

FINAL REPORT

**MONITORING OF CORAL REEF COMMUNITIES FROM
ISLA DE VIEQUES, PUERTO RICO, 2004**

by :

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SUMMARY

Coral reef communities in Vieques were monitored during the summer 2004 for the first time since the initial baseline characterization survey in 2001. A total of six reefs were included in the monitoring effort. These were: Caballo Blanco, Coronas and Mosquito Reefs in the north coast; Monte Pirata and Canjilones Reefs on the west coast and Boya Esperanza Reef on the south coast. The work also included a baseline characterization of Black Jack, a deep coral reef system (30 – 40 meters) associated with a submerged seamount on the south coast of Vieques. Monitoring of sessile-benthic, motile megabenthic and fish communities was based upon quantitative assessments from sets of five permanent transects established at each reef and a non-random active search census (ASEC) of commercially important fish and shellfish populations.

No major changes of the sessile-benthic community structure of Vieques reefs were measured three years after the baseline characterization survey. Live stony coral cover varied < 2.5 % at five out of the six reefs monitored and < 1 % at three (Canjilones, Pirata and Mosquito). The largest variation was measured at Coronas Reef, which presented a decline in mean coral cover of 3.9 %. Analysis of the variation in live coral cover at Coronas Reef suggests that the difference was related to sampling variability and not associated with deterioration of the coral community. The taxonomic structure of stony corals intercepted by (permanent) line transects remained virtually unchanged between the baseline characterization survey in 2001 and the present monitoring effort. Boulder Brain Coral, *Montastrea annularis* was the dominant species in terms of substrate cover representing between 40 - 84.2 % of the total stony coral substrate cover at all seven reefs surveyed (including Black Jack Reef). Widespread coral bleaching associated with diseases or other causes was not observed to be occurring to any significant extent in any of the Vieques reefs. Mechanical displacement of coral colonies within one of the monitoring transect was observed at Pirata Reef, on the west coast. Damage appears to have been caused by anchoring.

Turf algae remained as the dominant sessile-benthic (biotic) component of the reef community in terms of substrate cover at all reefs surveyed and appears to represent a quasi permanent state of the substrate in most reefs around Puerto Rico. Fleshy, coralline and calcareous macroalgae were observed from Vieques reefs, but constituted minor components of the benthic community, as well as sponges, ascidians, zoanthids, and encrusting gorgonians. Soft corals, or erect gorgonians varied between 1 and 4 colonies per transect from the baseline characterization survey in 2001 at the six reefs surveyed. Three of the six reefs presented a variation of only one (plus or minus) gorgonian colonies

per transect. This variation seems to reflect a natural and dynamic process of soft coral growth, recruitment and mortality, but may be also influenced by sampling variability due to the movement of the transect line upon surge conditions underwater.

Fish abundance (range 66.2 – 549.3 Ind/30 m²) and species richness (16 – 26.6 spp/30 m²) within belt-transects increased at all reefs surveyed relative to the baseline characterization in 2001. The increment in total abundance was largely associated with the abundance of Masked Goby (*Coryphopterus personatus*), a small schooling fish that forms large “swarms” near holes, crevices and below reef overhangs. Although reported as a numerically dominant species in the previous survey from several reefs, its real abundance was probably under-estimated due to its cryptic behavior under conditions of strong surge prevailing during the 2001 survey. A marked increment in abundance of other schooling fish populations that swim above coral heads in the reef, such as *Chromis spp.* and *Clepticus spp.* was also noted. It is possible that the overall increment in species richness is also related to the higher underwater visibility and the lower surge action prevailing during the present monitoring event in the shallow reefs of Vieques.

In terms of trophic structure, the fish communities from the reefs in Vieques appear to be well balanced. Parrotfishes (*Sparisoma spp.*, *Scarus spp.*), Doctorfishes (*Acanthurus spp.*) and some of the damselfish species (*Stegastes spp.*) comprised a species rich and abundant herbivorous assemblage from most reefs. Zooplanktivorous fishes, represented by numerically dominant populations, such as *Chromis spp.*, Reef Silversides, Masked Gobies and Creole Wrasse were prominent and constitute an important link that transfers plankton based biomass to pelagic piscivores, represented by juvenile snappers, jacks, Cero Mackerel, Great Barracuda and sharks. Small epibenthic invertebrate predators were also represented by several populations, including the wrasses (*Thalassoma*, *Halichoeres spp.*), hamlets (*Hypoplectrus spp.*), squirrelfishes, (*Holocentrus spp.*), blennies (*Ophioblennius sp.*) and gobies (*Gobiosoma*, *Coryphopterus spp.*). Large benthic invertebrate feeders, such as Hogfishes, Stingrays, Lane and Schoolmaster snappers were common. Top benthic and pelagic predators included the Mutton Snapper, Tiger and Nassau Grouper, Nurse Sharks and Reef Sharks.

Several large and/or commercially important fish species were observed during the Active Search Census (ASEC). These included juveniles and adult Mutton Snapper (*Lutjanus analis*), Nassau and Tiger Groupers, Red Hinds, Hogfishes, Nurse Shark, Coneys (*Cephalopholis fulva*), and schools of juveniles and young adult Yellowtail, Lane and Schoolmaster Snappers, among other species. Large pelagic commercially important

species included the Great Barracuda, Rainbow Runner and the Cero Mackerel. All snapper and grouper species, as well as the reef sharks and hogfishes were observed in young to full adult sizes. The size frequency distribution data provided by the ASEC technique suggest that the reefs surveyed represent residential habitats for adult commercially important species and foraging habitats for top predators, such as reef sharks, mackerels and barracuda.

Introduction

This work represents the first monitoring event of coral reef communities from Isla de Vieques. Baseline quantitative surveys of sessile benthic, motile megabenthic and reef fish communities were performed by García et al. (2001 a) during the summer of 2001, as part of a series of baseline assessments prepared for natural reserve sites in Puerto Rico (García et al. 2001 b, c, d). The coral reefs of Isla de Vieques are of particular concern because of their economic relevance as ecotourism attraction sites, and also because they function as essential habitats for commercially important fish and shellfish (mostly Queen Conch and Spiny Lobster) populations that are locally exploited. Due to the up-current location of the Vieques Island, its coral reefs and other coastal habitats are potentially important sources of fish and marine invertebrate larvae (including lobster) that can replenish (Puerto Rico's) mainland populations down-current from Vieques and Culebra Islands (Roberts, 1997).

Previous reports on Vieques coral reefs include the work by Antonius and Weiner (1982) based on the Florida Reef Foundation study prepared in relation to a suit against the Navy back in 1978. In this study, a number of shallow coral reef sections from within the eastern military bombing range in Vieques were compared to other reefs from the U. S. Virgin Islands. Antonius and Weiner (1982) concluded that the reefs within the bombing range in Vieques exhibited a slightly superior health condition in terms of diseased and/or dead corals than the control reefs from the Virgin Islands. Their theory is that man utilization of coral reefs for tourism and fishing activities is perhaps more detrimental than the bombing practices by the U. S. Navy at Isla de Vieques. They also commented on the difficulties of assessment of bomb versus storm induced breakage of coral colonies.

Reefs outside the U. S. Navy shooting range or deep reef sections within the shooting range had not been previously characterized. In the other available study of the coral reefs from Isla de Vieques, Dodge (1982) did not find any significant differences in coral growth between colonies within and external to the bombing range in Vieques. Despite much controversy, the coral reef communities of the Isla de Vieques had not been properly characterized in terms of the variations of percent cover by sessile-benthic components at different depths. Also, important fish and megabenthic invertebrate populations were not included in the Antonius and Weiner (1982) survey and characterization of these important components of the coral reef community had been lacking.

The baseline characterization survey of García et al. (2001 a) showed that several coral reefs in Vieques rank among the top systems of Puerto Rico in terms of live coral cover.

For example, Comandante, Mosquito, Boya Esperanza, Monte Pirata and Caballo Blanco reefs are among the top seven reefs in terms of live coral cover (>30 %) from a matrix of 49 reefs surveyed around Puerto Rico in the 6 – 14 m depth range (García et al., in prep). The present monitoring evaluation confirms previous assessments of the “healthy” condition of Vieques reefs and shows that several of these reef systems also rank among the top in terms of fish species richness and abundance, including abundance of commercially important fish populations.

The main objectives of this study have been to:

- 1) Perform the first monitoring evaluation of variations in substrate cover by sessile-benthic categories, and of species richness and abundance of fishes and motile megabenthic invertebrates from a selection of six representative coral reef systems in the north (Caballo Blanco, Coronas, Mosquito), west (Monte Pirata, Canjilones) and south coast of Vieques (Boya Esperanza).
- 2) Provide a quantitative baseline characterization of the sessile-benthic, motile-megabenthic and fish populations from a deep reef formation (30 – 40 meters) associated with a submerged seamount in the south coast of Vieques.
- 3) Construct a data base on size frequency distributions of commercially important fish populations from representative coral reefs in the north, west and south coast of Vieques using an Active Search Census (ASEC) experimental method designed to obtain data on large, elusive and commercially important fish species.

Methods

The baseline characterization of coral reef communities in Vieques by García et al. (2001 a) was performed on sets of five permanent transects at each reef. Transects were marked with steel rods at each end and its number identified with tie-raps. Transects were arranged in a line sequence following a depth contour for fringing reef formations such as Coronas, Mosquito, Caballo Blanco and Black Jack, or in a parallel sequence for spur-and-groove formations such as Monte Pirata, Canjilones and Boya Esperanza. In either case, the third transect of each set was marked with a buoy and georeferenced at the surface. Georeferences and depths for all reef monitored are presented in Table 1. All transects established in 2001 were found during 2004. One transect at Monte Pirata Reef was mechanically damaged by what appeared to be an anchor that broke and overturned the coral head in which the steel rod had been drilled.

Table 1. Geographic coordinates and depths of coral reefs surveyed in Vieques during July, 2004.

Reef Sites	Depth (m)	Latitude	Longitude
Canjilones	15.2	18° 05.380' N	065° 35.413' W
Monte Pirata	12.1	18° 05.512' N	065° 35.011, W
Boya Esperanza	9.5	18° 04.832' N	065° 29.277' W
West Caballo Blanco	4.5	18° 10.297' N	065° 28.126' W
Mosquito	10.6	18° 09.804' N	065° 29.632' W
Coronas	10.6	18° 09.896' N	065° 09.454' W
Black Jack	36.0	18° 03.350' N	065° 27.788' W

Field Procedures

Reef stations were approached with a GPS and marked with a surface buoy. In the case of Black Jack (deep reef) a decompression line was anchored to the bottom and marked with a surface buoy. Transects were marked with a white nylon line from rod to rod. Belt-transect surveys for fish and motile megabenthic invertebrates were performed first to minimize disturbances caused by sessile-benthic community surveys.

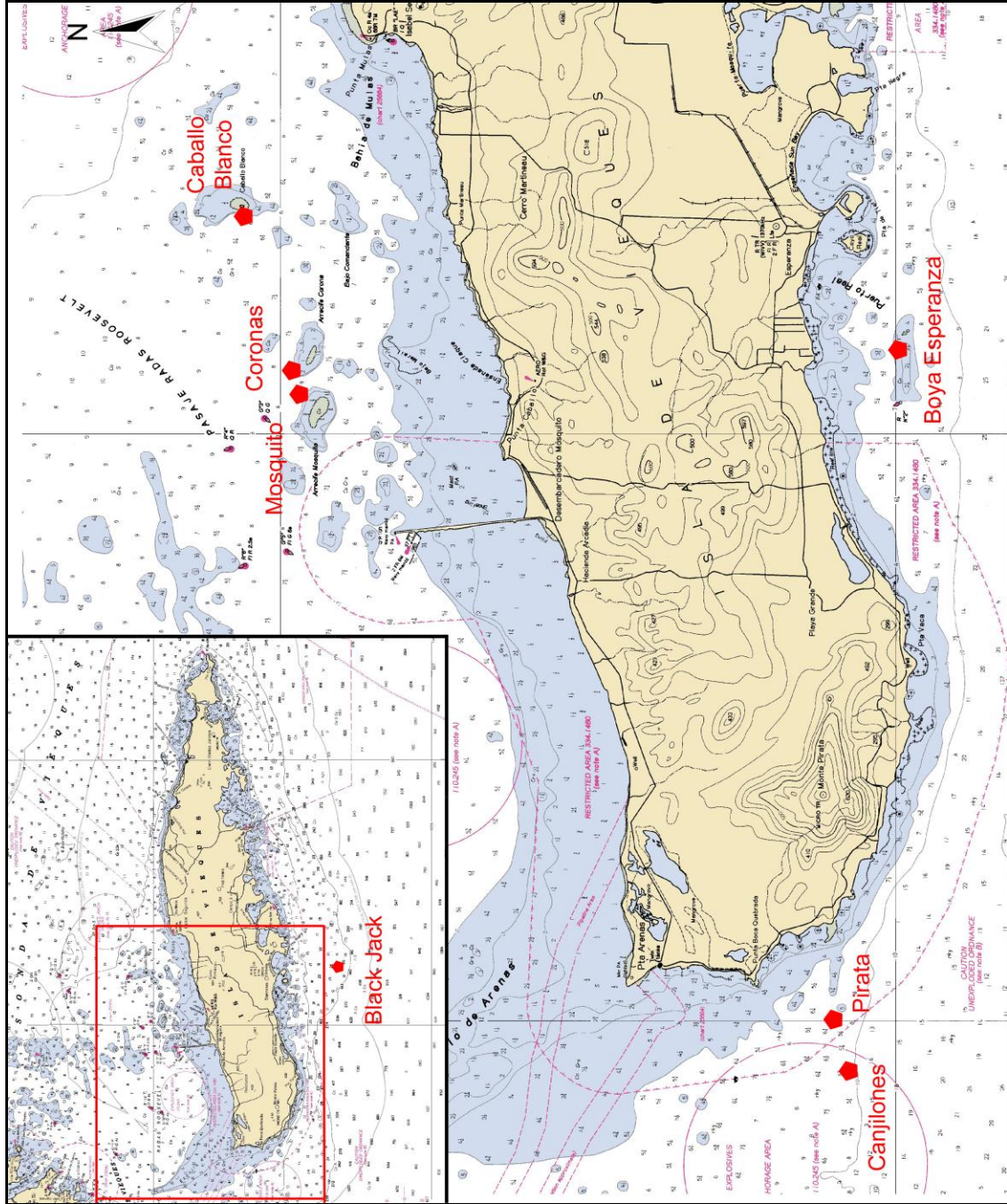


Figure 1. Location of reef monitoring surveys

Monitoring of Sessile-Benthic Communities

Quantitative assessments of sessile-benthic reef communities were obtained at the six shallow reefs using a modification of the Chain Transect Method (Porter, 1972, CARICOMP, 1984). This technique 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).

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. 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. 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. All 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.

Video-transects were filmed at all reef sites for archival reference and used to quantify the percent substrate cover by sessile-benthic categories at Black Jack Reef, given the bottom time limitations of working deeper than 30 meters. Videos were taken along the five 10-meter long transects using a Sony digital camera (Model VX-2100) protected by a Gates underwater housing. A stainless steel rod that extended approximately 61 cm (24 inches) beyond the camera housing lens plate was attached to the housing to maintain a constant camera-subject distance during filming. Prior to filming, a fine nylon line was stretched from rod to rod to serve as a reference line for the video transect. During the filming of each video transect, the camera was held perpendicular to the seafloor and moved slowly along the transect line. Ten randomly selected, non-overlapping video frames were selected from each video transect. Video frames were reviewed using a digital camera interfaced with a color video monitor. Individual video frames were “captured” and saved as picture files in a computer. One set of 25 electronic point overlays were constructed from x, y plots of

random numbers generated with excel software and saved as templates. These templates were overlaid on each captured video frame, resulting in 25 random points within each frame. The number of points that covered each of the substrate-biotic groups was recorded as its percent cover within each frame. The individual percent cover values of the 10 selected frames were combined from each transect.

Substrate categories represented by sessile-benthic organisms were identified to species in the case of corals and to general taxonomic groups in the case of sponges, algae and others. Coral taxonomy followed the most recent revision by Veron (2000). 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.

(B) Fishes and Motile Megabenthic Invertebrates

Motile megabenthic (larger than 1 cm) invertebrates (lobsters, crabs, shrimps, echinoids, molluscs, etc.) and diurnal, non-cryptic fishes associated with reefs and seagrass 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 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 (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.

Large, elusive fish populations, which includes most of the commercially important and many recreationally valuable populations were surveyed using an Active Search Census (ASEC) technique. This is a non-random, fixed-time method designed to optimize information of the numbers of fish individuals present at each of the main reef habitats, providing simultaneous information on size frequency data. At each reef (or depth strata) the total number of individuals of each particular species observed within a fixed time frame of 30 minutes were registered. Individuals were actively searched for in the water column and within crevices, ledges and potentially important hiding places. For each individual sighted, a length estimate was recorded. One ASEC survey was performed at each reef.

Results

Characterization and Monitoring of Coral Reef Communities

1. CANJILONES REEF

Canjilones Reef is a diffuse “spur-and-groove” formation located at the southern edge of a rather long and narrow rocky ridge that runs along an east-west axis off Punta Arenas, on the southwest coast of Vieques (Figure 1). The ridge presents an almost flat, hard-ground terrace with sparse gorgonians and coral heads at depths of 9 -11 meters and slopes down to another terrace at a depth of 15 meters where the spur-and-groove coral reef formation has developed. Our permanent transects were established along five consecutive spurs at a depth of 15.2 meters. The spurs rise only about 2 - 3 meters from the narrow sandy channels that separate them at the base. There is still another reef slope with coral growth along the wall down to a depth of 23.5 meters, where the sandy base of the reef is finally reached. Panoramic pictures of Canjilones Reef are included as Photo Album 1.

Sessile-benthic Community – Canjilones Reef

The sessile-benthic community was characterized by a moderate surface cover of stony corals (mean : 24.5 %) and density of gorgonians (mean : 23 colonies per transect). A total of 25 species of stony corals were identified from Canjilones Reef. The Boulder Brain Coral, *Montastrea annularis* was the main reef building coral species, representing approximately 73 % of the total surface cover by corals (Table 2). It was present in all five transects with a range in cover from 10.2 – 28.5 %. Great Star Coral (*Montastrea cavernosa*) and Lettuce Coral (*Agaricia agaricites*) were also common. Boulder Star Coral

contributed substantially to the relatively high substrate rugosity of this reef (mean: 5.09 m) with large, massive (vertically projected) colonies.

Table 2. Canjilones Reef. Percent cover by sessile-benthic substrate categories during 2004.

