	37	0.52
7	TURF ALG	mixed assemblage	35	0.49
8	RO	reef overhang	15	0.21
9	ERE SPO	Xestospongia muta	63	0.89
10	RO	reef overhang	8	0.11
11	FLE ALG	Dictyota sp.	13	0.18
12	RO	reef overhang	4	0.06
13	MAS COR	Montastrea annularis	5	0.07
14	RO	reef overhang	2	0.03
15	MAS COR	Montastrea annularis	9	0.13
16	TURF ALG	mixed assemblage	3	0.04
17	MAS COR	Montastrea annularis	15	0.21
18	RO	reef overhang	7	0.10
19	TURF ALG	mixed assemblage	3	0.04
20	RO	reef overhang	5	0.07
21	MAS COR	Montastrea annularis	11	0.15
22	TURF ALG	mixed assemblage	13	0.18
23	MAS COR	Montastrea annularis	15	0.21
24	RO	reef overhang	7	0.10
25	FOL COR	Agaricia agaricites	7	0.10
26	TURF ALG	mixed assemblage	32	0.45
27	FOL COR	Agaricia agaricites	3	0.04
28	TURF ALG	mixed assemblage	8	0.11
29	MAS COR	Montastrea annularis	6	0.08
30	TURF ALG	mixed assemblage	12	0.17
31	RO	reef overhang	7	0.10
32	TURF ALG	mixed assemblage	58	0.82
33	RO	reef overhang	3	0.04
34	MAS COR	Montastrea annularis	20	0.28
35	TURF ALG	mixed assemblage	17	0.24
36	SAND	sand	13	0.18
37	RO	reef overhang	4	0.06
38	TURF ALG	mixed assemblage	42	0.59
39	RO	reef overhang	4	0.06
40	TURF ALG	mixed assemblage	22	0.31
41	FOL COR	Agaricia agaricites	11	0.15
42	TURF ALG	mixed assemblage	48	0.68
43	MAS COR	Diploria strigosa	9	0.13
44	TURF ALG	mixed assemblage	32	0.45
45	ERE SPO	erect sponge	8	0.11
46	TURF ALG	mixed assemblage	24	0.34

47	MAS COR	Montastrea annularis	42	0.59
48	TURF ALG	mixed assemblage	7	0.10
49	RO	reef overhang	8	0.11
50	MAS COR	Montastrea annularis	25	0.35
51	RO	reef overhang	4	0.06
52	MAS COR	Meandrina meandrites	10	0.14
53	FOL COR	Agaricia agaricites	4	0.06
54	TURF ALG	mixed assemblage	4	0.06
55	FOL COR	Agaricia agaricites	15	0.21
56	RO	reef overhang	3	0.04
57	MAS COR	Montastrea annularis	11	0.15
58	TURF ALG	mixed assemblage	64	0.90
59	ENC COR	Porites astreoides	6	0.08
60	SAND	sand	10	0.14
61	FOL COR	Agaricia agaricites	4	0.06
62	TURF ALG	mixed assemblage	18	0.25
63	SAND	sand	10	0.14
64	ENC COR	Porites astreoides	5	0.07
65	TURF ALG	mixed assemblage	9	0.13
66	ERE SPO	erect sponge	5	0.07
67	TURF ALG	mixed assemblage	4	0.06
68	RO	reef overhang	15	0.21
69	TURF ALG	mixed assemblage	25	0.35

Gorgonians = 13

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Padina* sp. and fine sediment