SUBSTRATE CATEGORIES	TRANSECTS					MEAN
	1	2	3	4	5	
TURF ALGAE	50.14	46.201	44.40	47.64	35.69	44.81
LIVE CORAL	19.96	27.88	18.11	24.56	32.30	24.56
FLESHY ALGAE	11.70	8.08	12.47	4.52	4.33	8.22
SPONGES		0.27	1.09	3.93	4.61	1.98
ENCRUSTING GORGONIAN			0.55	0.88	0.38	0.36
ZOANTHIDS			0.73			0.15
CALCAREOUS ALGAE				0.30	0.28	0.12
ABIOTIC						
REEF OVERHANGS	18.20	17.53	22.66	18.18	20.72	19.46
SAND					1.70	0.34
ERECT GORGONIANS (#colonies)	14	26	24	22	27	23
RUGOSITY (m)	5.17	5.51	5.48	4.34	4.96	5.09
CORAL SPECIES	1	2	3	4	5	MEAN
<i>Montastrea annularis</i>	10.21	25.34	13.83	11.49	28.53	17.88
<i>Agaricia agaricites</i>	2.04		1.82	3.54		1.48
<i>Montastrea cavernosa</i>	2.79	0.64		2.55	0.76	1.35
<i>Porites astreoides</i>	0.65		1.36	1.97	1.13	1.02
<i>Siderastrea siderea</i>	3.80			0.98		0.96
<i>Colpophyllia natans</i>				2.55		0.51
<i>Porites porites</i>	0.19	1.45				0.33
<i>Agaricia grahamae</i>				0.98	0.28	0.25
<i>Diploria labyrinthiformis</i>			0.82			0.16
<i>Madracis decactis</i>				0.49	0.28	0.15
<i>Mycetophyllia lamarckiana</i>					0.66	0.13
<i>Siderastrea radians</i>					0.66	0.13
<i>Leptoseris cucullata</i>		0.45				0.09
<i>Isophyllia rigida</i>	0.28					0.06
<i>Acropora cervicornis</i>			0.27			0.05

Corals Outside Transects:

Dendrogyra cylindrus, *Dichocoenia stokesii*, *Diploria strigosa*, *Eusmilia fastigiata*, *Stephanocoenia michilini*, *Isophyllastrea rigida*, *Isophyllia sinuosa*, *Mycetophyllia ferox*, *Scolymia cubensis*

Turf algae, consisting of a mixed assemblage of articulate coralline red and brown macroalgae (mostly *Lobophora* sp.) was found covering most of the hard substrates not colonized by stony corals. Its mean cover along transects was 44.8 %. Abiotic substrate categories presented a relatively high cover (mean: 19.8 %), mostly associated with reef overhangs (or ledges) created by the laminar growth of Boulder Star Coral.

Live coral cover, as well as other main reef substrate categories remained essentially constant between the summer of 2001 and the 2004 monitoring survey. A slight increment

in the mean number of gorgonians was observed (from 19 to 23 colonies per transect), which may reflect recruitment and or growth of colonies towards the permanent transect line (Figure 2). Also, there was an increment of fleshy algal cover, from 5.1 % in 2001 to 8.2 % in 2004, but growth appears to have occurred over turf algae. It has been observed in many reefs around Puerto Rico that turf algal cover is a quasi permanent state of the reef substrate and that upon loss of fleshy algae the substrate retains its primary turf algal cover.

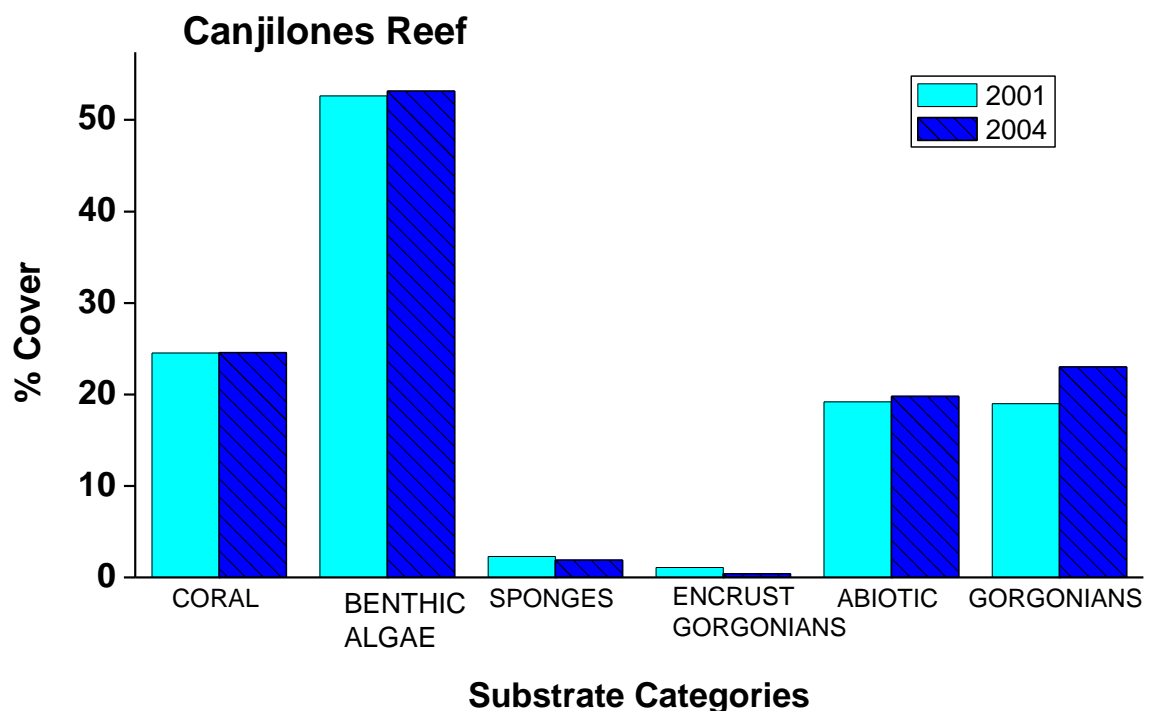


Figure 2. Percent cover by substrate categories at Canjilones Reef, western Vieques during 2001 baseline characterization and 2004 monitoring surveys

Fishes and Motile Megabenthic Invertebrates - Canjilones Reef

A total of 64 species of reef fishes were identified during our monitoring survey of Canjilones Reef. The mean abundance of fishes within belt-transects was 65.4 Ind/30m², and the mean number of species per transect was 22.6 (Table 3). A marked increment of 44 % in mean fish abundance and 25 % increment in number of fish species per transect was observed during 2004 over the initial 2001 survey (García et al., 2001 a). It is possible that the strong wave action and associated surge and relatively low visibility prevailing

during the initial characterization survey masked somewhat the abundance of reef fishes at this reef.

The most abundant species within belt-transects were the Masked Goby (*Coryphopterus personatus*) with 11.6 Ind/30 m², Blue Chromis (*Chromis cyanea*) with 8.2 Ind/30 m², Striped Parrotfish (*Scarus iserti*) with 6.2 Ind/30 m², Blue-head Wrasse (*Thalassoma bifasciatum*) with 5.8 Ind/30 m² and the Bicolor Damselfish (*Stegastes partitus*) with 5.6 Ind/30 m². The aforementioned species were present in at least four out of the five transects surveyed. The Redband Parrotfish (*Sparisoma aurofrenatum*) and the Sharknose and Peppermint gobies (*Gobiosoma evelynae*, *Coryphopterus lipernes*) were also present in at least four transects. The most specious family within belt-transects was the Scaridae (Parrotfishes) with six species. One large Midnight Parrotfish (*Scarus coelestinus*) was also present outside transect areas for a total of seven parrotfishes identified from Canjilones Reef.

Several large and/or commercially important fish species were observed during the Active Search Census (ASEC) at Canjilones Reef (Table 4). These included a pair of Caribbean Reef Sharks (*Carcharhinus perezii*), Spotted Eagle Ray (*Aetobatus narinari*), Southern Stingray (*Dasyatis americana*), Cero Mackerel (*Scomberomorus regalis*), Hogfish (*Lachnolaimus maximus*), Red Hind (*Epinephelus guttatus*), Rock Hind (*E. adscensionis*), Coneys (*Cephalopholis fulva*) and several Yellowtail and Schoolmaster Snappers, among other species. All snapper and grouper species, as well as the reef sharks and hogfishes were observed in young to full adult sizes. The size distribution data (Table 4) suggests that Canjilones Reef functions mostly as a habitat for adult reef fishes. During the previous survey, the Great Barracuda and several Nurse Sharks were present at Canjilones Reef. No motile megabenthic invertebrates were recorded within belt-transects. Two juvenile Spiny Lobsters, *Panulirus argus* and one hawksbill Turtle, (*Eretmochelys imbricata*) were observed during the ASEC survey.

Table 3. Taxonomic composition and abundance of fishes surveyed within belt-transects at Canjilones Reef, Vieques 2004.

<i>SPECIES</i>	<i>COMMON NAME</i>	BELT-TRANSECTS					MEAN
		1	2	3	4	5	
<i>Coryphopterus personatus</i>	Masked Goby	2	1	33	2	20	11.6
<i>Chromis cyanea</i>	Blue Chromis	1	4	19	17		8.2
<i>Scarus iserti</i>	Stripped Parrotfish	7	1	12	6	5	6.2
<i>Thalassoma bifasciatum</i>	Bluehead Wrasse	5	7	10	3	4	5.8
<i>Stegastes partitus</i>	Bicolor Damselfish	6	3	2	5	12	5.6
<i>Halichoeres garnoti</i>	Yellow-head Wrasse	3	1	1	8	7	4.0
<i>Sparisoma aurofrenatum</i>	Redband Parrotfish	1	3	3	4	1	2.4
<i>Gobiosoma evelynae</i>	Sharknose Goby	3	2	2	1	2	2.0
<i>Coryphopterus lipernes</i>	Peppermint Goby		3	2	1	3	1.8
<i>Segastes leucostictus</i>	Beaugregory	1	2		3	2	1.6
<i>Sparisoma viride</i>	Stoplight Parrotfish	2		2	2	1	1.4
<i>Acanthurus chirurgus</i>	Doctorfish	3	1			2	1.2
<i>Sparisoma radians</i>	Bucktooth Parrotfish	3			2	1	1.2
<i>Carangoides ruber</i>	Bar Jack	5					1.0
<i>Ocyurus chrysurus</i>	Yellowtail Snapper	1			3	1	1.0
<i>Canthigaster rostrata</i>	Caribbean Puffer		1	1	1	1	0.8
<i>Cephalopholis fulva</i>	Coney	1	1	2			0.8
<i>Myripristis jacobus</i>	Blackbar Soldierfish		2	1		1	0.8
<i>Chaetodon capistratus</i>	Foureye Butterflyfish			1	2	1	0.8
<i>Flammeo marianus</i>	Longspine Squirrelfish			2	1		0.6
<i>Haemulon flavolineatum</i>	French Grunt		2	1			0.6
<i>Acanthurus bahianus</i>	Ocean Surgeon		1			1	0.4
<i>Acanthurus coeruleus</i>	BlueTang	1	1				0.4
<i>Cephalopholis cruentatus</i>	Graysby	2					0.4
<i>Chaetodon striatus</i>	Banded Buttrflyfish	1				1	0.4
<i>Holocentrus rufus</i>	Squirrelfish			1	1		0.4
<i>Hypoplectrus chlorurus</i>	Yellowtail Hamlet	1	1				0.4
<i>Hypoplectrus nigricans</i>	Black Hamlet	1				1	0.4
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish		1			1	0.4
<i>Serranus tigrinus</i>	Harlequin Bass		1			1	0.4
<i>Aulostomus maculatus</i>	Trumpetfish					1	0.2
<i>Bodianus rufus</i>	Spanish Hogfish				1		0.2
<i>Cantherhines pullus</i>	Tail-light Filefish			1			0.2
<i>Haemulon sciurus</i>	Bluestripped Grunt				1		0.2
<i>Holacanthus tricolor</i>	Rock Beauty	1					0.2
<i>Hypoplectrus puella</i>	Barred Hamlet				1		0.2
<i>Lutjanus mahogani</i>	Mahogani Snapper		1				0.2
<i>Mulloides martinicus</i>	Yellowtail Goatfish			1	1		0.4
<i>Pomacanthus arcuatus</i>	Gray Angelfish		1				0.2
<i>Pseudupeneus maculatus</i>	Spotted Goatfish	1					0.2
<i>Scarus taeniopterus</i>	Princess Parrotfish		1				0.2
<i>Scarus vetula</i>	Queen Parrotfish					1	0.2
<i>Stegastes dorsopunicans</i>	Dusky Damselfish				1		0.2
<i>Coryphopterus sp.</i>	Unid. Goby	1					0.2
<i>Epinephelus guttatus</i>	Red Hind			1			0.2
<i>Lachnolaimus maximus</i>	Hogfish			1			0.2
<i>Lutjanus apodus</i>	Schoolmaster			1			0.2
	TOTAL INDIVIDUALS	53	42	100	67	71	66.6
	TOTAL SPECIES	23	23	22	22	23	22.6

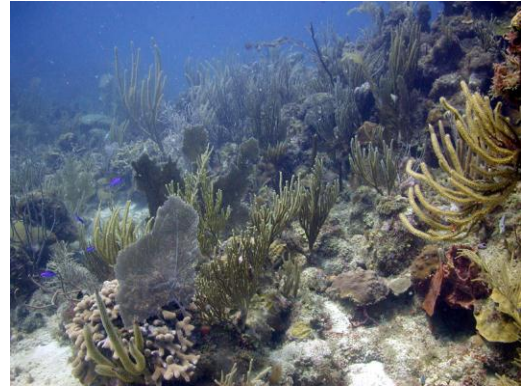
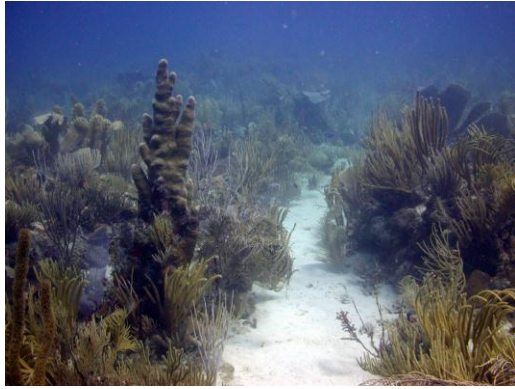
Table 4. Size - frequency distribution of large and/or commercially important fishes and invertebrates identified during an ASEC survey at Canjilones Reef, West Vieques 2004

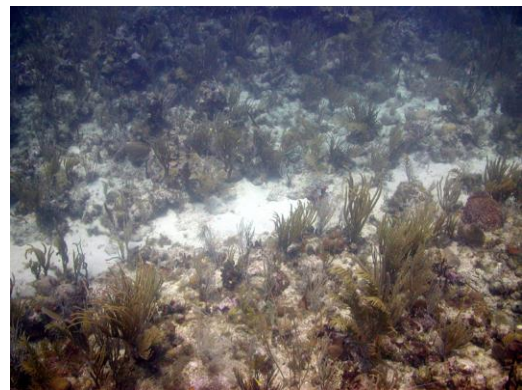
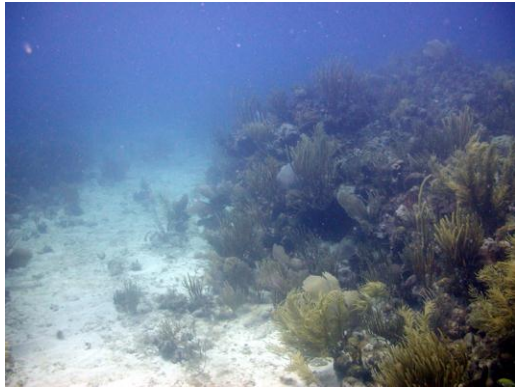
Depth range : 15 - 17 m
Duration - 30 min.

SPECIES	COMMON NAME	FREQUENCY – (SIZE, cm)		
Fishes:				
<i>Calamus pluma</i>	Pluma	1 - (33.0)		
<i>Carcharhinus perezii</i>	Reef Shark	1 - (91)	1 - (150)	
<i>Dasyatis americana</i>	Southern Stingray	1 - (120)		
<i>Epinephelus adscensionis</i>	Roch Hind	1 - (40)		
<i>Epinephelus guttatus</i>	Red Hind	1 - (30)	1 - (28)	1 - (25)
<i>Gymnothorax moringa</i>	Spotted Moray	1 - (75)		
<i>Haemulon plumieri</i>	White Grunt	1 - (30)	1 - (35)	
<i>Lachnolaimus maximus</i>	Hogfish	2 - (40)		
<i>Lutjanus apodus</i>	Schoolmaster	1 - (20)	3 - (30)	1 - (35)
	Mahogany			
<i>Lutjanus mahogany</i>	Snapper	1 - (18)	1 - (20)	
<i>Ocyurus chrysurus</i>	Yellowtail Snapper	3 - (18)	2 - (25)	1 - (30)
<i>Scarus coelestinus</i>	Midnight Parrotfish	1 - (65)		
<i>Scomberomorus regalis</i>	Cero Mackerel	1 - (45)		
<i>Aetobatis narinari</i>	Spotted Eagle Ray	1 - (150)		
Invertebrates:				
<i>Panulirus argus</i>	Spinny Lobster	1 – [28]	1 – [20]	
Additional Species Outside Transects :				
<i>Coryphopterus glaucofraenum</i>	Bridled Goby			
<i>Gnatholepis thompsoni</i>	Golspot Goby			
<i>Gramma loreto</i>	Fairy Basslet			
<i>Haemulon carbonarium</i>	Caesar's Grunt			
<i>Haemulon macrostomum</i>	Spanish Grunt			
<i>Hypoplectrus unicolor</i>	Butter Hamlet			
<i>Lactophrys triqueter</i>	Smooth Trunkfish			
<i>Malacanthus plumieri</i>	Sand Tilefish			
<i>Pseudupeneus maculatus</i>	Spotted Goatfish			

() Total Length in cms. (except stingrays)
[] Carapace Length in cms.

Photo Album 1. Canjilones Reef, 2004





2. Monte Pirata Reef

Monte Pirata Reef sits at the northern edge of a hard-ground ridge that runs along an east-west axis off the southwest coast of Vieques (Figure 1). The reef is a low relief, rather diffuse spur-and-groove formation found at depths between 12-16 meters on the slope of the hard ground ridge. Transects were established along consecutive spurs at a depth of 12.1 meters. Panoramic views of the Monte Pirata Reef are presented in Photo Album 2.

The sessile-benthic reef community exhibited a varied assemblage of stony corals and gorgonians. A total of 25 species of stony corals, including 14 species intercepted by transects were identified from Monte Pirata Reef (Table 5).