**APPENDIX 4.9 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
PLAYA LAS MUJERES, MONA ISLAND. JUNE 7, 2000.**

DEPTH: 16.6 m
RUGOSITY: 3.10 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	12	0.17
1	ENC COR	Porites astreoides	4	0.06
2	BRA COR	Eusmilia fastigiata	5	0.07
3	MILLE	Millepora alcicornis	1	0.01
4	BRA COR	Eusmilia fastigiata	15	0.21
5	TURF ALG	mixed assemblage	2	0.03
6	FOL COR	Agaricia agaricites	5	0.07
7	TURF ALG	mixed assemblage	6	0.08
8	BRA COR	Eusmilia fastigiata	6	0.08
9	ENC SPO	encrusting sponge	3	0.04
10	BRA COR	Eusmilia fastigiata	4	0.06
11	RO	reef overhang	6	0.08
12	ENC COR	Porites astreoides	5	0.07
13	TURF ALG	mixed assemblage	30	0.42
14	MAS COR	Montastrea annularis	27	0.38
15	TURF ALG	mixed assemblage	13	0.18
16	ENC COR	Porites astreoides	5	0.07
17	TURF ALG	mixed assemblage	10	0.14
18	FOL COR	Agaricia fragilis	4	0.06
19	TURF ALG	mixed assemblage	26	0.37
20	ENC SPO	encrusting sponge	20	0.28
21	RO	reef overhang	5	0.07
22	MAS COR	Colpophyllia natans	66	0.93
23	RO	reef overhang	15	0.21
24	TURF ALG	mixed assemblage	11	0.15
25	FOL COR	Agaricia agaricites	4	0.06
26	TURF ALG	mixed assemblage	34	0.48
27	ENC COR	Porites astreoides	4	0.06
28	TURF ALG	mixed assemblage	22	0.31
29	RO	reef overhang	5	0.07
30	MAS COR	Montastrea annularis	10	0.14
31	RO	reef overhang	5	0.07
32	MAS COR	Montastrea annularis	36	0.51
33	TURF ALG	mixed assemblage	16	0.23
34	MAS COR	Montastrea annularis	26	0.37
35	TURF ALG	mixed assemblage	63	0.89
36	RO	reef overhang	20	0.28
37	FOL COR	Agaricia agaricites	4	0.06
38	ENC SPO	encrusting sponge	4	0.06
39	FOL COR	Agaricia agaricites	6	0.08
40	TURF ALG	mixed assemblage	47	0.66
41	RO	reef overhang	16	0.23
42	MAS COR	Colpophyllia natans	40	0.56
43	RO	reef overhang	4	0.06
44	MAS COR	Montastrea annularis	133	1.87
45	RO	reef overhang	13	0.18

46	ENC COR	Porites astreoides	5	0.07
47	TURF ALG	mixed assemblage	10	0.14
48	MILLE	Millepora alcicornis	1	0.01
49	TURF ALG	mixed assemblage	29	0.41
50	ENC COR	Porites astreoides	7	0.10
51	TURF ALG	mixed assemblage	8	0.11
52	MAS COR	Diploria strigosa	14	0.20
53	TURF ALG	mixed assemblage	4	0.06
54	ENC COR	Porites astreoides	7	0.10
55	MAS COR	Mycetophyllia lamarckiana	4	0.06
56	RO	reef overhang	17	0.24
57	TURF ALG	mixed assemblage	6	0.08

Gorgonians = 5

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Padina* sp. and fine sediment

**APPENDIX 4.10 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
PLAYA LAS MUJERES, MONA ISLAND. JUNE 7, 2000.**

DEPTH: 16.6 m
RUGOSITY: 3.21 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Colpophyllia natans	45	0.63
1	TURF ALG	mixed assemblage	1	0.01
2	MAS COR	Diploria labyrinthiformis	13	0.18
3	RO	reef overhang	9	0.13
4	MAS COR	Montastrea annularis	13	0.18
5	TURF ALG	mixed assemblage	7	0.10
6	MAS COR	Montastrea annularis	9	0.13
7	RO	reef overhang	4	0.06
8	MAS COR	Montastrea annularis	10	0.14
9	TURF ALG	mixed assemblage	7	0.10
10	SAND	sand	24	0.34
11	RO	reef overhang	23	0.32
12	ENC SPO	encrusting sponge	27	0.38
13	RO	reef overhang	7	0.10
14	MAS COR	Montastrea annularis	83	1.17
15	TURF ALG	mixed assemblage	10	0.14
16	ERE SPO	erect sponge	5	0.07
17	TURF ALG	mixed assemblage	4	0.06
18	RO	reef overhang	11	0.15
19	MAS COR	Montastrea annularis	33	0.46
20	HOLE	hole	2	0.03
21	TURF ALG	mixed assemblage	35	0.49
22	RO	reef overhang	10	0.14
23	ENC COR	Porites astreoides	5	0.07
24	MAS COR	Montastrea annularis	4	0.06
25	TURF ALG	mixed assemblage	10	0.14
26	RO	reef overhang	5	0.07
27	MAS COR	Montastrea annularis	22	0.31
28	TURF ALG	mixed assemblage	15	0.21
29	MAS COR	Montastrea annularis	9	0.13
30	TURF ALG	mixed assemblage	24	0.34
31	ENC SPO	encrusting sponge	7	0.10
32	TURF ALG	mixed assemblage	1	0.01
33	MAS COR	Montastrea annularis	2	0.03
34	RO	reef overhang	2	0.03
35	MAS COR	Colpophyllia natans	78	1.10
36	RO	reef overhang	24	0.34
37	MAS COR	Montastrea annularis	27	0.38
38	TURF ALG	mixed assemblage	10	0.14
39	MAS COR	Montastrea annularis	31	0.44
40	ENC SPO	encrusting sponge	5	0.07
41	FOL COR	Agaricia agaricites	17	0.24
42	RO	reef overhang	16	0.23
43	TURF ALG	mixed assemblage	5	0.07
44	ERE SPO	erect sponge	8	0.11
45	TURF ALG	mixed assemblage	28	0.39