Table 5. Monte Pirata Reef. Percent cover by sessile-benthic substrate categories during 2004

SUBSTRATE CATEGORIES	TRANSECTS					MEAN
	1	2	3	4	5	
TURF ALGAE	n/d	47.31	63.28	58.58	n/d	56.39
LIVE CORAL		26.20	14.87	29.52		23.53
FLESHY ALGAE		2.18		0.91		1.03
SPONGES		1.14		1.64		0.92
ENCRUSTING GORGONIAN		0.38	1.95			0.78
ZOANTHIDS				0.64		0.21
ABIOTIC						
REEF OVERHANGS		10.22	17.75	8.72		12.23
SAND		12.58	2.15			4.91
ERECT GORGONIANS (#colonies)		30	22	27		26.33
RUGOSITY (m)		4.89	3.73	5.51		4.71
CORAL SPECIES	1	2	3	4	5	MEAN
<i>Montastrea annularis</i>		13.72	6.36	17.80		12.63
<i>Montastrea cavernosa</i>		3.60	3.90	1.36		2.95
<i>Porites porites</i>		3.50	0.62	0.91		1.67
<i>Porites astreoides</i>		0.47	0.41	3.00		1.29
<i>Sidersatrea siderea</i>		1.61		1.82		1.14
<i>Agaricia sp.</i>		1.32	2.05			1.13
<i>Agaricia agaricites</i>			1.23	1.27		0.83
<i>Isophyllia sinuosa</i>		1.51		0.36		0.62
<i>Meandrina meandrites</i>				1.82		0.61
<i>Stephanocoenia michilini</i>		0.473				0.16
<i>Dichocoenia stokesi</i>				0.45		0.15
<i>Isophyllia rigida</i>				0.36		0.12
<i>Siderastrea radians</i>				0.36		0.12
<i>Eusmilia fastigiata</i>			0.31			0.10

Corals Outside Transects :

Acropora cervicornis, *Agaricia grahame*, *Colpophyllia natans*, *Diploria strigosa*, *Diploria labyrinthiformis*, *Dendrogyra cylindrus*, *Madracis decactis*, *Millepora alcicornis*, *Mycetophyllia aliciae*, *Mussa angulosa*, *Scolymia cubensis*

Massive, encrusting and branching stony coral growth types were present with a combined surface cover of 23.5 % (range: 14.9 – 29.5 %). Boulder Star Coral, *Montastrea annularis* was the dominant coral species in terms of surface cover with a mean of 12.6 %. Great Star Coral (*Montastrea cavernosa*), Finger Coral (*Porites porites*), Lettuce Coral (*Agaricia agaricites*), Mustard Hill Coral (*P. astreoides*) and Greater Star Coral (*Siderastrea siderea*) were also common within transects surveyed. Sponges, zoanthids (*Palythoa* sp.) and encrusting gorgonian (*Erythropodium caribaeorum*) were recorded along transects, but represented small components of the benthic community structure. A dense algal turf was found colonizing an average of 56.4 % of the available hard substrate. A mixed assemblage of red coralline algae and brown macroalgae (mostly *Lobophora* sp. and *Dyctiota* sp.) were the main components of the algal turf. Abiotic substrate categories represented a surface cover of 17.1 %, largely associated with reef overhangs created by coral growth and coralline sand deposited on reef substrate depressions.

Monitoring observations of the sessile-benthic community at Monte Pirata Reef are based on transects 2, 3 and 4. Transect 1 was mechanically damaged possibly due to anchoring and transect 5 was not quantified because of the strong current prevailing near the end of our survey. Live coral cover declined by 1%, benthic algae increased by 2.3 % and abiotic cover declined by 2.1 %. Differences of less than 4-5 % are probably within the limits of precision of the chain method (Figure 3).

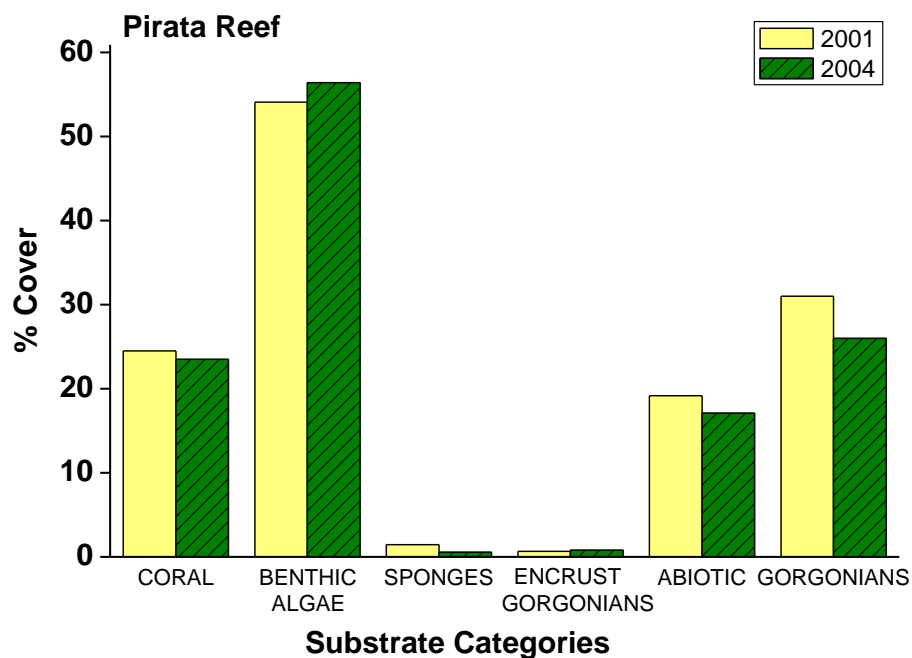


Figure 3. Percent cover by substrate categories at Monte Pirata Reef, western Vieques during 2001 baseline characterization and 2004 monitoring surveys

The reduction in numbers of erect gorgonians from 31 to 27 colonies per transect are probably real and may reflect mechanical detachment due to strong wave action and anchoring. Monte Pirata Reef receives strong wave action from south-east swells that are intensified by the topographic effect (on wave height) of the submerged ridge. Stony corals and turf algae, the dominant biological assemblages in terms of hard substrate cover in healthy reefs appear to be resilient to moderate wave action and currents.

Fishes and Motile Megabenthic Invertebrates - Monte Pirata Reef

A total of 65 reef fishes were identified at Monte Pirata Reef, 43 of which were observed within belt-transect areas (Table 6). The mean abundance of fishes was 72.0 Ind/30 m² and the mean number of species per transect was 21. Mean fish abundance increased by 45 % and fish species richness or number of fish species per transect increased by 19 % during 2004 over the initial 2001 survey (García et al., 2001). It is possible that the strong wave action and associated surge and relatively low visibility prevailing during the initial survey influenced the abundance and species richness of fishes at this reef.

The numerically dominant reef fish assemblage at Monte Pirata Reef included the Blue Chromis (*Chromis cyanea*) with 25.2 Ind/m², Bluehead Wrasse (*Thalassoma bifasciatum*) with 9.8 Ind/m², Bicolor Damselfish (*Stegastes partitus*) with 5.4 Ind/m², and Stripped Parrotfish (*Scarus iserti*) with 4.2 Ind/m². The aforementioned species, plus the French Grunt (*Haemulon flavolineatum*) and the Stoplight Parrotfish (*Sparisoma viride*) were observed within all five belt-transects surveyed. The most speciose families were the Scaridae (Parrotfishes) and the Pomacentridae (Damselfishes) with six species each.

The fish community structure at Monte Pirata Reef appeared to be well balanced in terms of trophic groups. Parrotfishes (*Sparisoma spp.*, *Scarus spp.*), Doctorfishes (*Acanthurus spp*) and some of the damselfish species (*Stegastes spp.*) comprised a species rich and abundant herbivorous assemblage. The numerically dominant population of Blue Chromis by itself represents an important zooplanktivorous link that functions in the transfer of plankton based biomass to pelagic piscivores, represented by Yellowtail Snapper, Black Jack, Cero Mackerel and Great Barracuda. Small epibenthic invertebrate predators were also represented by several fish populations, including the wrasses (*Thalassoma*, *Halichoeres spp*), squirrelfishes (*Holocentrus spp*), blennies (*Ophioblennius sp.*) and gobies (*Gobiosoma*, *Coryphopterus spp.*). Larger invertebrate and small fish predators included

Table 6. Taxonomic composition and abundance of fishes surveyed within belt-transects at Monte Pirata Reef, Vieques 2004.

SPECIES	COMMON NAME	BELT-TRANSECTS					MEAN
		1	2	3	4	5	
<i>Chromis cyanea</i>	Blue Chromis	19	10	52	2	43	25.2
<i>Thalassoma bifasciatum</i>	Bluehead Wrasse	1	24	8	8	8	9.8
<i>Stegastes partitus</i>	Bicolor damselfish	4	4	6	3	10	5.4
<i>Scarus iserti</i>	Stripped Parrotfish	4	1	2	9	5	4.2
<i>Sparisoma viride</i>	Stoplight Parrotfish	6	3	1	2	1	2.6
<i>Haemulon flavolineatum</i>	French Grunt	1	2	1	2	3	1.8
<i>Sparisoma radians</i>	Bucktooth Parrotfish	3	4			1	1.6
<i>Canthigaster rostrata</i>	Caribbean Puffer		2	1	3	1	1.4
<i>Myripristis jacobus</i>	Blackbar Soldierfish	2		2		3	1.4
<i>Halichoers maculipinna</i>	Clown Wrasse	3			1	2	1.2
<i>Scarus taeniopterus</i>	Princess Parrotfish	3				3	1.2
<i>Segastes leucostictus</i>	Beaugregory	2	1		2	1	1.2
<i>Serranus tigrinus</i>	Harlequin Bass	1	3		1	1	1.2
<i>Sparisoma aurofrenatum</i>	Redband Parrotfish		2	2	2		1.2
<i>Chaetodon capistratus</i>	Foureye Butterflyfish			2	2	1	1.0
<i>Gobiosoma evelynae</i>	Sharknose Goby	3			1	1	1.0
<i>Coryphopterus lipernes</i>	Peppermint Goby	1				3	0.8
<i>Coryphopterus personatus</i>	Masked Goby		3	1			0.8
<i>Hypoplectrus nigricans</i>	Black Hamlet	2	2				0.8
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish			1	2	1	0.8
<i>Acanthurus bahianus</i>	Ocean Surgeon	2		1			0.6
<i>Acanthurus coeruleus</i>	BlueTang	1		1		1	0.6
<i>Aulostomus maculatus</i>	Trumpetfish	1	1		1		0.6
<i>Cephalopholis cruentatus</i>	Graysby	1		1		1	0.6
<i>Haemulon chrysargyreum</i>	Smallmouth Grunt			2		1	0.6
<i>Mulloides martinicus</i>	Yellowtail Goatfish			2		1	0.6
<i>Abudefduf sexatilis</i>	Sargent Major			2			0.4
<i>Acanthurus chirurgus</i>	Doctorfish	1			1		0.4
<i>Chaetodon ocellatus</i>	Spotfin Butterflyfish			2			0.4
<i>Holocentrus rufus</i>	Squirrelfish			1		1	0.4
<i>Bodianus rufus</i>	Spanish Hogfish		1				0.2
<i>Chaetodon striatus</i>	Banded Butterflyfish			1			0.2
<i>Chromis multilineata</i>	Brown Chromis				1		0.2
<i>Flameo marianus</i>	Longspine Squirrelfish				1		0.2
<i>Haemulon plumeri</i>	White Grunt				1		0.2
<i>Halichoeres garnoti</i>	Yellow-head Wrasse			1			0.2
<i>Holacanthus tricolor</i>	Rock Beauty			1			0.2
<i>Lutjanus apodus</i>	Schoolmaster					1	0.2
<i>Ophioblennius atlanticus</i>	Redlip Blenny	1					0.2
<i>Pomacanthus arcuatus</i>	Gray Angelfish				1		0.2
<i>Pomacanthus paru</i>	French Angelfish				1		0.2
<i>Scarus vetula</i>	Queen Parrotfish			1			0.2
<i>Stegastes dorsopunicans</i>	Dusky Damselfish				1		0.2
	TOTAL INDIVIDUALS	62	63	95	48	94	72.4
	TOTAL SPECIES	21	15	24	22	23	21

the Hogfishes (*Bodianus*, *Lachnolaimus*), Snappers (*Lutjanus spp.*) and groupers (*Epinephelus spp*, *Cephalopholis spp*).

Several large and/or commercially important fish species were observed during the Active Search Census (ASEC) at Monte Pirata Reef (Table 7). These included a Spotted Eagle Ray (*Aetobatus narinari*), Great Barracuda (*Sphyraena barracuda*), Cero Mackerel (*Scomberomorus regalis*), Hogfish (*Lachnolaimus maximus*), Nassau Grouper (*Epinephelus striatus*), Red Hind (*E. guttatus*), Rock Hind (*E. adscensionis*), Coneys (*Cephalopholis fulva*) and several Yellowtail and Schoolmaster Snappers, among other species. All snapper, hogfish, mackerel and grouper species were observed in young to full adult sizes. During the previous survey one Mutton Snapper (*Lutjanus analis*) was reported from this reef. The size distribution data (Table 8) suggests that Monte Pirata Reef functions mostly as a habitat for adult reef fishes.

Table 7. Size-frequency distribution of large and/or commercially important reef fishes identified during an ASEC survey at Monte Pirata Reef, West Vieques 2004

Depth range : 12 - 16 m
Duration - 30 min.

SPECIES	COMMON NAME	SIZE FREQUENCY		
		# - (cm)		
<i>Aetobatis narinari</i>	Spotted Eagle Ray	1 - (91)		
<i>Balistes vetula</i>	Queen Triggerfish	1 - (30)	1 - (35)	1 - (25)
<i>Carangoides ruber</i>	Bar Jack	2 - (15)		
<i>Caranx lugubris</i>	Black Jack	1 - (75)		
<i>Epinephelus adscensionis</i>	Rock Hind	1 - (40)		
<i>Epinephelus guttatus</i>	Red Hind	1 - (35)	1 - (25)	
<i>Gymnothorax moringa</i>	Spotted Moray	1 - (75)		
<i>Haemulon plumieri</i>	White Grunt	1 - (30)	1 - (33)	
<i>Lachnolaimus maximus</i>	Hogfish	1 - (50)		
<i>Lutjanus apodus</i>	Schoolmaster	1 - (30)	1 - (18)	
<i>Lutjanus mahogany</i>	Mahogany Snapper	1 - (20)	1 - (23)	
<i>Ocyurus chrysurus</i>	Yellowtail Snapper	2 - (25)		
<i>Scarus coelestinus</i>	Midnight Parrotfish	1 - (60)		
<i>Scomberomorus regalis</i>	Cero Mackerel	1 - (60)		
<i>Octopus vulgaris</i>	Common Octopus	1 - (45)		
<i>Panulirus argus</i>	Spiny Lobster	1- [25]		
Other Fishes Present :				
<i>Aluteres scriptus</i>	Scrawled Filefish			
<i>Anisotremus virginicus</i>	Porkfish			
<i>Echeneis naucrates</i>	Sharksucker			
<i>Gnatholepis thompsoni</i>	Goldspot Goby			
<i>Grama loreto</i>	Royal Gramma			
<i>Hypoplectrus unicolor</i>	Butter Hamlet			
<i>Lactophrys triqueter</i>	Smooth Trunkfish			
<i>Pseudupeneus maculatus</i>	Spotted Goatfish			
<i>Sparisoma rubripinne</i>	Yellowtail Parrotfish			
<i>Synodus intermedius</i>	Lizardfish			

() Total Length in cms. (except stingrays); [] Carapace Length in cms.

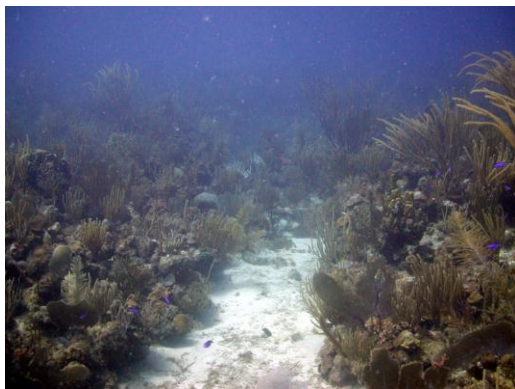
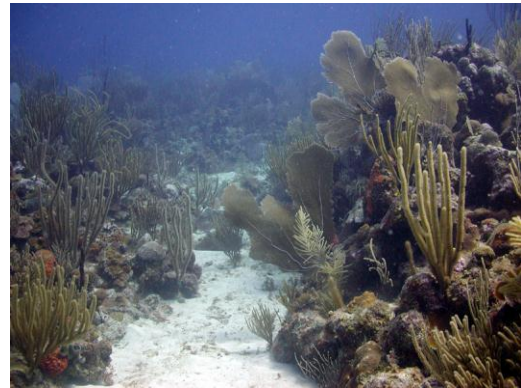
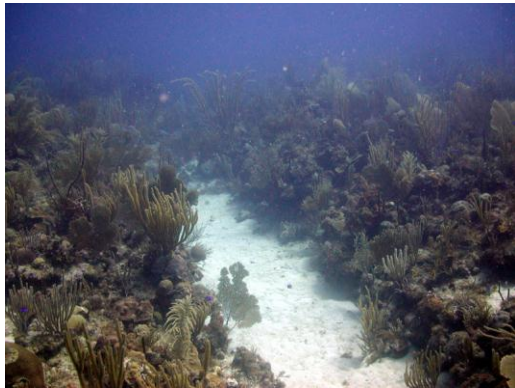
One adult Spiny Lobster, *Panulirus argus* and one Common Octopus, (*Octopus vulgaris*) were observed during the ASEC survey. Two Long-spined Sea Urchins (*Diadema antillarum*) and two Arrow Crabs (*Stenorhincus seticornis*) were observed within belt-transects (Table 8).

Table 8. Taxonomic composition and abundance of motile megabenthic invertebrates within belt- transects at Monte Pirata Reef, West Vieques 2004.

Survey Date: July 17, 2004
 Depth: 12.1 m

INVERTEBRATE SPECIES	COMMON NAME	TRANSECTS					MEAN ABUNDANCE (IND/30 m²)
		1	2	3	4	5	
<i>Stenorhincus seticornis</i>	Arrow Crab	0	1	0	0	1	0.4
<i>Diadema antillarum</i>	Long-spined Sea Urchins		2				0.4
TOTALS		0	3	0	0	1	0.8

Photo Album 2. Monte Pirata Reef





3. Boya Esperanza Reef

Boya Esperanza Reef is a submerged patch reef sitting at the edge of a hard-ground platform located about 0.8 nautical miles off Puerto Esperanza, on the south coast of Vieques (Figure 1). A green navigation buoy marks the eastern boundary of the reef and the entrance channel to Puerto Esperanza. The reef has a highly irregular bathymetry, with large coral outcrops rising more than five meters from the base of the reef platform and reaching to about 2 meters from the surface. Extensive coralline sand pools (deposits) are found at the base of the reef on its northern boundary. Large crevices are found at the interface of the sandy bottom and the rock/coral outcrops. Our survey was performed on the southern section of the reef, at a depth of 9 -10 meters. Transects were established in a north-south direction on top of large coral outcrops. Panoramic images of the reef are included in Photo Album 3.

Large colonies of Boulder Star Coral, *Montastrea annularis* represent the most prominent feature of Boya Esperanza Reef. Several coral boulders reach a diameter of more than 4 meters and rise from the base up to about 5 meters. Besides the huge coral colonies, most other corals were small to medium sized encrusting colonies. This shallow reef seems to be revealing the effects of very strong wave action associated with hurricanes upon benthic community structure. A total of 21 species of stony corals were identified at Boya Esperanza Reef, 12 of which were intercepted by linear transects in our survey (Table 9).

Mean substrate cover by Boulder Star Coral, *Montastrea annularis* (28.3 %) represented 84.2 % of the total cover by stony corals at Boya Esperanza Reef. Soft corals (gorgonians) were moderately abundant, with a mean density of 20 colonies intercepted per transect. The encrusting gorgonian, *Erythropodium caribaeorum* was present in four out of the five transects with a mean cover of 0.6 %. Zoanthids, sponges and ascideans were also present, but represented only minor components of the benthic reef community structure. Turf algae was the dominant biological component in terms of coral cover with a mean of 53.1 %. Total substrate cover by benthic algae averaged 56.5 % with the contributions of fleshy and calcareous macroalgae.

Only minor variations of the reef sessile-benthic (biotic) components from the initial characterization in 2001 resulted during our 2004 monitoring event. Percent substrate cover by live corals declined by 2.4 % and benthic algae declined by 1.4 % (Figure 4). These differences are probably within the error margin of the chain transect method. There was also a reduction of one gorgonian per transect from the 2001 survey. The most significant change in community structure was the increment in abiotic cover. This category was

Table 9. Boya Esperanza Reef. Percent cover by sessile-benthic substrate categories, 2004

SUBSTRATE CATEGORIES	TRANSECTS					MEAN
	1	2	3	4	5	
TURF ALGAE	73.00	49.31	38.68	50.63	53.96	53.12
LIVE CORAL	15.01	36.46	45.77	37.76	33.07	33.61
ABIOTIC						
REEF OVERHANG	6.97	8.43	11.85	6.92	6.33	8.10
SAND	4.29					0.86
CALCAREOUS ALGAE		4.64		3.20	2.97	2.16
FLESHY ALGAE		0.63	1.55	1.07	2.97	1.24
ENCRUSTING GORGONIAN	0.32		1.75	0.43	0.40	0.58
ZOANTHIDS	0.43	0.53				0.19
ASCIDIANS			0.39			0.08
SPONGES					0.30	0.06
GORGONIANS (# colonies)	28	6	16	24	26	20
RUGOSITY (m)	3.14	3.37	4.49	3.24	4.23	3.69
CORAL SPECIES	1	2	3	4	5	MEAN
<i>Montastrea annularis</i>	6.86	34.87	43.15	30.42	26.24	28.31
<i>Porites astreoides</i>	2.89	0.84		2.45		1.24
<i>Siderastrea siderea</i>	2.14			1.70	2.18	1.20
<i>Montastrea cavernosa</i>			0.88		4.26	1.03
<i>Porites porites</i>	1.18			1.17		0.47
<i>Stephanocoenia michilini</i>			1.07	0.32	0.40	0.36
<i>Diploria labyrinthiformis</i>	1.50					0.30
<i>Agaricia agaricites</i>		0.32	0.29	0.43		0.21
<i>Millepora alcicornis</i>	0.43	0.42				0.17
<i>Isophyllia sinuosa</i>				0.75		0.15
<i>Colpophyllia natans</i>				0.53		0.11
<i>Siderastrea radians</i>			0.39			0.08

Corals Outside Transects :

Acropora cervicornis, Agaricia grahame, Diploria strigosa, Dendrogyra cylindrus, Isophyllastrea rigida, Madracis decactis, Mycetophyllia ferox, Mussa angulosa, Scolymia cubensis

comprised by reef overhangs, holes, gaps and sand. Given the relatively high rugosity of this reef, and the difficulties in providing accurate measurements of these substrate anomalies, it is possible that at least some of the temporal variation is an artifact of the sampling method.

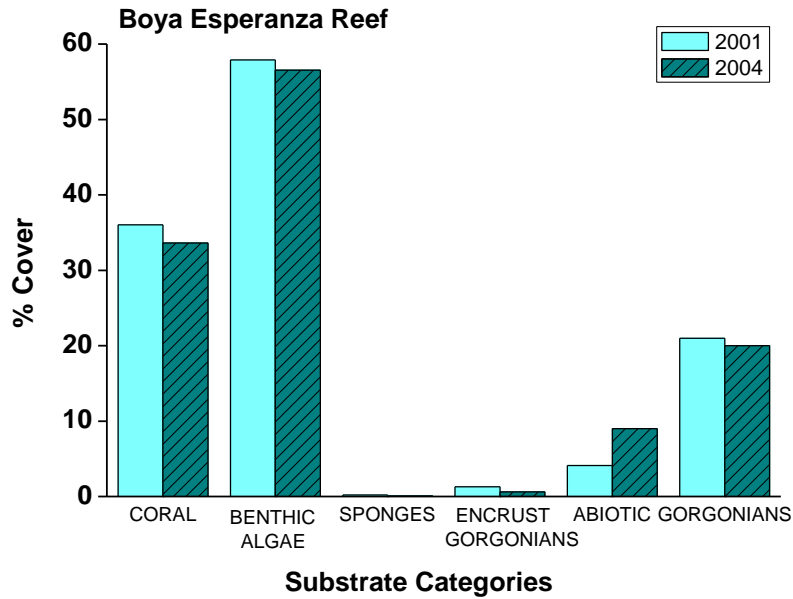


Figure 4. Percent cover by substrate categories at Boya Esperanza Reef, south Vieques during 2001 baseline characterization and 2004 monitoring surveys.

Fishes and Motile Megabenthic Invertebrates - Boya Esperanza Reef

A total of 63 reef fishes were identified at Boya Esperanza Reef, 46 of which were observed within belt-transect areas (Table 10). The mean abundance of fishes was 112.6 Ind/30 m² and the mean number of species per transect was 26.6. This represents an increment of mean abundance of approximately 94 % and an increment of six species per transect from the initial baseline characterization survey in 2001 (García et al., 2001). The higher visibility and calm weather prevailing during the monitoring survey in 2004 must have influenced the higher fish population census at this reef.

The numerically dominant assemblage included the Bluehead Wrasse (*Thalassoma bifasciatum*) with 32.2 Ind/30 m², Blue Chromis (*Chromis cyanea*) with 19.2 Ind/30 m², Bicolor Damselfish (*Stegastes partitus*) with 6.8 Ind/30 m², Brown Chromis (*Chromis multilineata*) with 5.0 Ind/30 m² and the Yellowhead Wrasse (*Halichoeres garnoti*) with 5.0 Ind/30 m². The aforementioned species (with exception of the Yellowhead Wrasse) and seven other fish species were present in all five belt-transects surveyed (Table 10).

The fish community structure at Boya Esperanza Reef appeared to be well balanced in terms of trophic groups. Parrotfishes (*Sparisoma spp.*, *Scarus spp.*), Doctorfishes (*Acanthurus spp*) and some of the damselfish species (*Stegastes spp.*) comprised a species rich and abundant herbivorous assemblage. The Blue and Brown Chromis, Creole Wrasse and juvenile stages of jacks (mostly Bar Jacks), grunts (as well as other juvenile reef fishes) are zooplanktivores that transfer plankton based biomass to pelagic piscivores, represented by Blue Runners, Black Jack, Yellowtail Snapper and Great Barracudas. Small epibenthic invertebrate predators were also represented by several fish populations, including the wrasses (*Thalassoma*, *Halichoeres spp*), squirrelfishes (*Holocentrus spp*), blennies (*Ophioblennius sp.*) and gobies (*Gobiosoma*, *Coryphopterus spp.*). Larger invertebrate and small fish predators included the Snappers (*Lutjanus spp.*) and groupers (*Epinephelus spp*, *Cephalopholis spp*).

Several large and/or commercially important fish species were observed during the Active Search Census (ASEC) at Boya Esperanza Reef (Table 11). These included a school of large Blue Runners (*Carangoides crysos*), one Great Barracuda (*Sphyraena barracuda*), one large Mutton Snapper (*Lutjanus analis*), Red Hinds (*E. guttatus*), Coneys (*Cephalopholis fulva*), and several Yellowtail, Mahogany, Lane and Schoolmaster Snappers, among other species. Snapper, grouper, barracudas and jacks were observed in young to full adult sizes. The size distribution data (Table 11) suggests that Boya Esperanza Reef functions mostly as a habitat for adult reef fishes. A small population of adult Queen Conch (*Strombus gigas*) was observed grazing on a film of benthic algae at the sandy pools. One Coral Crab, *Carpilus coralinus* was present within belt-transects (Table 12).

Table 10. Taxonomic composition and abundance (Individuals/30 m²) of fishes surveyed within belt-transects at Boya Esperaza Reef, South Vieques 2004.

SPECIES	COMMON NAME	BELT-TRANSECTS					MEAN
		1	2	3	4	5	
<i>Thalassoma bifasciatum</i>	Bluehead Wrasse	40	42	16	25	38	32.2
<i>Chromis cyanea</i>	Blue Chromis	2	17	13	11	53	19.2
<i>Stegastes partitus</i>	Bicolor Damselfish	5	6	12	4	7	6.8
<i>Chromis multilineata</i>	Brown Chromis	1	4	14	5	1	5.0
<i>Halichoeres garnoti</i>	Yellow-head Wrasse	8	6		4	7	5.0
<i>Halichoeres maculipinna</i>	Clown Wrasse	1	4	3	7	5	4.0
<i>Bodianus rufus</i>	Spanish Hogfish		3	11		1	3.0
<i>Clepticus parrae</i>	Creole Wrasse			15			3.0
<i>Haemulon flavolineatum</i>	French Grunt	1	3	8	2		2.8
<i>Stegastes dorsopunicans</i>	Dusky Damselfish	3	5	1	3	2	2.8
<i>Sparisoma viride</i>	Stoplight Parrotfish	2	6	1	3	1	2.6
<i>Gobiosoma evelynae</i>	Sharknose Goby	1	3		3	4	2.2
<i>Carangoides ruber</i>	Bar Jack	3	2	5			2.0
<i>Scarus iserti</i>	Stripped Parrotfish	2	1		3	3	1.8
<i>Sparisoma radians</i>	Bucktooth Parrotfish	4		3		1	1.6
<i>Canthigaster rostrata</i>	Caribbean Puffer		1	2	2	2	1.4
<i>Sparisoma aurofrenatum</i>	Redband Parrotfish	2	1	1	2	1	1.4
<i>Abudefduf sexatilis</i>	Sargent Major		1	2	2	1	1.2
<i>Acanthurus bahianus</i>	Ocean Surgeon	1	1	1	1	2	1.2
<i>Acanthurus coeruleus</i>	BlueTang	1	1	1	2	1	1.2
<i>Serranus tigrinus</i>	Harlequin Bass		1	1	1	3	1.2
<i>Cephalopholis cruentatus</i>	Graysby	1	1	1	1	1	1.0
<i>Carangoides crysos</i>	Blue Runner					4	0.8
<i>Haemulon chrysargyreum</i>	Smallmouth Grunt		2	1	1		0.8
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish	1	1	1	1		0.8
<i>Amblycirrhitus pinos</i>	Redspotted Hawkfish		1	1	1		0.6
<i>Aulostomus maculatus</i>	Trumpetfish	1			1	1	0.6
<i>Chaetodon capistratus</i>	Foureye Butterflyfish				1	2	0.6
<i>Gerres cinereus</i>	Yellowfin Mojarra			3			0.6
<i>Malacoctenus triangulatus</i>	Saddled Blenny				2	1	0.6
<i>Myripristis jacobus</i>	Blackbar Soldierfish		2	1			0.6
<i>Haemulon aurolineatum</i>	Tomtate		1	1			0.4
<i>Holocentrus rufus</i>	Squirrelfish	1				1	0.4
<i>Mulloides martinicus</i>	Yellowtail Goatfish			1	1		0.4
<i>Ophioblennius atlanticus</i>	Redlip Blenny		1			1	0.4
<i>Pseudupeneus maculatus</i>	Spotted Goatfish			2			0.4
<i>Acanthurus chirurgus</i>	Doctorfish		1				0.2
<i>Gramma loreto</i>	Royal Gramma		1				0.2
<i>Haemulon macrostomum</i>	Spanish Grunt		1				0.2
<i>Holacanthus tricolor</i>	Rock Beauty			1			0.2
<i>Lactophrys triqueter</i>	Smooth Trunkfish		1				0.2
<i>Ocyurus chrysurus</i>	Yellowtail Snapper				1		0.2
<i>Pomacanthus arcuatus</i>	Gray Angelfish					1	0.2
<i>Scarus taeniopterus</i>	Princess Parrotfish					1	0.2
<i>Scarus vetula</i>	Queen Parrotfish					1	0.2
<i>Stegastes planifrons</i>	Yellow-eye Damselfish			1			0.2
	TOTAL INDIVIDUALS	81	121	124	90	147	112.6
	TOTAL SPECIES	20	30	29	26	28	26.6

Table 11. Size-frequency distribution of large and/or commercially important reef fishes identified during an ASEC survey at Boya Esperanza Reef, South Vieques 2004

Depth range : 12 - 16 m

Duration - 30 min.

SPECIES	COMMON NAME	SIZE - FREQUENCY			
		# - (cm)			
<i>Carangoides crysos</i>	Blue Runner	1 - (25.4)	2 - (38.1)	3 - (48.3)	1 - (61.0)
<i>Carangoides ruber</i>	Bar Jack	8 - (22.9)			
<i>Caranx lugubris</i>	Black Jack	1 - (38.1)			
<i>Epinephelus guttatus</i>	Red Hind	1 - (25.4)	1 - (35.6)		
<i>Ocyurus chrysurus</i>	Yellowtail Snapper	5 - (20.3)	3 - (25.4)	3 - (30.5)	
<i>Lutjanus analis</i>	Mutton Snapper	1 - (61.0)			
<i>Lutjanus apodus</i>	Schoolmaster	7 - (22.9)	2 - (30.5)	4 - (38.1)	
<i>Lutjanus griseus</i>	Gray Snapper	2 - (17.8)	3 - (22.9)		
<i>Lutjanus mahogany</i>	Mahogany Snapper	1 - (20.3)	1 - (27.9)	1 - (35.6)	
<i>Lutjanus synagris</i>	Lane Snapper	4 - (15.2)	3 - (20.3)		
<i>Lactophrys quadricornis</i>	Scrawled Cowfish	1 - (25.4)			
<i>Sphyrna barracuda</i>	Great Barracuda	1 - (91.4)			
Other Fishes Present :					
<i>Calamus pluma</i>	Pluma				
<i>Haemulon sciurus</i>	Bluestripped Grunt				
<i>Lactophrys bicaudalis</i>	Spotted Trunkfish				
<i>Malacanthus plumieri</i>	Sand Tilefish				
<i>Haemulon carbonarium</i>	Caesar's Grunt				
<i>Halichoeres radiatus</i>	Puddinwife				
<i>Priacanthus cruentatus</i>	Glasseye Snapper				
<i>Scarus coelestinus</i>	Midnight Parrotfish				
<i>Sparisoma rubripinne</i>	Yellowtail Parrotfish				

() Total Length in cms.

Table 12. Boya Esperanza Reef. Taxonomic composition and abundance of motile megabenthic invertebrates within belt-transects. July, 2004

Survey Date: July, 2004

Depth: 9.1 m

SPECIES	COMMON NAME	TRANSECTS					MEAN ABUNDANCE (IND/30 m2)
		1	2	3	4	5	
<i>Carpilus coralinus</i>	Coral Crab	0	0	0	0	1	0.2
	TOTALS	0	0	0	0	1	0.2

Photo Album 3. Boya Esperanza Reef





4. West Caballo Blanco

The fore reef of Caballo Blanco features a gently sloping terrace at depths between 3 - 4 meters and a steeper drop to its base at a depth of 11 meters (Figure 1). Our survey was performed on the upper terrace of the reef slope at a depth of four meters. This is an area where large, massive colonies of Boulder Brain Coral (*Montastrea annularis*) produce substantial topographic relief and habitat complexity. Some of these coral heads reach 2 - 3 meters in height and at least two meters in diameter. A mixed stand of Turtle and Manatee seagrasses is found growing over coralline sand at the base of the reef. Transects were aligned north-south along the reef slope, following a depth contour of 4.0 meters.

Panoramic images of the reef slope at Caballo Blanco are presented as Photo Album 4.

Percent substrate cover by sessile-benthic categories intercepted by line transects at Caballo Blanco Reef are shown in Table 13.

Table 13. Caballo Blanco Reef. Percent substrate cover by sessile-benthic categories, 2004

SUBSTRATE CATEGORIES	TRANSECTS					MEAN
	1	2	3	4	5	
TURF ALGAE	33.96	43.61	34.82	50.66	42.83	41.17
LIVE CORAL	40.77	30.01	23.60	26.18	24.62	29.03
CALCAREOUS ALGAE	1.62	0.82	12.69	1.18	5.33	4.33
FLESHY ALGAE		1.00		2.49	1.42	0.98
SPONGES	1.02				0.29	0.26
ENCRUSTING GORGONIANS					0.48	0.10
ABIOTIC						
REEF OVERHANG	21.79	21.13	28.89	19.49	16.73	21.60
SAND	0.85	3.45			2.63	1.39
SILT					5.70	1.14
GORGONIANS (# colonies)	16	11	3	13	19	12.40
RUGOSITY (m)	6.55	5.54	7.31	5.24	4.83	5.89
CORAL SPECIES	1	2	3	4	5	MEAN
<i>Montastrea annularis</i>	36.51	17.68	20.75	23.77	16.80	23.10
<i>Siderastrea siderea</i>	2.56	3.17			1.81	1.51
<i>Diploria labyrinthiformis</i>		5.89				1.18
<i>Diploria strigosa</i>					4.18	0.84
<i>Porites astreoides</i>	1.11	0.91		0.84	0.95	0.76
<i>Porites porites</i>			2.85			0.57
<i>Dichocoenia stokesii</i>		1.72				0.34
<i>Siderastrea radians</i>	0.43			0.99	0.29	0.34
<i>Colpophyllia natans</i>					0.58	0.12
<i>Millepora alcicornis</i>				0.56		0.11
<i>Montastrea cavernosa</i>		0.45				0.09
<i>Agaricia agaricites</i>	0.17	0.18				0.07

Coral Species Outside Transects: *Acropora cervicornis*, *Eusmilia fastigiata*, *Agaricia grahame*, *Mycetophyllia lamarkiana*, *Siderastrea radians*, *Isophyllia sinuosa*, *Meandrina meandrites*, *Dendrogyra cylindrus*, *Mycetophyllia aliciae*, *Stephanocoenia michilini*

The vertically projected growth of large, massive colonies of Boulder Brain Coral was the most conspicuous feature of the reef slope at Caballo Blanco. The mean cover by Boulder Brain Coral (*Montastrea annularis*) was 23.1 %, or 78.9 % of the total cover by stony corals (e.g. 29.3 %) (Table 13). A total of 21 species of stony corals were identified, 12 of which were intersected by line transects during our monitoring survey. The main assemblage of stony corals in terms of surface cover was composed of species that typically grow as massive colonies, such as *M. annularis*, *Diploria labyrinthiformis*, and *Siderastrea siderea*. Encrusting species included *D. strigosa* and *P. astreoides*. Soft corals (gorgonians) were present in relatively low densities (mean: 12 colonies/transect).

The dominant biotic substrate component of the reef sessile-benthic community in terms of surface cover was the algal turf with a mean of 41.2 % (range: 34.0 – 50.7 %). Calcareous algae, mostly *Halimeda incrasata* was very common at the reef slope with a mean cover of 4.3 %. Encrusting gorgonians (*Erythropodium caribaeorum*) and sponges were observed in several transects, but with very low substrate cover (< 1 %). Abiotic cover, mostly associated with reef overhangs averaged a surface cover of 24.1 %. Reef overhangs from large coral colonies contributed significantly to the high reef substrate rugosity (e.g. 5.9 m).

Temporal variations of percent substrate cover by sessile-benthic categories from the initial baseline characterization in 2001 to the recent monitoring event in 2004 are presented in Figure 5.