46	BRA COR	Madracis decactis	2	0.03
47	TURF ALG	mixed assemblage	11	0.15
48	MAS COR	Montastrea annularis	3	0.04
49	TURF ALG	mixed assemblage	26	0.37
50	RO	reef overhang	4	0.06
51	TURF ALG	mixed assemblage	70	0.99
52	ENC COR	Porites astreoides	2	0.03
53	TURF ALG	mixed assemblage	6	0.08
54	SAND	sand	10	0.14
55	ENC COR	Porites astreoides	3	0.04
56	TURF ALG	mixed assemblage	10	0.14
57	RO	reef overhang	3	0.04
58	TURF ALG	mixed assemblage	3	0.04
59	MAS COR	Siderastrea siderea	17	0.24
60	MAS COR	Colpophyllia natans	14	0.20
61	TURF ALG	mixed assemblage	1	0.01
62	MAS COR	Colpophyllia natans	6	0.08

Gorgonians = 8

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Padina* sp. and fine sediment

**APPENDIX 4.11 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
LAS CARMELITAS, MONA ISLAND. JUNE 8, 2000.**

DEPTH: 9.1 m
RUGOSITY: 5.47 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	52	0.73
1	TURF ALG	mixed assemblage	56	0.79
2	MAS COR	Montastrea annularis	103	1.45
3	TURF ALG	mixed assemblage	25	0.35
4	MAS COR	Montastrea annularis	41	0.58
5	ENC SPO	encrusting sponge	30	0.42
6	CAL ALG	Halimeda sp.	6	0.08
7	TURF ALG	mixed assemblage	21	0.30
8	RO	reef overhang	3	0.04
9	MAS COR	Montastrea annularis	10	0.14
10	TURF ALG	mixed assemblage	9	0.13
11	MAS COR	Montastrea annularis	36	0.51
12	TURF ALG	mixed assemblage	21	0.30
13	MAS COR	Montastrea annularis	43	0.61
14	RO	reef overhang	27	0.38
15	MAS COR	Montastrea annularis	21	0.30
16	TURF ALG	mixed assemblage	15	0.21
17	MAS COR	Montastrea annularis	26	0.37
18	RO	reef overhang	30	0.42
19	TURF ALG	mixed assemblage	69	0.97
20	MAS COR	Diploria albyrinthiformis	13	0.18
21	TURF ALG	mixed assemblage	28	0.39
22	RO	reef overhang	27	0.38
23	TURF ALG	mixed assemblage	173	2.44
24	ENC SPO	encrusting sponge	9	0.13
25	TURF ALG	mixed assemblage	33	0.46
26	ENC COR	Porites astreoides	7	0.10
27	TURF ALG	mixed assemblage	4	0.06
28	BRA COR	Eusmilia fastigiata	5	0.07
29	TURF ALG	mixed assemblage	7	0.10
30	BRA COR	Eusmilia fastigiata	5	0.07
31	FOL COR	Agaricia agaricites	4	0.06
32	RO	reef overhang	9	0.13
33	MAS COR	Colpophyllia natans	18	0.25
34	FLE ALG	Dictyota sp.	30	0.42
35	MAS COR	Colpophyllia natans	15	0.21
36	TURF ALG	mixed assemblage	53	0.75
37	MAS COR	Montastrea annularis	14	0.20

Gorgonians = 1

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Halimeda* sp.