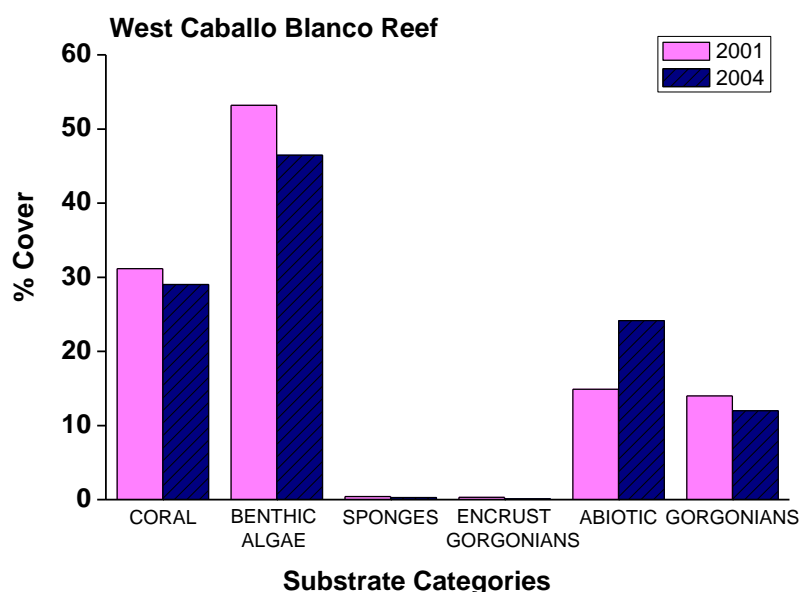


Figure 5. Percent cover by substrate categories at West Caballo Blanco Reef, north Vieques during 2001 baseline characterization and 2004 monitoring surveys.

Live coral cover declined by 2.1 %, from 31.2 in 2001 to 29 % in 2004. Such variation in cover by live corals is probably within the precision of the chain method. The decline of cover by benthic algae was associated to a reduction of cover by turf algae and matched by a corresponding increment of cover by abiotic categories. Again, this variation may be an artifact of the method related in this case to the high rugosity of the substrate and the difficulty in assessment of cover in vertically projected surfaces, such as they are present in reef overhangs. Turf algae is highly resilient to changes over time and becomes a quasi-permanent state of the reef substrate. Growth of massive and encrusting corals and large sponges, such as *Xestospongia muta* may gradually displace the algal turf over long periods of time. Short term variations of substrate cover by turf algae have been previously observed and have been associated to seasonal overgrowth by fleshy algae, and/or transitory overlays of sand in highly dynamic reef systems of the north coast of Puerto Rico (CSA/CH2MHILL, 2002).

Fishes and Motile Megabenthic Invertebrates - Caballo Blanco Reef

A total of 66 reef fishes were identified at Caballo Blanco Reef Slope, 40 of which were observed within belt-transect areas (Table 14). The mean abundance of fishes was 85.0 Ind/30 m² and the mean number of species per transect was 18.2. This represents an increment of mean abundance of almost 300 % and an increment of seven species per transect from the initial baseline characterization survey in 2001 (García et al., 2001). The higher visibility and calm weather prevailing during the monitoring survey in 2004 must have influenced the higher fish population census at this reef.

The numerically dominant assemblage included the Masked Goby (*Coryphopterus personatus*) with 24.4 Ind/30m², Dusky Damselfish (*Stegastes dorsopunicans*) with 16.2 Ind/30m², Striped Parrotfish (*Scarus iserti*) with 13.0 Ind/30m², Brown Chromis (*Chromis multilineata*) with 4.0 Ind/30m², and the Bluehead Wrasse (*Thalassoma bifasciatum*) with 4.0 Ind/30m². Other common species observed within all five belt-transects surveyed include the Blue Tang, Squirrelfish, Black Hamlet, and the Redband and Stoplight parrotfishes (Table 14). Fish abundance during the 2004 survey was strongly influenced by a large aggregation of 122 individuals of the Masked Goby in transect 1. The Masked Goby is a small (1 cm) schooling fish that forms swarms under ledges and other protective habitats in the reef. Schools of Brown Chromis were also present at transects 1 and 3, with maximum abundances of 14 per transect. The Masked Goby and Brown Chromis were not previously observed within belt-transacts during the 2001 baseline characterization survey.

Table 14. Taxonomic composition and abundance (Individuals/30 m²) of fishes surveyed within belt-transects at Caballo Blanco Reef, north Vieques 2004.

SPECIES	COMMON NAME	BELT-TRANSECTS					MEAN
		1	2	3	4	5	
<i>Coryphopterus personatus</i>	Masked Goby	122					24.4
<i>Stegastes dorsopunicans</i>	Dusky Damselfish	16	20	18	13	14	16.2
<i>Scarus iserti</i>	Stripped Parrotfish	16	12	19	6	12	13.0
<i>Chromis multilineata</i>	Brown Chromis	6		14			4.0
<i>Thalassoma bifasciatum</i>	Bluehead Wrasse			12	5	2	3.8
<i>Sparisoma aurofrenatum</i>	Redband Parrotfish	1	2	4	3	2	2.4
<i>Sparisoma viride</i>	Stoplight Parrotfish	3	3	1	2	3	2.4
<i>Gobiosoma evelynae</i>	Sharknose Goby	3	2		3	2	2.0
<i>Hypoplectrus nigricans</i>	Black Hamlet	1	3	2	1	2	1.8
<i>Carangoides ruber</i>	Bar Jack			7			1.4
<i>Acanthurus chirurgus</i>	Doctorfish	1		2	2	1	1.2
<i>Holocentrus rufus</i>	Squirrelfish	2	1	1	1	1	1.2
<i>Acanthurus coeruleus</i>	BlueTang	1	1	1	1	1	1.0
<i>Acanthurus bahianus</i>	Ocean Surgeon		2			2	0.8
<i>Halichoeres radiatus</i>	Pudding Wife		1	1	1	1	0.8
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish	3			1		0.8
<i>Myripristis jacobus</i>	Blackbar Soldierfish	3		1			0.8
<i>Scarus vetula</i>	Queen Parrotfish	2				1	0.6
<i>Canthigaster rostrata</i>	Caribbean Puffer	1		1			0.4
<i>Cephalopholis cruentatus</i>	Graysby	1		1			0.4
<i>Chaetodon capistratus</i>	Foureye Butterflyfish	2					0.4
<i>Chromis cyanea</i>	Blue Chromis	1		1			0.4
<i>Coryphopterus glaucofraenum</i>	Bridled Goby	1				1	0.4
<i>Gerres cinereus</i>	Yellowfin Mojarra			1		1	0.4
<i>Hypoplectrus chlorurus</i>	Yellowtail Hamlet			1	1		0.4
<i>Hypoplectrus puella</i>	Barred Hamlet	1				1	0.4
<i>Mulloides martinicus</i>	Yellowtail Goatfish			2			0.4
<i>Stegastes variabilis</i>	Cocoa Damselfish		2				0.4
<i>Abudefduf sexatilis</i>	Sargent Major	1					0.2
<i>Aulostomus maculatus</i>	Trumpetfish		1				0.2
<i>Cantherhines pullus</i>	Tail-light Filefish	1					0.2
<i>Coryphopterus lipernes</i>	Peppermint Goby	1					0.2
<i>Epinephelus guttatus</i>	Red Hind					1	0.2
<i>Haemulon sciurus</i>	Bluestripped Grunt	1					0.2
<i>Halichoeres bivittatus</i>	Slippery Dick			1			0.2
<i>Hypoplectrus unicolor</i>	Butter Hamlet				1		0.2
<i>Ocyurus chrysurus</i>	Yellowtail Snapper	1					0.2
<i>Pomacanthus arcuatus</i>	Gray Angelfish		1				0.2
<i>Stegastes leucostictus</i>	Beaugregory				1		0.2
<i>Stegastes partitus</i>	Bicolor Damselfish			1			0.2
TOTAL INDIVIDUALS		192	51	92	42	48	85.0
TOTAL SPECIES		25	13	21	15	17	18.2

Large aggregations of commercially important reef fish species, particularly Yellowtail Snappers (*Ocyurus chrysurus*) were observed during the Active Search Census (ASEC) at Caballo Blanco Reef (Table 15). Smaller aggregations of Schoolmaster and Lane Snappers were also present. Schools of juvenile Bar Jacks and associated large pelagic predators, such as Great Barracuda, Blue Runners, Black Jacks and Cero Mackerel were prominent over the reef. Yellowfin Mojarra and Plumas were observed foraging in the sandy sediments. A juvenile Mutton Snapper and a juvenile Nurse Shark were also present.

Table 15. Size-frequency distribution of large and/or commercially important reef fishes identified during an ASEC survey at Caballo Blanco Reef, north Vieques 2004

Depth range : 4 - 8 m

Duration - 30 min.

SPECIES	COMMON NAME	SIZE – FREQUENCY (# - cm)			
<i>Calamus pluma</i>	Pluma	13 - (25)	5 – (30)		
<i>Carangoides crysos</i>	Blue Runner	2 - (25)	1 - (35)		
<i>Carangoides ruber</i>	Bar Jack	80 - (13)	2 - (25)	1 - (38)	
<i>Caranx lugubris</i>	Black Jack	1 - (30)			
<i>Epinephelus guttatus</i>	Red Hind	2 - (25)			
<i>Gerres cinereus</i>	Yellowfin Mojarra	2 - (20)	12 - (30)	2 - (35)	
<i>Ginglymostoma cirratum</i>	Nurse Shark	1 - (96)			
<i>Lutjanus analis</i>	Mutton Snapper	1 - (30)			
<i>Lutjanus apodus</i>	Schoolmaster	3 - (25)	2 - (30)	4 - (38)	
<i>Ocyurus chrysurus</i>	Yellowtail Snapper	7 - (15)	48 - (25)	19 - (30)	2 - (35)
<i>Scomberomoru regalis</i>	Cero Mackerel	1 - (70)			
<i>Sphyrnaena barracuda</i>	Great Barracuda	1 - (75)			
Other Fishes Present :					
<i>Abudefduf taurus</i>	Night Sergeant				
<i>Anisotremus surinamensis</i>	Black Margate				
<i>Gnatholepis thompsoni</i>	Goldspot Goby				
<i>Gramma loreto</i>	Royal Gramma				
<i>Haemulon album</i>	White Margate				
<i>Haemulon chrysargyreum</i>	Smallmouth Grunt				
<i>Haemulon flavolineatum</i>	French Grunt				
<i>Haemulon macrostomum</i>	Spanish Grunt				
<i>Haemulon plumieri</i>	White Grunt				
<i>Halichoeres garnoti</i>	Yellowhead Wrasse				
<i>Holocentrus adscensionis</i>	Lonjaw Squirrelfish				
<i>Lactophrys bicaudalis</i>	Spotted Trunkfish				
<i>Pseudupeneus maculatus</i>	Spotted Goatfish				
<i>Serranus tabacarius</i>	Tobacco Fish				
<i>Synodus intermedius</i>	Lizardfish				
<i>Sparisoma rubripinne</i>	Yellowtail Parrotfish				
<i>Sparisoma chrysopteron</i>	Redtail Parrotfish				

() Total Length in cms.

The size distribution data suggests that Caballo Blanco Reef functions both as a habitat for juvenile reef fishes such as snappers, jacks and grunts and as a foraging site for large pelagic predators, such as Great Barracuda, Jacks and Cero Mackerel. It is also the recruitment and residential habitat of a diverse assemblage of reef fishes and the foraging ground of fishes that feed upon small epibenthic and infaunal invertebrates from sandy and seagrass habitats, such as mojarras, porgies and White Margates (*Haemulon album*).

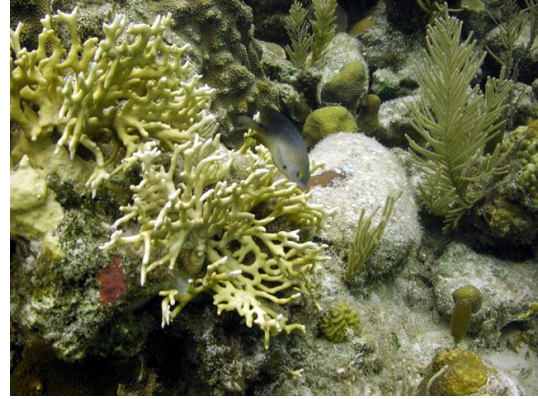
Motile megabenthic invertebrates within belt-transects at Caballo Blanco presented a mean density of 5.6 Ind/30 m² (Table 16). The taxonomic assemblage included three species of sea urchins (*Eucidaris tribuloides*, *Echinometra lucunter* and *Diadema antillarum*), a snail associated with gorgonians, one crab and two juvenile Spiny Lobsters (*Panulirus argus*).

Table 16. Caballo Blanco Reef Slope. Taxonomic composition and abundance of motile megabenthic invertebrates. July, 2004

		TRANSECTS					MEAN ABUNDANCE (IND/30 m ²)
		1	2	3	4	5	
SPECIES	COMMON NAME						
<i>Eucidaris tribuloides</i>	Slate Pencil Urchin	1					0.2
<i>Echinometra lucunter</i>	Rock-boring Urchin	3	2	3	3		2.2
<i>Diadema antillarum</i>	Long-spined Sea Urchin			10	1		2.2
<i>Carpilus coralinus</i>	Coral Crab			1			0.2
<i>Panulirus argus</i>	Spiny Lobster					2	0.4
<i>Cyphoma gibbosum</i>	Flamingo Tongue				2		0.4
TOTALS		4	2	14	6	2	5.6

Photo Album 4. Caballo Blanco Reef Slope





5. Mosquito Reef

Mosquito Reef is an emergent islet, or “key” localized at about 1.7 nautical miles off from Punta Caballo, on the north coast of Vieques (Figure 1). The coral reef system is a fringing formation with an extensive reef crest surrounding the islet and a steep slope down to its base at a depth of 14.5 meters. A Manatee Seagrass (*Syringodium filiforme*) bed is found at the reef interface. A vast accumulation of large broken fragments of Elkhorn Coral, *Acropora palmata* overgrown by turf algae and other encrusting biota were observed at the reef crest. Our survey was performed on the northeast section of the reef slope at a depth of 10.6 meters. The reef substrate at the slope was irregular, with many massive coral colonies providing substantial topographic relief. Panoramic views of the Mosquito coral reef community are included as Photo Album 5.

A species rich assemblage of soft and stony corals was the most prominent feature of the reef slope at Mosquito Reef. A total of 24 stony coral species were identified in the vicinity of our survey area, 13 of which were intercepted by transects (Table 17). Mean cover by stony corals along transects was 35.2 % (range: 24.9 – 47.7 %). Boulder Star Coral (*Montastrea annularis*) was the dominant species in terms of surface cover with a mean of 19.4 % (range: 11.3 – 32.7 %). Colonies of the Boulder Brain Coral (*Colpophyllia natans*) and the Mustard Hill Coral (*Porites astreoides*) were present from all five transects. The Greater Star Coral (*Siderastrea siderea*) and the Finger Coral (*Porites porites*) were present in four transects. Soft corals (gorgonians) were moderately abundant in the shallow sections of the reef slope, but were less prominent near the base of the reef where large coral heads occupied most of the available space. Gorgonians averaged 13 colonies per transect.

Turf algae, a combined assemblage of short filamentous algae was the dominant assemblage in terms of percent cover by substrate categories at Mosquito Reef with a mean of 45.4 % (Table 17). Fleshy algae, mostly composed of brown the macroalgae *Dyctiota sp.* was present in small amounts in four out of the five transects surveyed. The combined cover by benthic algae was 46.0 %. Patches of the encrusting gorgonian, *Erythropodium caribaeorum* were present at all five transects with a mean cover of 2.6 %. Sponges were also intercepted by the five transects and averaged a surface cover of 1.5 %. Abiotic substrates, mainly influenced by reef overhangs from large coral heads and ledges presented a mean cover of 14.7 %. The mean reef rugosity was 3.82 meters. Sessile-benthic community profiles from permanent transects at Mosquito Reef are included as Appendix 5.

Table 17. Mosquito Reef. Percent substrate cover by sessile-benthic categories, 2004

SUBSTRATE CATEGORIES	TRANSECTS					MEAN
	1	2	3	4	5	
TURF ALGAE	59.40	43.53	35.60	43.96	44.51	45.40
LIVE CORAL	24.92	32.25	47.67	37.10	34.23	35.23
ENCRUSTING GORGONIAN	0.94	0.69	3.39	2.56	5.19	2.55
SPONGES	2.08	1.87	1.06	1.74	0.70	1.49
FLESHY ALGAE	1.45	0.59	0.53	0.41		0.60
ANTHOZOANS	0.31					0.06
ABIOTIC						
REEF OVERHANGS	10.90	15.49	11.76	13.73	15.37	13.45
RUBBLE		5.59				1.12
SAND				0.51		0.10
GORGONIANS (# Colonies)	22	11	7	13	13	13
RUGOSITY (m)	3.56	4.37	3.30	3.75	4.11	3.82
CORAL SPECIES						
<i>Montastrea annularis</i>	16.00	19.60	32.73	11.27	17.37	19.39
<i>Colpophyllia natans</i>	3.95	6.27	6.25	4.20	6.59	5.45
<i>Montastrea cavernosa</i>				11.37	2.59	2.79
<i>Porites astreoides</i>	2.18	3.33	1.48	5.54	1.30	2.77
<i>Porites porites</i>	0.31	2.55	6.15	0.92		1.99
<i>Siderastrea siderea</i>	1.04	0.49	1.06		3.19	1.16
<i>Siderastrea radians</i>	1.25				1.80	0.61
<i>Mycetophyllia ferox</i>				1.54		0.31
<i>Mycetophyllia lamarckiana</i>				1.43		0.29
<i>Agaricia agaricites</i>				0.82		0.16
<i>Leptoseris cucullata</i>					0.70	0.14
<i>Millepora alcicornis</i>	0.21				0.40	0.12
<i>Stephanocoenia michilini</i>					0.30	0.06

Coral Species Outside Transects: *Diploria strigosa*, *D. labyrinthiformis*, *Mussa sp.*, *Eusmilia fastigiata*, *Agaricia grahame*, *Mycetophyllia lamarkiana*, *M. aliciae*, *Madracis decactis*, *Isophyllia rigida*, *Leptoseris cucullata*, *Dendrogyra cylindrus*, *Dichocoenia stokesii*, *Mycetophyllia aliciae*, *Stephanocoenia michilini*

Live coral cover, as well as benthic algae and other sessile-benthic biotic categories remained virtually unchanged between the initial baseline characterization survey in 2001 and the present monitoring event in 2004 (Figure 6). The largest difference of substrate cover resulted for abiotic categories, but the difference is still very small (< 2%) and within the precision of the method. The mean number of gorgonians per transect increased by one colony during the present monitoring survey.

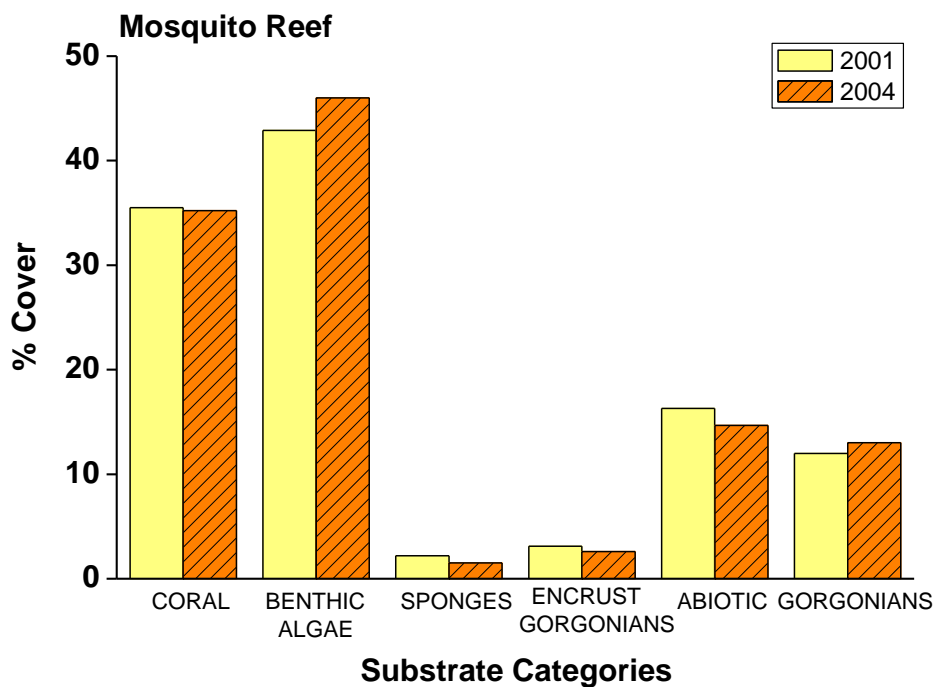


Figure 6. Percent cover by substrate categories at Mosquito Reef, north Vieques during 2001 baseline characterization and 2004 monitoring surveys.

Fishes and Motile Megabenthic Invertebrates - Mosquito Reef

A total of 57 reef fishes were identified from Mosquito Reef, 43 of which were observed within belt-transect areas (Table 18). The mean abundance of fishes was 407.6 Ind/30 m² and the mean number of species per transect was 22.4. This represents an increment of more than 670 % on mean abundance and 24 % on number of fish species per transect over the initial baseline characterization survey (García et al., 2001). The difference is largely related to the occurrence of many schools or swarms of the Masked Goby (*Coryphopterus personatus*) within all five belt-transects surveyed. The mean of the Masked Goby represented approximately 72.5 % of the total fish abundance estimates for Mosquito Reef. The Masked Goby was also the most abundant fish species in our previous assessment (García et al., 2001), but its abundance has either multiplied since then (from a mean abundance of 24.8 Ind/30 m²), or their real abundance was under-estimated due to their cryptic behavior during strong surge from wave action. The mean fish abundance from Mosquito Reef (407.6 Ind/30 m²) is the highest ever reported for a belt-transect survey at a reef in Puerto Rico.

Table 18. Taxonomic composition and abundance (Individuals/30 m²) of fishes surveyed within belt-transects at Mosquito Reef, north Vieques 2004.

SPECIES	COMMON NAME	TRANSECTS					MEAN
		1	2	3	4	5	
<i>Coryphopterus personatus</i>	Masked Goby	280	300	150	430	315	295.0
<i>Inermia vittata</i>	Boga		120	42		100	52.4
<i>Scarus iserti</i>	Stripped Parrotfish	13	10	11	8	11	10.6
<i>Stegastes dorsopunicans</i>	Dusky Damselfish	6	12	14	7	6	9.0
<i>Haemulon aurolineatum</i>	Tomtate					33	6.6
<i>Gobiosoma evelynae</i>	Sharknose Goby	5	3	8	5	7	5.6
<i>Sparisoma viride</i>	Stoplight Parrotfish	7	4	1	3	3	3.6
<i>Haemulon sp</i>	Juvenile Grunts			4		5	1.8
<i>Pomacanthus arcuatus</i>	Gray Angelfish			2	4	3	1.8
<i>Sparisoma aurofrenatum</i>	Redband Parrotfish	3	3	2		1	1.8
<i>Coryphopterus glaucofraenum</i>	Bridled Goby	2		2	2	2	1.6
<i>Abudefduf sexatilis</i>	Sargent Major	2	3			2	1.4
<i>Stegastes variabilis</i>	Cocoa Damselfish	1	1	2	2	1	1.4
<i>Acanthurus coeruleus</i>	BlueTang	2	1	1	1	1	1.2
<i>Acanthurus bahianus</i>	Ocean Surgeon	1	1	1	1	1	1.0
<i>Chaetodon capistratus</i>	Foureye Butterflyfish	1	1		2	1	1.0
<i>Hypoplectrus nigricans</i>	Black Hamlet	2	1	2			1.0
<i>Acanthurus chirurgus</i>	Doctorfish	1		1	2		0.8
<i>Hypoplectrus unicolor</i>	Butter Hamlet	1	1			2	0.8
<i>Scarus vetula</i>	Queen Parrotfish	1			2	1	0.8
<i>Stegastes leucostictus</i>	Beaugregory	1		2	1		0.8
<i>Chromis multilineata</i>	Brown Chromis			3			0.6
<i>Haemulon flavolineatum</i>	French Grunt		1	1		1	0.6
<i>Holocentrus rufus</i>	Squirrelfish	1	1			1	0.6
<i>Hypoplectrus puella</i>	Barred Hamlet		1		1	1	0.6
<i>Ocyurus chrysurus</i>	Yellowtail Snapper			1		2	0.6
<i>Sparisoma radians</i>	Bucktooth Parrotfish	1		1	1		0.6
<i>Gnatholepis thompsoni</i>	Goldspot Goby	2					0.4
<i>Halichoeres garnoti</i>	Yellow-head Wrasse		1		1		0.4
<i>Microspathodon chrysurus</i>	Yellowtail Damselfil		1			1	0.4
<i>Stegastes partitus</i>	Bicolor Damselfish					2	0.4
<i>Aulostomus maculatus</i>	Trumpetfish				1		0.2
<i>Canthigaster rostrata</i>	Caribbean Puffer		1				0.2
<i>Cephalopholis cruentatus</i>	Graysby			1			0.2
<i>Epinephlus guttatus</i>	Red Hind	1					0.2
<i>Flameo marianus</i>	Longspine Squirrelfish		1				0.2
<i>Haemulon macrostomum</i>	Spanish Grunt		1				0.2
<i>Hypoplectrus chlorurus</i>	Yellowtail Hamlet	1					0.2
<i>Hypoplectrus guttavarius</i>	Shy Hamlet					1	0.2
<i>Hypoplectrus sp</i>	Hamlet				1		0.2
<i>Lactophrys triqueter</i>	Smooth Trunkfish					1	0.2
<i>Lutjanus apodus</i>	Schoolmaster				1		0.2
<i>Synodus intermedius</i>	Lizardfish				1		0.2
TOTAL INDIVIDUALS		335	469	252	477	505	407.6
TOTAL SPECIES		22	22	21	21	26	26.4

In addition to the Masked Goby, the numerically dominant fish assemblage within belt-transects at Mosquito Reef during the 2004 monitoring survey included the Reef Silverside (*Allanetta sp.*) with 52.4 Ind/30 m², Striped Parrotfish (*Scarus iserti*) with 10.6 Ind/30 m², Dusky Damselfish (*Stegastes dorsopunicans*) with 9.0 Ind/30 m², Tomtate (*Haemulon aurolineatum*) with 6.6 Ind/30 m² and the Sharknose Goby (*Gobiosoma evelynae*) with 5.6 Ind/30 m² (Table 19). The Ocean Surgeon, Blue Tang, Stoplight Parrotfish and Cocoa Damselfish were observed from all belt-transects in lower mean abundances. Reef Silversides were not previously reported for Mosquito Reef. Schools of 40 – 120 individuals (2 – 4 cm) were observed hovering at about 2 meters from the reef substrate.

As previously observed during the baseline characterization survey in 2001 (García et al., 2001) large aggregations of commercially important reef fish species, particularly Yellowtail and Lane Snappers (*Ocyurus chrysurus*, *Lutjanus synagris*) were observed during the Active Search Census (ASEC) at Mosquito Reef. Yellowtail Snappers were observed over a wide size range, from early juveniles to full adults, but young adult individuals were most common (Table 19). Lane Snappers were also observed in a wide size range. They were typically found at the reef sand interface, moving in pairs and/or in schools of 10 -15 individuals. One adult Red Hind and juvenile Nassau Grouper and Mutton Snapper were also present. Schools of juvenile Bar Jacks were the most prominent pelagic fish species on the reef. Plumas and a juvenile Hogfish were observed foraging in the sandy sediments at the base of the reef. Large reef predators, such as the Great Barracuda (*Sphyræna barracuda*) and the Southern Stingray (*Dasyatis americana*) were previously reported from Mosquito Reef (García et al., 2001).

The size distribution data suggests that Mosquito Reef functions both as a habitat for juvenile reef fishes such as snappers, jacks and grunts and as a foraging site for large pelagic predators, such as Great Barracuda. It is also the recruitment and residential habitat of a diverse assemblage of reef fishes, including some of commercial importance, such as the Lane, Mutton and Yellowtail Snappers, Red Hind and Nassau Groupers and a foraging ground and natural habitat of fishes that feed upon small epibenthic and infaunal invertebrates from sandy and seagrass habitats, such as porgies (Pluma) and stingrays.

Motile megabenthic invertebrates within belt-transects at the reef slope of Mosquito Reef included the Long-spined Sea Urchins (*Diadema antillarum*) and the Banded Coral and Pederson Cleaner Shrimps (Table 20). One Spiny Lobster was observed during the ASEC survey.

Table 19. Size-frequency distribution of large and/or commercially important reef fishes identified during an ASEC survey at Mosquito Reef, north Vieques 2004

Depth range : 8 - 12 m Duration - 30 min.

SPECIES	COMMON NAME	SIZE – FREQUENCY (# - cm)			
<i>Calamus pluma</i>	Pluma	1 - (18)			
<i>Carangoides ruber</i>	Bar Jack	3 - (15)			
<i>Epinephelus guttatus</i>	Red Hind	1 - (30)			
<i>Lachnolaimus maximus</i>	Hogfish	1 - (25)			
<i>Lutjanus analis</i>	Mutton Snapper	1 - (40)			
<i>Lutjanus synagris</i>	Lane Snapper	11 - (12)	23 - (20)	3 – (25)	
<i>Ocyurus chrysurus</i>	Yellowtail Snapper	43 - (12)	39 - (20)	16 - (25)	4 - (35)
<i>Panulirus argus</i>	Spiny Lobster	1 – [20]			
Other Fishes Present :					
<i>Aluteres scriptus</i>	Scrawled Filefish				
<i>Gramma loreto</i>	Royal Gramma				
<i>Haemulon sciurus</i>	Blue Striped Grunt				
<i>Haemulon plumieri</i>	White Grunt				
<i>Mulloides martinicus</i>	Yellow Goatfish				
<i>Pseudupeneus maculatus</i>	Spotted Goatfish				

() Total Length in cms.
[] Carapace Length

Table 20. Mosquito Reef. Taxonomic composition and abundance of motile megabenthic invertebrates within belt-transects. July, 2004

Survey Date: July, 2004
Depth: 10.6 m

SPECIES	COMMON NAME	TRANSECTS					MEAN ABUNDANCE (IND/30 m2)
		1	2	3	4	5	
<i>Periclimenes pedersoni</i>	Pederson Cleaner Shrimp			1			0.2
<i>Stenopus hispidus</i>	Banded Coral Shrimp	2					0.4
<i>Diadema antillarum</i>	Long-spined Sea Urchin				1	1	0.4
TOTALS		2	0	1	1	1	1.0

Photo Album 5. Mosquito Reef





6. Corona Reef

Corona is an emergent islet, or “key” located due east of Mosquito Reef on the northern section of Vieques (Figure 1). The coral reef system is a fringing formation similar to Mosquito Reef, with a wide reef crest and a narrow and steep slope dropping to its base at a depth of 14 meters. A mixed stand of Turtle and Manatee Seagrasses is found near the base of the reef. The reef substrate is irregular. Stony corals are mostly found as encrusting and branching colonies and do not contribute much topographic relief, except along the northeastern section of the reef, where large coral colonies have established near the base of the reef contributing substantial relief. Our survey was performed on the northwest section of the reef slope at a depth of 10.6 meters. Panoramic images of Coronas Reef are included as Photo Album 6.

The sessile-benthic reef community at Coronas Reef is characterized by small and medium sized stony corals growing mostly interspersed as encrusting and branching isolated colonies in the reef. A total of 26 stony coral species were identified in the vicinity of our survey area, 14 of which were intercepted by transects (Table 21). Mean cover by stony corals along transects was 21.4 % (range: 15.5 - 26.4 %). Boulder Star and Great Star Corals (*Montastrea annularis*, *M. cavernosa*) were the dominant species in terms of surface cover with means of 8.5 % and 5.5 %, respectively. Massive Starlet Coral (*Siderastrea siderea*) was also intersected by all five transects with a mean cover of 2.0 %. Mustard Hill Coral (*Porites astreoides*) was present in four transects with a mean cover of 3.0 %. Soft corals (gorgonians) were highly abundant with a mean of 26 colonies intercepted per transect. Large colonies of *Pseudopterogorgia spp.*, *Pterogorgia spp.*, *Eunicea spp.* and *Plexaura sp.* were visually the most prominent biological component of the benthic reef community and provided substantial topographic relief and protective habitat.

Turf algae was the dominant component of the sessile-benthic reef community in terms of substrate cover with a mean of 55.3 % (range: 35.9 – 70.7 %) (Table 21). Fleshy algae were present in very low amounts at Corona Reef, but were not intercepted by transects. The encrusting gorgonian, *Erythropodium caribaeorum* was present at all five transects with a mean cover of 1.8%. Encrusting and erect sponges (*Callyspongia vaginalis*, *Niphates sp.*, *Aplysina sp.*) were common (mean surface cover: 2.3 %). Abiotic substrates, mainly influenced by coral overhangs presented a mean cover of 19.1 %. The mean reef rugosity was 4.58 meters. Sessile-benthic community profiles from permanent transects at Corona Reef are included as Appendix 6.

Table 21. Corona Reef. Percent substrate cover by sessile-benthic categories, 2004

SUBSTRATE CATEGORIES	TRANSECTS					MEAN
	1	2	3	5	4	
TURF ALGAE	35.89	58.25	58.39	70.74	53.43	55.34
LIVE CORAL	26.41	15.53	18.23	22.11	24.82	21.42
SPONGES	1.36	6.63	0.31	1.16	1.85	2.26
ENCRUSTING						
GORGONIANS	2.61	1.59	0.62	1.57	2.67	1.81
ABIOTIC						
REEF OVERHANGS	27.26	17.32	22.45	4.42	15.59	17.41
SILT	6.47				1.64	1.62
SAND		0.69				0.14
GORGONIANS (# colonies)	25	26	30	24	23	26
RUGOSITY (m)	7.62	4.49	3.68	3.38	3.73	4.58
CORAL SPECIES						
<i>Montastrea annularis</i>	15.89	1.17	5.46	9.05	10.87	8.49
<i>Montastrea cavernosa</i>	6.53	3.02	5.25	9.05	3.59	5.49
<i>Porites astreoides</i>		4.96	4.01	0.95	4.92	2.97
<i>Siderastrea siderea</i>	2.00	3.79	1.24	0.42	2.77	2.04
<i>Agaricia agaricites</i>	0.32	0.68	0.52		1.23	0.55
<i>Siderastrea radians</i>			0.93	1.79		0.54
<i>Colpophyllia natans</i>					1.44	0.29
<i>Stephanocoenia michilini</i>	0.85		0.52			0.27
<i>Agaricia sp.</i>		1.36				0.27
<i>Diploria strigosa</i>				0.84		0.17
<i>Madracis decactis</i>	0.74					0.15
<i>Millepora alcicornis</i>		0.39				0.08
<i>Eusmilia fastigiata</i>			0.31			0.06
<i>Dichocoenia stokesi</i>		0.19				0.04

Coral Species Outside Transects: *Acropora cervicornis*, *Dendrogyra cylindrus*, *Diploria labyrinthiformis*, *Mussa sp.*, *Eusmilia fastigiata*, *Agaricia grahame*, *Mycetophyllia aliciae*, *Madracis decactis*, *Isophyllia sinuosa*, *I. rigida*, *Meandrina meandrites*, *Leptoseris cucullata*, *Dendrogyra cylindrus*, *Dichocoenia stokesii*, *Mycetophyllia ferox*, *Solenastrea sp.*

Temporal variations of percent substrate cover by sessile-benthic categories from the initial baseline characterization in 2001 to the recent monitoring event in 2004 are presented in Figure 7. Live coral cover increased by 3.9 %, from 17.5 % in 2001 to 21.4 % in 2004. Such variation in cover by live corals is probably within the precision of the chain method. Small increments in cover by colonies of *Montastrea annularis*, *M. cavernosa* and *Porites astreoides* were observed in some transects, but the increment in cover was not uniform across all transects surveyed, as would be expected if coral growth would be the reason for increment in substrate cover.

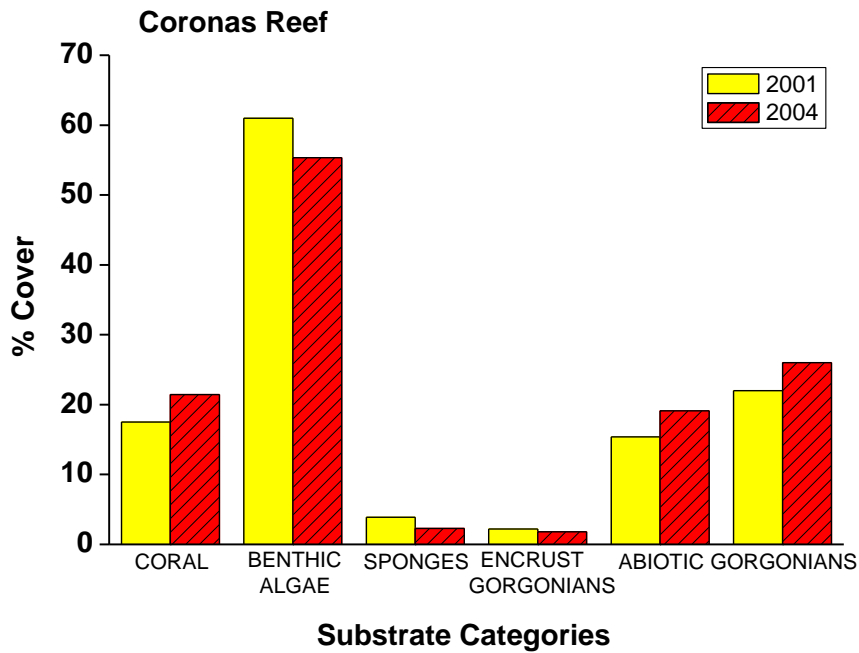


Figure 7. Percent cover by substrate categories at Corona Reef, north Vieques during 2001 baseline characterization and 2004 monitoring surveys.

The decline of cover by benthic algae was matched by a corresponding increment of cover by coral and abiotic categories. Again, this variation may be an artifact of the method related in this case to the high rugosity of the substrate and the difficulty in assessment of cover in vertically projected surfaces, such as they are present in reef overhangs. There was an increment in erect gorgonian colonies intercepted by the transect line, from 22 to 26. Such increment may be real and associated with recruitment and/or growth of colonies at Coronas Reef, which appears to present favorable conditions for colonization by erect gorgonians.

Fishes and Motile Megabenthic Invertebrates - Coronas Reef

A total of 62 reef fishes were identified at Coronas Reef, 45 of which were observed within belt-transect areas (Table 22). The mean abundance of fishes was 338.0 Ind/30 m² and the mean number of species per transect was 22.4. This represents an increment of more than

Table 22. Taxonomic composition and abundance (Individuals/30 m²) of fishes surveyed within belt-transects at Coronas Reef, north Vieques 2004.