**APPENDIX 4.12 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
LAS CARMELITAS, MONA ISLAND. JUNE 8, 2000.**

DEPTH: 9.1 m

RUGOSITY: 5.58 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	29	0.41
1	FOL COR	Agaricia agaricites	7	0.10
2	TURF ALG	mixed assemblage	13	0.18
3	OH	reef overhang	14	0.20
4	MAS COR	Montastrea annularis	39	0.55
5	OH	reef overhang	8	0.11
6	MAS COR	Montastrea annularis	2	0.03
7	TURF ALG	mixed assemblage	26	0.37
8	OH	reef overhang	6	0.08
9	TURF ALG	mixed assemblage	31	0.44
10	OH	reef overhang	5	0.07
11	TURF ALG	mixed assemblage	40	0.56
12	MAS COR	Montastrea annularis	23	0.32
13	OH	reef overhang	13	0.18
14	MAS COR	Montastrea annularis	13	0.18
15	OH	reef overhang	10	0.14
16	MAS COR	Montastrea annularis	74	1.04
17	OH	reef overhang	5	0.07
18	CAL ALG	Halimeda sp.	5	0.07
19	OH	reef overhang	25	0.35
20	MAS COR	Montastrea annularis	10	0.14
21	OH	reef overhang	26	0.37
22	TURF ALG	mixed assemblage	10	0.14
23	MAS COR	Diploria strigosa	2	0.03
24	TURF ALG	mixed assemblage	27	0.38
25	ENC COR	Porites astreoides	4	0.06
26	TURF ALG	mixed assemblage	29	0.41
27	OH	reef overhang	6	0.08
28	TURF ALG	mixed assemblage	7	0.10
29	OH	reef overhang	14	0.20
30	TURF ALG	mixed assemblage	21	0.30
31	OH	reef overhang	28	0.39
32	TURF ALG	mixed assemblage	26	0.37
33	ENC COR	Porites astreoides	3	0.04
34	ENC SPO	encrusting sponge	10	0.14
35	TURF ALG	mixed assemblage	6	0.08
36	ENC SPO	encrusting sponge	4	0.06
37	TURF ALG	mixed assemblage	9	0.13
38	FOL COR	Agaricia agaricites	2	0.03
39	TURF ALG	mixed assemblage	28	0.39
40	FOL COR	Agaricia agaricites	2	0.03
41	TURF ALG	mixed assemblage	36	0.51
42	FOL COR	Agaricia agaricites	2	0.03
43	TURF ALG	mixed assemblage	4	0.06
44	TURF ALG	mixed assemblage	26	0.37

45	OH	reef overhang	40	0.56
46	TURF ALG	mixed assemblage	16	0.23
47	MAS COR	Montastrea annularis	43	0.61
48	TURF ALG	mixed assemblage	12	0.17
49	MAS COR	Montastrea annularis	11	0.15
50	TURF ALG	mixed assemblage	43	0.61
51	ZOAN	Palythoa caribaeorum	13	0.18
52	TURF ALG	mixed assemblage	68	0.96
53	ENC SPO	encrusting sponge	9	0.13
54	TURF ALG	mixed assemblage	46	0.65
55	OH	reef overhang	28	0.39
56	TURF ALG	mixed assemblage	34	0.48
57	MAS COR	Montastrea cavernosa	13	0.18

Gorgonians = 6

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Halimeda* sp. and fine sediment