SPECIES	COMMON NAME	TRANSECTS					MEAN
		1	2	3	4	5	
<i>Coryphopterus personatus</i>	Masked Goby	350	200	270	340	180	268.0
<i>Scarus iserti</i>	Stripped Parrotfish	10	15	9	7	15	11.2
<i>Stegastes dorsopunicans</i>	Dusky Damselfish	3	5	7	8	3	5.2
<i>Gobiosoma evelynae</i>	Sharknose Goby	5	7	4	4	3	4.6
<i>Sparisoma aurofrenatum</i>	Redband Parrotfish	4	5	4	1	6	4.0
<i>Sparisoma viride</i>	Stoptlight Parrotfish	2	1	5	7	3	3.6
<i>Stegastes variabilis</i>	Cocoa Damselfish	6	2	3	2		2.6
<i>Lachnolaimus maximus</i>	Hogfish				12		2.4
<i>Acanthurus bahianus</i>	Ocean Surgeon	2	2		2	4	2.0
<i>Acanthurus coeruleus</i>	BlueTang	3		1	1	5	2.0
<i>Pseudupeneus maculatus</i>	Spotted Goatfish		1	1	8		2.0
<i>Haemulon aurolineatum</i>	Tomtate	5		3			1.6
<i>Holocentrus rufus</i>	Squirrelfish			3	3	2	1.6
<i>Chaetodon capistratus</i>	Foureye Butterflyfish	1	1	3		2	1.4
<i>Halichoeres garnoti</i>	Yellow-head Wrasse		3	3		1	1.4
<i>Coryphopterus sp.</i>	Goby	2	2			2	1.2
<i>Ocyurus chrysurus</i>	Yellowtail Snapper	3			2	3	1.6
<i>Scarus taeniopterus</i>	Princess Parrotfish			3		3	1.2
<i>Gramma loreto</i>	Royal Gramma	1		1	2		0.8
<i>Hypoplectrus nigricans</i>	Black Hamlet		1	1	1	1	0.8
<i>Canthigaster rostrata</i>	Caribbean Puffer		1	1		1	0.6
<i>Haemulon flavolineatum</i>	French Grunt				1	2	0.6
<i>Hypoplectrus unicolor</i>	Butter Hamlet	1	2				0.6
<i>Scarus vetula</i>	Queen Parrotfish	1	2				0.6
<i>Abudefduf sexatilis</i>	Sargent Major	1			1		0.4
<i>Aulostomus maculatus</i>	Trumpetfish	1	1				0.4
<i>Cephalopholis cruentatus</i>	Graysby	1			1		0.4
<i>Hypoplectrus chlorurus</i>	Yellowtail Hamlet	1		1			0.4
<i>Hypoplectrus puella</i>	Barred Hamlet			1		1	0.4
<i>Pomacanthus arcuatus</i>	Gray Angelfish		1			1	0.4
<i>Stegastes leucostictus</i>	Beaugregory			1	2	1	0.8
<i>Sparisoma radians</i>	Bucktooth Parrotfish	1	1				0.4
<i>Acanthurus chirurgus</i>	Doctorfish				1		0.2
<i>Cantherhines pullus</i>	Tail-light Filefish				1		0.2
<i>Coryphopterus lipernes</i>	Peppermint Goby				1		0.2
<i>Gerres cinereus</i>	Yellowfin Mojarra		1				0.2
<i>Haemulon sciurus</i>	Bluestripped Grunt				1		0.2
<i>Lutjanus synagris</i>	Lane Snapper		1				0.2
<i>Lutjanus apodus</i>	Schoolmaster		1				0.2
<i>Malacoctenus triangulatus</i>	Saddled Blenny			1			0.2
<i>Microspathodon chrysurus</i>	Yellowtail Damselfish					1	0.2
<i>Pomacanthus paru</i>	French Agelfish	1					0.2
<i>Carangoides ruber</i>	Bar Jack	2					0.4
<i>Epinephelus guttatus</i>	Red Hind				1		0.2
<i>Epinephelus striatus</i>	Nassau Grouper				1		0.2
TOTAL INDIVIDUALS		407	256	326	411	240	328.0
TOTAL SPECIES		23	22	21	25	21	22.6

500 % on mean abundance and 18 % on number of fish species per transect over the initial baseline characterization survey (García et al., 2001). As for Mosquito Reef, the difference was largely related to the occurrence of many schools or “swarms” of the Masked Goby (*Coryphopterus personatus*) within all five belt-transects surveyed. The mean abundance of the Masked Goby (268.0 Ind/30 m²) represented approximately 79.3 % of the total fish abundance estimate for Coronas Reef. The Masked Goby was also the most abundant fish in our previous assessment (García et al., 2001), but its abundance has either multiplied since then (from a mean abundance of 28.2 Ind/30 m²), or their real abundance was previously under-estimated due to their cryptic behavior in response to the strong surge prevailing during our 2001 survey. In addition to the Masked Goby, the numerically dominant fish assemblage included the Striped Parrotfish (*Scarus iserti*), Dusky Damselfish (*Stegastes dorsopunicans*) and Sharknose Goby (*Gobiosoma evelinae*). Other common species observed within all five belt-transects surveyed included the Redband and Stoplight parrotfishes (Table 22).

In terms of trophic structure, the fish community at Coronas Reef appears to be well balanced. Reef Silversides (*Allanetta sp.*) were abundant in the water column directly above the reef and schooling at the reef-sand interface. These are zooplanktivores that serve as forage to many piscivorous fishes, such as juvenile jacks, barracudas and snappers. The Brown and Blue Chromis (*Chromis spp.*) were also important components of the zooplanktivorous fish assemblage of Coronas Reef. These zooplanktivorous fishes transfer the plankton energy to higher trophic levels in the reef, reaching top pelagic predators, such as the Cero Mackerel and the Great Barracuda. The herbivorous fish assemblage was represented by several of the most speciose families, such as the parrotfishes (Scaridae) with seven species, doctorfishes (Acanthuridae) with three species and damselfishes (Pomacentridae) with at least two herbivorous species. Small epibenthic invertebrate feeders were represented by the Yellowhead Wrasse, Squirrelfish, Caribbean Puffer, juvenile grunts, hamlets, blennies and gobies. Large benthic invertebrate feeders, such as Hogfishes, Lane and Schoolmaster snappers were common. Top benthic predators included the Mutton Snapper, Nassau Grouper and Nurse Sharks.

Several large and/or commercially important fish species were observed during the Active Search Census (ASEC) at Coronas Reef (Table 23). These included four young adult Mutton Snapper (*Lutjanus analis*), one adult Nassau Grouper, a juvenile Tiger Grouper, adult Red Hinds, juvenile and young adult Hogfishes, an adult Nurse Shark, Coneys (*Cephalopholis fulva*), and schools of juveniles and young adult Yellowtail, Lane and

Schoolmaster Snappers, among other species. Large pelagic species included the Great Barracuda and the Cero Mackerel.

Motile megabenthic invertebrate observed within belt-transects at Corona Reef included a Rock Lobster, a Sea Cucumber, a Reef Spider Crab and a Banded Coral Shrimp (Table 24). A pair of Caribbean Reef Squids (*Sepioteuthis sp.*) were observed during the ASEC survey.

Table 23. Size-frequency distribution of large and/or commercially important reef fishes identified during an ASEC survey at Coronas Reef, north Vieques 2004

Depth range : 4 - 8 m

Duration - 30 min.

SPECIES	COMMON NAME	SIZE – FREQUENCY (# - cm)			
<i>Carangoides ruber</i>	Bar Jack	2 - (15)			
<i>Epinephelus guttatus</i>	Red Hind	1 - (30)			
<i>Epinephelus striatus</i>	Nassau Grouper	1 - (90)			
<i>Ginglymostoma cirratum</i>	Nurse Shark	1 - (120)			
<i>Lachnolaimus maximus</i>	Hogfish	1- (25)	2 - (30)	1 - (40)	1- (50)
<i>Lutjanus analis</i>	Mutton Snapper	1 - (30)	2 - (40)	1 - (50)	
<i>Lutjanus apodus</i>	Schoolmaster	3 - (25)	1 - (30)		
<i>Lutjanus synagris</i>	Lane Snapper	4 - (25)	1 - (30)		
<i>Myctoperca tigris</i>	Tiger Grouper	1 - (30)			
<i>Ocyurus chrysurus</i>	Yellowtail Snapper	2 - (20)	8 - (25)	4 - (30)	
<i>Scomberomorus regalis</i>	Cero Mackerel	1 - (60)			
<i>Sphyræna barracuda</i>	Great Barracuda	1 - (80)			
Other Fishes Present :					
<i>Allanetta sp.</i>	Reef Silversides				
<i>Anisotremus surinamensis</i>	Black Margate				
<i>Chaetodipterus faber</i>	Spadefish				
<i>Dasyatis americana</i>	Southern Stingray				
<i>Diodon histrix</i>	Porcupinefish				
<i>Gramma loreto</i>	Royal Gramma				
<i>Gymnothorax miliaris</i>	Goldentail Moray				
<i>Haemulon macrostomum</i>	Spanish Grunt				
<i>Haemulon plumieri</i>	White Grunt				
<i>Serranus tabacarius</i>	Tobacco Fish				
<i>Scarus coeruleus</i>	Midnight Parrotfish				

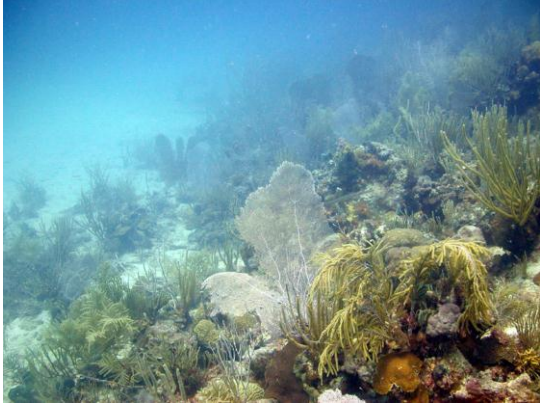
() Total Length in cms.

Table 24. Coronas Reef. Taxonomic composition and abundance of motile megabenthic invertebrates within belt-transects. July, 2004

Survey date: July 14, 2004
 Depth: 10.6

SPECIES	COMMON NAME	TRANSECTS					MEAN ABUNDANCE (IND/30 m²)
		1	2	3	4	5	
<i>Mithrax</i> sp.	Spider Crab	1					0.2
<i>Panulirus guttatus</i>	Rock Lobster		1				0.2
<i>Isostichopous badionotus</i>	Three-rowed Sea Cucumber	1					0.2
<i>Stenopus hispidus</i>	Banded Coral Shrimp			1			0.2
	TOTALS	2	1	1	0	0	0.8

Photo Album 6. Coronas Reef





7. Black Jack Reef

Black Jack Reef is an outer shelf promontory, or seamount located close to the shelf-edge, at about two nautical miles off from Ensenada Sun Bay, on the south coast of Vieques (Figure 1). The reef rises from a depth of 51 meters to a depth of 31 meters. At the top of the pinnacle the reef was characterized by moderate abundance of soft corals, including many large colonies. Stony corals were found mostly as encrusting and mound-shaped colonies interspersed among the reef top without providing much topographic relief. Great Star Coral (*Montastrea cavernosa*) was visibly the most abundant coral. Boulder Star Coral *M. annularis*) and Lettuce Coral (*Agaricia sp.*) were also part of the main stony coral assemblage at the top of the reef. The reef slopes down to a deeper terrace at depths of 36 - 40 meters where soft corals declined abruptly in abundance and stony coral cover increased substantially. Our transects were established within a depth range of 36 – 40 meters (120 – 132 feet) on the deeper terrace.

Live coral cover averaged 28.8 % within video-transect areas (range 25.0 – 40.4 %). A total of 28 species of stony corals were identified, including 12 within video-transects.

Table 24. Black Jack Reef. Percent substrate cover by sessile-benthic categories, 2004

SUBSTRATE CATEGORIES	TRANSECTS					MEAN
	1	2	3	4	5	
TURF ALGAE	58.00	56.40	60.60	61.00	51.20	57.44
LIVE CORAL	25.00	25.00	27.00	26.40	40.40	28.76
FLESHY ALGAE	7.40	10.20	7.00	5.20	2.80	6.52
SPONGES	7.40	6.40	4.80	5.40	4.80	5.76
ABIOTIC	1.20	1.80	0.60	2.00	0.60	1.24
CALCAREOUS ALGAE	1.00	0.20	0.00	0.00	0.20	0.28
GORGONIANS (# colonies)	1	2	1	2	2	2
CORAL SPECIES	1	2	3	4	5	MEAN
<i>Montastrea annularis</i>	18.20	19.20	21.00	17.00	34.00	21.88
<i>Porites astreoides</i>	1.40	1.60	1.20	0.60	4.20	1.80
<i>Agaricia grahamae</i>	2.00	1.00	1.20	4.60	0.00	1.76
<i>Montastrea cavernosa</i>	2.40	0.00	2.00	2.80	0.80	1.60
<i>Agaricia sp.</i>	0.20	0	0.60	0.80	1.20	0.56
<i>Diploria strigosa</i>	0.00	1.40	0.40	0.00	0.00	0.36
<i>Mycetophyllia ferox</i>	0.00	1.20	0.00	0.00	0.00	0.24
<i>Siderastrea radians</i>	0.00	0.40	0.40	0.00	0.20	0.20
<i>Agaricia agaricites</i>	0.60	0.00	0.00	0.20	0.00	0.16
<i>Madracis decactis</i>	0.20	0.20	0.00	0.00	0.00	0.08
<i>Isophyllia sinuosa</i>	0.00	0.00	0.20	0.20	0.00	0.08
<i>Scolymia cubensis</i>	0.00	0.00	0.00	0.20	0.00	0.04

Coral Species Outside Transects: *Agaricia grahamae*, *Diploria strigosa*, *D. labyrinthiformis*, *Dichocoenia stockesii*, *Leptoseris cucullata*, *Meandrina meandrites*, *Mycetophyllia lamarkiana*, *M. aliciae*, *Eusmilia fastigiata*, *Siderastrea siderea*, *Colpophyllia natans*, *Stephanocoenia michilini*, *Millepora squamosa*, *M. alcicornis*, *Antipathes sp.*

Boulder Star Coral (*Montastrea annularis*) was the dominant coral species in terms of substrate cover at the deep terrace of Black Jack Reef (mean cover : 21.9 %), representing 76 % of the total live coral cover at depths between 36 – 40 meters (Table 24). Boulder Star Coral exhibited laminar growth in closely spaced colonies of moderate size and low relief. The laminar growth pattern appears to be an adaptation for optimum light utilization. Other corals species that presented substrate cover above 1% and that were present in at least four out of five transects surveyed include the Mustard Hill Coral (*Porites astreoides*), Graham's Sheet Coral (*Agaricia grahamae*) and Great Star Coral (*Montastrea cavernosa*). The branching Black Coral (*Antipathes* sp.) was present in low abundance in the deep terrace of Black Jack Reef.

Turf algae was the dominant biological assemblage in terms of substrate cover with 57.4 %. Fleshy (*Lobophora* sp.) and calcareous algae (*Halimeda copiosa*) were also present within transect areas. The combined cover by benthic algae was 64.2 %. Encrusting sponges were present in all transect surveyed with a mean cover of 5.8 %. Erect gorgonians presented a mean abundance of 2 colonies per transect in the deep terrace and were mostly represented by colonies of small size.

Fishes and Motile Megabenthic Invertebrates – Black Jack Reef

A total of 54 reef fishes were identified from Black Jack Reef, 33 of which were observed within belt-transect areas (Table 25). The mean abundance of fishes was 549.3 Ind/30 m² and the mean number of species per transect was 16. An assemblage of three species represented 95 % of the total fish abundance within belt-transects. The numerically dominant species was the Masked Goby (*Coryphopterus personatus*) with a mean abundance of 390 Ind/30 m². This is the highest density ever reported for a demersal fish within a belt-transect from a reef surveyed in Puerto Rico. Following in abundance were the Creole Wrasse (*Clepticus parrae*) with 93.0 Ind/30 m² and the Blue Chromis (*Chromis cyanea*) with 36.7 Ind/30 m².

The fish trophic structure at Black Jack Reef appears to be heavily influenced by the plankton food web. To start with, the three most abundant fish species within belt-transects are zooplankton feeders. This assemblage plays a key ecological function as forage for an abundant and diverse pelagic reef fish community, including top predators, such as the Great Barracuda (*Sphyraena barracuda*), Rainbow Runner (*Elagatis bipinnulatus*) and the King and Cero Mackerels (*Scomberomorus cavalla*, *S. regalis*).

Table 25. Taxonomic composition and abundance (Individuals/30 m²) of fishes surveyed within belt-transects at Black Jack Reef, south Vieques 2004.

SPECIES	COMMON NAME	TRANSECTS			MEAN
		1	2	3	
<i>Coryphopterus personatus</i>	Masked Goby	420	450	300	390.0
<i>Clepticus parrae</i>	Creole Wrasse	29	250		93.0
<i>Chromis cyanea</i>	Blue Chromis	80	30		36.7
<i>Coryphopterus lipernes</i>	Peppermint Goby	9	11	9	9.7
<i>Stegastes partitus</i>	Bicolor Damselfish	1	7		2.7
<i>Gobiosoma evelynae</i>	Sharknose Goby	2	2	2	2.0
<i>Haemulon flavolineatum</i>	French Grunt			5	1.7
<i>Halichoeres garnoti</i>	Yellow-head Wrasse	1	4		1.7
<i>Chaetodon capistratus</i>	Foureye Butterflyfish	1	2	1	1.3
<i>Sparisoma aurofrenatum</i>	Redband Parrotfish	1	1	2	1.3
<i>Thalassoma bifasciatum</i>	Bluehead Wrasse	3			1.0
<i>Canthigaster rostrata</i>	Caribbean Puffer	1		1	0.7
<i>Flammeo marianus</i>	Longspine Squirrelfish		2		0.7
<i>Stegastes leucostictus</i>	Beaugregory	1	1		0.7
<i>Acanthurus chirurgus</i>	Doctorfish			1	0.3
<i>Acanthurus coeruleus</i>	BlueTang		1		0.3
<i>Balistes vetula</i>	Queen Triggerfish		1		0.3
<i>Cephalopholis cruentatus</i>	Graysby	1			0.3
<i>Chaetodon ocellatus</i>	Spotfin Butterflyfish	1			0.3
<i>Chaetodon striatus</i>	Banded Buttrflyfish			1	0.3
<i>Coryphopterus glaucofreatum</i>	Bridled Goby		1		0.3
<i>Haemulon carbonarium</i>	Caesar Grunt			1	0.3
<i>Holacanthus tricolor</i>	Rock Beauty		1		0.3
<i>Holocanthus ciliaris</i>	Queen Angelfish	1			0.3
<i>Holocentrus rufus</i>	Squirrelfish	1			0.3
<i>Hypoplectrus nigricans</i>	Black Hamlet		1		0.3
<i>Hypoplectrus puella</i>	Barred Hamlet			1	0.3
<i>Hypoplectrus unicolor</i>	Butter Hamlet		1		0.3
<i>Lactophrys triqueter</i>	Smooth Trunkfish	1			0.3
<i>Melichthys niger</i>	Black Durgon	1			0.3
<i>Pomacanthus arcuatus</i>	Gray Angelfish	1			0.3
<i>Pseudupeneus maculatus</i>	Spotted Goatfish	1			0.3
<i>Serranus tigrinus</i>	Harlequin Bass		1		0.3
	TOTAL INDIVIDUALS	557	767	324	549.3
	TOTAL SPECIES	20	18	11	16

The herbivorous fish assemblage was represented by several species of parrotfishes (*Scarus sp.*, *Sparisoma spp.*), doctorfishes (*Acanthurus spp.*), damselfishes (*Stegastes spp.*) and some triggerfishes (e.g. *Melichthys niger*). Small epibenthic invertebrate feeders were represented by the Yellowhead Wrasse, Squirrelfish, Caribbean Puffer, juvenile grunts, hamlets and gobies. Large benthic invertebrate feeders, such as Hogfishes, Red Hind, Coneys, and Schoolmaster snappers were common. Top benthic predators included the Mutton Snapper and the Tiger Grouper.