**APPENDIX 4.13 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
LAS CARMELITAS, MONA ISLAND. JUNE 8, 2000.**

DEPTH: 9.1 m
RUGOSITY: 6.48 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	mixed assemblage	9	0.13
1	MAS COR	Montastrea annularis	7	0.10
2	TURF ALG	mixed assemblage	7	0.10
3	MAS COR	Montastrea annularis	4	0.06
4	RO	reef overhang	5	0.07
5	TURF ALG	mixed assemblage	7	0.10
6	MAS COR	Montastrea annularis	21	0.30
7	CAL ALG	Halimeda sp.	10	0.14
8	RO	reef overhang	32	0.45
9	MAS COR	Diploria strigosa	8	0.11
10	TURF ALG	mixed assemblage	12	0.17
11	MAS COR	Diploria strigosa	23	0.32
12	TURF ALG	mixed assemblage	4	0.06
13	RO	reef overhang	32	0.45
14	TURF ALG	mixed assemblage	34	0.48
15	MAS COR	Montastrea annularis	12	0.17
16	TURF ALG	mixed assemblage	103	1.45
17	MAS COR	Montastrea annularis	50	0.70
18	TURF ALG	mixed assemblage	5	0.07
19	ERE SPO	erect sponge	18	0.25
20	TURF ALG	mixed assemblage	12	0.17
21	MAS COR	Montastrea cavernosa	10	0.14
22	TURF ALG	mixed assemblage	23	0.32
23	RO	reef overhang	4	0.06
24	MAS COR	Diploria labyrinthiformis	34	0.48
25	MAS COR	Diploria strigosa	10	0.14
26	TURF ALG	mixed assemblage	3	0.04
27	BRA COR	Madracis decactis	2	0.03
28	TURF ALG	mixed assemblage	6	0.08
29	RO	reef overhang	13	0.18
30	MAS COR	Montastrea annularis	32	0.45
31	RO	reef overhang	16	0.23
32	MAS COR	Colpophyllia natans	7	0.10
33	TURF ALG	mixed assemblage	15	0.21
34	RO	reef overhang	7	0.10
35	TURF ALG	mixed assemblage	25	0.35
36	RO	reef overhang	7	0.10
37	TURF ALG	mixed assemblage	5	0.07
38	RO	reef overhang	17	0.24
39	ENC COR	Porites astreoides	12	0.17
40	RO	reef overhang	14	0.20
41	TURF ALG	mixed assemblage	30	0.42
42	RO	reef overhang	19	0.27
43	MAS COR	Colpophyllia natans	12	0.17
44	TURF ALG	mixed assemblage	30	0.42
45	MAS COR	Montastrea annularis	8	0.11
46	TURF ALG	mixed assemblage	3	0.04

47	MAS COR	Montastrea annularis	29	0.41
48	TURF ALG	mixed assemblage	9	0.13
49	MAS COR	Montastrea annularis	31	0.44
50	TURF ALG	mixed assemblage	22	0.31
51	HOLE	hole	18	0.25
52	MAS COR	Montastrea annularis	11	0.15
53	CAL ALG	Halimeda goreau	7	0.10
54	TURF ALG	mixed assemblage	42	0.59
55	RO	reef overhang	4	0.06
56	FOL COR	Agaricia agaricites	10	0.14
57	TURF ALG	mixed assemblage	20	0.28
58	HOLE	hole	10	0.14
59	TURF ALG	mixed assemblage	7	0.10
60	RO	reef overhang	11	0.15
61	TURF ALG	mixed assemblage	16	0.23
62	FOL COR	Agaricia agaricites	13	0.18
63	RO	reef overhang	6	0.08
64	FOL COR	Agaricia agaricites	9	0.13
65	TURF ALG	mixed assemblage	13	0.18
66	CAL ALG	Halimeda goreau	8	0.11
67	RO	reef overhang	6	0.08
68	MAS COR	Montastrea annularis	9	0.13
69	TURF ALG	mixed assemblage	12	0.17
70	RO	reef overhang	6	0.08
71	TURF ALG	mixed assemblage	23	0.32
72	MAS COR	Montastrea annularis	7	0.10
73	RO	reef overhang	18	0.25
74	TURF ALG	mixed assemblage	14	0.20

Gorgonians = 4

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Halimeda* sp. and fine sediment

**APPENDIX 4.14 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
LAS CARMELITAS, MONA ISLAND. JUNE 8, 2000.**

DEPTH: 9.1 m
RUGOSITY: 2.90 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	SAND	sand	3	0.04
1	ENC COR	Porites astreoides	22	0.31
2	TURF ALG	mixed assemblage	24	0.34
3	FLE ALG	Dictyota sp.	6	0.08
4	OH	reef overhang	5	0.07
5	ENC COR	Porites astreoides	4	0.06
6	TURF ALG	mixed assemblage	17	0.24
7	OH	reef overhang	5	0.07
8	TURF ALG	mixed assemblage	31	0.44
9	CAL ALG	Amphiroa sp.	5	0.07
10	TURF ALG	mixed assemblage	58	0.82
11	SAND	sand	5	0.07
12	OH	reef overhang	22	0.31
13	TURF ALG	mixed assemblage	15	0.21
14	MAS COR	Montastrea annularis	11	0.15
15	TURF ALG	mixed assemblage	6	0.08
16	MAS COR	Montastrea annularis	38	0.54
17	TURF ALG	mixed assemblage	70	0.99
18	BRA COR	Porites furcata	10	0.14
19	TURF ALG	mixed assemblage	96	1.35
20	FOL COR	Agaricia agaricites	11	0.15
21	TURF ALG	mixed assemblage	10	0.14
22	MAS COR	Meandrina brasiliensis	4	0.06
23	TURF ALG	mixed assemblage	2	0.03
24	FOL COR	Agaricia agaricites	4	0.06
25	TURF ALG	mixed assemblage	16	0.23
26	MAS COR	Montastrea annularis	5	0.07
27	TURF ALG	mixed assemblage	9	0.13
28	MAS COR	Montastrea annularis	34	0.48
29	OH	reef overhang	13	0.18
30	MAS COR	Montastrea annularis	10	0.14
31	OH	reef overhang	7	0.10
32	MAS COR	Montastrea annularis	8	0.11
33	TURF ALG	mixed assemblage	9	0.13
34	ENC COR	Porites astreoides	12	0.17
35	TURF ALG	mixed assemblage	99	1.39
36	MAS COR	Montastrea cavernosa	11	0.15
37	TURF ALG	mixed assemblage	93	1.31
38	MAS COR	Diploria strigosa	5	0.07
39	TURF ALG	mixed assemblage	17	0.24
40	OH	reef overhang	6	0.08
41	ERE SPO	erect sponge	15	0.21
42	TURF ALG	mixed assemblage	49	0.69
43	ENC COR	Porites astreoides	7	0.10
44	TURF ALG	mixed assemblage	7	0.10

Gorgonians = 4

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Halimeda* sp. and fine sediment

**APPENDIX 4.15 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
LAS CARMELITAS, MONA ISLAND. JUNE 8, 2000.**

DEPTH: 9.1 m
RUGOSITY: 2.21 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	32	0.45
1	TURF ALG	mixed assemblage	3	0.04
2	RO	reef overhang	10	0.14
3	TURF ALG	mixed assemblage	3	0.04
4	RO	reef overhang	9	0.13
5	TURF ALG	mixed assemblage	20	0.28
6	MAS COR	Colpophyllia natans	12	0.17
7	TURF ALG	mixed assemblage	10	0.14
8	CORAL	juvenile coral	3	0.04
9	TURF ALG	mixed assemblage	42	0.59
10	HOLE	hole	6	0.08
11	TURF ALG	mixed assemblage	94	1.32
12	MAS COR	Montastrea annularis	6	0.08
13	TURF ALG	mixed assemblage	54	0.76
14	FLE ALG	Dictyota sp.	6	0.08
15	TURF ALG	mixed assemblage	15	0.21
16	RO	reef overhang	10	0.14
17	TURF ALG	mixed assemblage	23	0.32
18	ENC COR	Porites astreoides	15	0.21
19	TURF ALG	mixed assemblage	83	1.17
20	ENC SPO	encrusting sponge	5	0.07
21	TURF ALG	mixed assemblage	18	0.25
22	CAL ALG	Halimeda sp.	8	0.11
23	TURF ALG	mixed assemblage	16	0.23
24	ENC SPO	encrusting sponge	7	0.10
25	TURF ALG	mixed assemblage	70	0.99
26	BRA COR	Porites furcata	20	0.28
27	TURF ALG	mixed assemblage	130	1.83
28	RO	reef overhang	8	0.11
29	TURF ALG	mixed assemblage	60	0.85
30	MAS COR	Diploria strigosa	4	0.06
31	TURF ALG	mixed assemblage	38	0.54
32	FOL COR	Agaricia agaricites	4	0.06
33	BRA COR	Porites furcata	23	0.32

Gorgonians = 2

Note: Turf Alg composed primarily of short filamentous algae, *Dictyota* sp., *Halimeda* sp. and fine sediment