The size distribution of commercially important fishes observed during the Active Search Census (ASEC) at Black Jack Reef is presented in Table 26. These included two Barracudas, five Mutton Snappers (*Lutjanus analis*), young adult and adult Yellowtail Snappers, one adult Tiger Grouper, adult Red Hinds, juvenile and young adult Hogfishes, adult Rainbow Runners and adult Cero and Great Mackerels.

Table 23. Size-frequency distribution of large and/or commercially important reef fishes identified during an ASEC survey at Black Jack Reef, south Vieques 2004

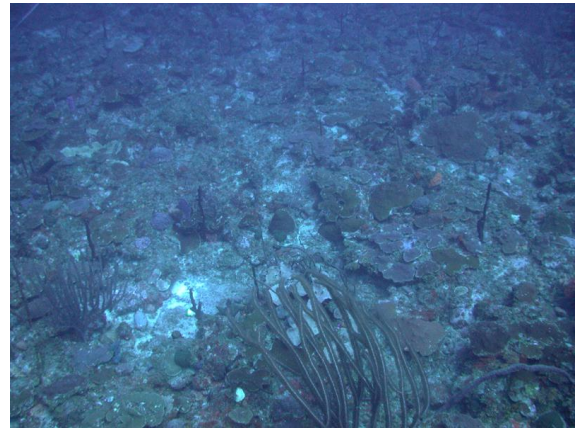
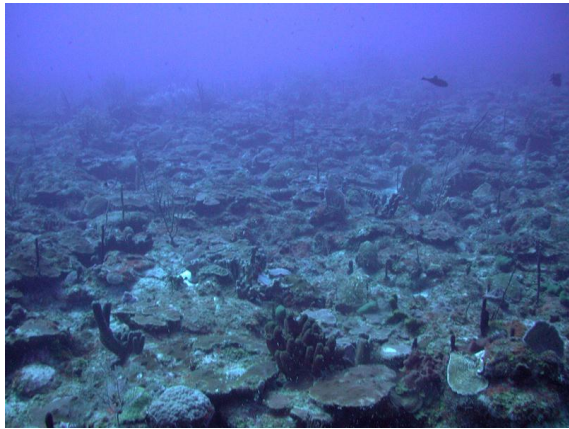
Depth range : 30 - 40 m

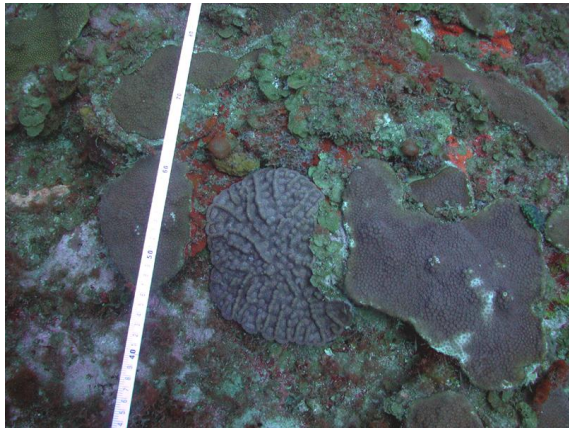
Duration - 30 min.

SPECIES	COMMON NAME	SIZE – FREQUENCY (# - cm)		
<i>Epinephelus guttatus</i>	Red Hind	1 - (30)		
<i>Elagatis bipinnulatus</i>	Rainbow Runner	5 – (50)	1 - (60)	1 - (70)
<i>Lachnolaimus maximus</i>	Hogfish	2 - (30)	1 - (60)	
<i>Lutjanus analis</i>	Mutton Snapper	1 - (40)	1 - (60)	2 - (75)
<i>Lutjanus apodus</i>	Schoolmaster	2 - (25)	1 - (30)	
<i>Myctroperca tigris</i>	Tiger Grouper	1 - (50)		
<i>Ocyurus chrysurus</i>	Yellowtail Snapper	3 - (20)	2 - (30)	1 - (35)
<i>Scomberomorus regalis</i>	Cero Mackerel	1 - (50)	1 - (60)	
<i>Sphyrna barracuda</i>	Great Barracuda	1 - (60)	1 - (80)	
Invertebrates				
<i>Panulirus argus</i>	Spiny Lobster	1 – (25)		
Other Fishes Present :				
<i>Gramma loreto</i>	Royal Gramma			
<i>Haemulon macrostomum</i>	Spanish Grunt			
<i>Haemulon plumieri</i>	White Grunt			
<i>Lactophrys quadricornis</i>	Scrawled Cowfish			
<i>Pomacanthus paru</i>	French Angelfish			
<i>Scaus chrysopterum</i>	Redtail Parrotfish			
<i>Serranus tabacarius</i>	Tobacco Fish			
<i>Synodus intermedius</i>	Lizardfish			
<i>Sparisoma viride</i>	Stoplight Parrotfish			
<i>Scarus coeruleus</i>	Midnight Parrotfish			
<i>Xanthychihys ringens</i>	Sargassum Triggerfish			

() Total Length in cms.

Photo Album 7. Black Jack Reef





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1.1 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
CANJILONES REEF, VIEQUES. July 2004

DEPTH: 15.2 m
RUGOSITY: 5.17 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	8	0.11
1	TURF ALG	Algal turf	42	0.59
2	MAS COR	Montastrea annularis	9	0.13
3	FLE ALG	Lobophora variegata	17	0.24
4	TURF ALG	Algal turf	51	0.72
5	FOL COR	Agaricia agaricites	3	0.04
6	FLE ALG	Lobophora variegata	7	0.10
7	FLE ALG	Dictyota sp.	6	0.08
8	FLE ALG	Lobophora variegata	13	0.18
9	TURF ALG	Algal turf	5	0.07
10	RO	Reef overhang	16	0.23
11	TURF ALG	Algal turf	20	0.28
12	FLE ALG	Dictyota sp.	10	0.14
13	RO	Reef overhang	5	0.07
14	MAS COR	Montastrea annularis	13	0.18
15	TURF ALG	Algal turf	8	0.11
16	MAS COR	Montastrea annularis	12	0.17
17	RO	Reef overhang	4	0.06
18	TURF ALG	Algal turf	69	0.97
19	RO	Reef overhang	4	0.06
20	FLE ALG	Dictyota sp.	6	0.08
21	MAS COR	Isophyllia rigida	3	0.04
22	RO	Reef overhang	3	0.04
23	MAS COR	Montastrea annularis	6	0.08
24	RO	Reef overhang	8	0.11
25	BRA COR	Porites porites	2	0.03
26	TURF ALG	Algal turf	24	0.34
27	FLE ALG	Dictyota sp.	11	0.15
28	RO	Reef overhang	14	0.20
29	MAS COR	Montastrea cavernosa	13	0.18
30	TURF ALG	Algal turf	5	0.07
31	MAS COR	Montastrea cavernosa	6	0.08
32	TURF ALG	Algal turf	4	0.06
33	MAS COR	Montastrea cavernosa	11	0.15
34	RO	Reef overhang	7	0.10
35	MAS COR	Montastrea annularis	6	0.08
36	FLE ALG	Lobophora variegata	12	0.17
37	RO	Reef overhang	5	0.07
38	TURF ALG	Algal turf	17	0.24
39	MAS COR	Montastrea annularis	6	0.08
40	RO	Reef overhang	7	0.10
41	FLE ALG	Lobophora variegata	10	0.14

42	TURF ALG	Algal turf	28	0.39
43	RO	Reef overhang	11	0.15
44	TURF ALG	Algal turf	10	0.14
45	MAS COR	Montastrea annularis	8	0.11
46	RO	Reef overhang	11	0.15
47	MAS COR	Montastrea annularis	5	0.07
48	RO	Reef overhang	8	0.11
49	TURF ALG	Algal turf	11	0.15
50	MAS COR	Montastrea annularis	5	0.07
51	RO	Reef overhang	8	0.11
52	ENC COR	Porites astreoides	7	0.10
53	TURF ALG	Algal turf	32	0.45
54	FOL COR	Agaricia agaricites	14	0.20
55	TURF ALG	Algal turf	24	0.34
56	RO	Reef overhang	7	0.10
57	TURF ALG	Algal turf	29	0.41
58	MAS COR	Montastrea annularis	11	0.15
59	TURF ALG	Algal turf	42	0.59
60	RO	Reef overhang	10	0.14
61	TURF ALG	Algal turf	33	0.46
62	RO	Reef overhang	19	0.27
63	MAS COR	Siderastrea siderea	4	0.06
64	FLE ALG	Lobophora variegata	11	0.15
65	MAS COR	Siderastrea siderea	37	0.52
66	MAS COR	Montastrea annularis	11	0.15
67	RO	Reef overhang	10	0.14
68	TURF ALG	Algal turf	6	0.08
69	FLE ALG	Dictyota sp.	7	0.10
70	TURF ALG	Algal turf	7	0.10
71	MAS COR	Montastrea annularis	6	0.08
72	RO	Reef overhang	9	0.13
73	TURF ALG	Algal turf	17	0.24
74	RO	Reef overhang	4	0.06
75	FLE ALG	Lobophora variegata	8	0.11
76	TURF ALG	Algal turf	33	0.46
77	FLE ALG	Lobophora variegata	8	0.11
78	TURF ALG	Algal turf	6	0.08
79	RO	Reef overhang	26	0.37
80	FOL COR	Agaricia agaricites	5	0.07
81	TURF ALG	Algal turf	11	0.15
82	MAS COR	Montastrea annularis	4	0.06
83	TURF ALG	Algal turf	6	0.08

Gorgonians = 14

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

1.2 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
CANJILONES REEF, VIEQUES. July 2004

DEPTH: 15.2 m
RUGOSITY: 5.51 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	28	0.39
1	MAS COR	Montastrea annularis	25	0.35
2	RO	Reef overhang	6	0.08
3	FLE ALG	Dictyota sp.	5	0.07
4	MAS COR	Montastrea annularis	12	0.17
5	TURF ALG	Algal turf	6	0.08
6	ERE SPO	Erect sponge	3	0.04
7	FLE ALG	Lobophora variegata	12	0.17
8	RO	Reef overhang	6	0.08
9	FLE ALG	Lobophora variegata	13	0.18
10	RO	Reef overhang	18	0.25
11	BRA COR	Porites porites	6	0.08
12	TURF ALG	Algal turf	50	0.70
13	RO	Reef overhang	4	0.06
14	TURF ALG	Algal turf	64	0.90
15	MAS COR	Montastrea annularis	21	0.30
16	RO	Reef overhang	4	0.06
17	TURF ALG	Algal turf	21	0.30
18	FOL COR	Leptoseris cucullata	5	0.07
19	TURF ALG	Algal turf	43	0.61
20	RO	Reef overhang	8	0.11
21	TURF ALG	Algal turf	71	1.00
22	FLE ALG	Lobophora variegata	9	0.13
23	RO	Reef overhang	11	0.15
24	TURF ALG	Algal turf	7	0.10
25	MAS COR	Montastrea annularis	5	0.07
26	RO	Reef overhang	5	0.07
27	TURF ALG	Algal turf	6	0.08
28	BRA COR	Porites porites	6	0.08
29	TURF ALG	Algal turf	6	0.08
30	BRA COR	Porites porites	4	0.06
31	FLE ALG	Lobophora variegata	24	0.34
32	TURF ALG	Algal turf	4	0.06
33	RO	Reef overhang	14	0.20
34	TURF ALG	Algal turf	4	0.06
35	RO	Reef overhang	25	0.35
36	MAS COR	Montastrea annularis	35	0.49
37	RO	Reef overhang	14	0.20
38	TURF ALG	Algal turf	26	0.37
39	MAS COR	Montastrea annularis	14	0.20
40	RO	Reef overhang	6	0.08
41	TURF ALG	Algal turf	13	0.18

42	MAS COR	Montastrea annularis	14	0.20
43	TURF ALG	Algal turf	99	1.39
44	RO	Reef overhang	8	0.11
45	MAS COR	Montastrea cavernosa	7	0.10
46	TURF ALG	Algal turf	4	0.06
47	MAS COR	Montastrea annularis	11	0.15
48	FLE ALG	Lobophora variegata	20	0.28
49	TURF ALG	Algal turf	10	0.14
50	RO	Reef overhang	10	0.14
51	TURF ALG	Algal turf	14	0.20
52	MAS COR	Montastrea annularis	16	0.23
53	RO	Reef overhang	9	0.13
54	TURF ALG	Algal turf	15	0.21
55	RO	Reef overhang	18	0.25
56	MAS COR	Montastrea annularis	33	0.46
57	FLE ALG	Lobophora variegata	6	0.08
58	MAS COR	Montastrea annularis	15	0.21
59	MAS COR	Montastrea annularis	21	0.30
60	RO	Reef overhang	8	0.11
61	MAS COR	Montastrea annularis	13	0.18
62	TURF ALG	Algal turf	4	0.06
63	MAS COR	Montastrea annularis	16	0.23
64	TURF ALG	Algal turf	10	0.14
65	RO	Reef overhang	8	0.11
66	TURF ALG	Algal turf	4	0.06
67	MAS COR	Montastrea annularis	6	0.08
68	RO	Reef overhang	11	0.15
69	MAS COR	Montastrea annularis	22	0.31

Gorgonians =26

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

1.3 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
CANJILONES REEF, VIEQUES. July 2004

DEPTH: 15.2 m
RUGOSITY: 5.48 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	41	0.58
1	MAS COR	Montastrea annularis	4	0.06
2	TURF ALG	Algal turf	16	0.23
3	BRA COR	Acropora cervicornis	3	0.04
4	TURF ALG	Algal turf	8	0.11
5	RO	Reef overhang	6	0.08
6	FOL COR	Agaricia agaricites	13	0.18
7	TURF ALG	Algal turf	12	0.17
8	MAS COR	Montastrea annularis	9	0.13
9	TURF ALG	Algal turf	12	0.17
10	ENC COR	Porites astreoides	3	0.04
11	TURF ALG	Algal turf	7	0.10
12	MAS COR	Montastrea annularis	4	0.06
13	TURF ALG	Algal turf	4	0.06
14	ERE SPO	Erect sponge	4	0.06
15	TURF ALG	Algal turf	9	0.13
16	MAS COR	Montastrea annularis	11	0.15
17	RO	Reef overhang	32	0.45
18	TURF ALG	Algal turf	30	0.42
19	RO	Reef overhang	18	0.25
20	TURF ALG	Algal turf	4	0.06
21	ZOAN	Palythoa caribaeorum	8	0.11
22	TURF ALG	Algal turf	9	0.13
23	MAS COR	Montastrea annularis	4	0.06
24	MAS COR	Montastrea annularis	6	0.08
25	RO	Reef overhang	10	0.14
26	MAS COR	Montastrea annularis	4	0.06
27	FLE ALG	Lobophora variegata	11	0.15
28	RO	Reef overhang	13	0.18
29	TURF ALG	Algal turf	10	0.14
30	MAS COR	Montastrea annularis	13	0.18
31	RO	Reef overhang	9	0.13
32	TURF ALG	Algal turf	20	0.28
33	FLE ALG	Dictyota sp.	8	0.11
34	FOL COR	Agaricia agaricites	3	0.04
35	MAS COR	Montastrea annularis	11	0.15
36	RO	Reef overhang	11	0.15
37	TURF ALG	Algal turf	10	0.14
38	FLE ALG	Dictyota sp.	19	0.27
39	TURF ALG	Algal turf	6	0.08
40	ENC COR	Porites astreoides	9	0.13
41	RO	Reef overhang	6	0.08

42	MAS COR	Diploria labyrinthiformis	9	0.13
43	TURF ALG	Algal turf	29	0.41
44	RO	Reef overhang	11	0.15
45	TURF ALG	Algal turf	33	0.46
46	FLE ALG	Lobophora variegata	7	0.10
47	GORG	Erythropodium caribaeorum	6	0.08
48	TURF ALG	Algal turf	13	0.18
49	RO	Reef overhang	6	0.08
50	MAS COR	Montastrea annularis	22	0.31
51	RO	Reef overhang	7	0.10
52	TURF ALG	Algal turf	24	0.34
53	FLE ALG	Dictyota sp.	9	0.13
54	ERE SPO	Erect sponge	5	0.07
55	FLE ALG	Dictyota sp.	6	0.08
56	FLE ALG	Lobophora variegata	10	0.14
57	TURF ALG	Algal turf	32	0.45
58	RO	Reef overhang	15	0.21
59	MAS COR	Montastrea annularis	6	0.08
60	TURF ALG	Algal turf	5	0.07
61	MAS COR	Montastrea annularis	5	0.07
62	FLE ALG	Lobophora variegata	23	0.32
63	TURF ALG	Algal turf	20	0.28
64	RO	Reef overhang	17	0.24
65	FLE ALG	Lobophora variegata	15	0.21
66	TURF ALG	Algal turf	23	0.32
67	FLE ALG	Dictyota sp.	10	0.14
68	TURF ALG	Algal turf	36	0.51
69	ERE SPO	Erect sponge	3	0.04
70	ENC COR	Porites astreoides	3	0.04
71	TURF ALG	Algal turf	56	0.79
72	MAS COR	Montastrea annularis	7	0.10
73	RO	Reef overhang	19	0.27
74	MAS COR	Montastrea annularis	26	0.37
75	RO	Reef overhang	13	0.18
76	TURF ALG	Algal turf	6	0.08
77	RO	Reef overhang	26	0.37
78	MAS COR	Montastrea annularis	20	0.28
79	FLE ALG	Dictyota sp.	10	0.14
80	RO	Reef overhang	12	0.17
81	FLE ALG	Lobophora variegata	9	0.13
82	TURF ALG	Algal turf	5	0.07
83	RO	Reef overhang	6	0.08
84	FOL COR	Agaricia agaricites	4	0.06
85	RO	Reef overhang	12	0.17
86	TURF ALG	Algal turf	8	0.11

Gorgonians = 24

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

1.4 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
CANJILONES REEF, VIEQUES. July 2004

DEPTH: 15.2 m
RUGOSITY: 4.34 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	31	0.44
1	FOL COR	Agaricia agaricites	5	0.07
2	RO	Reef overhang	33	0.46
3	MAS COR	Montastrea annularis	4	0.06
4	RO	Reef overhang	4	0.06
5	MAS COR	Montastrea annularis	11	0.15
6	TURF ALG	Algal turf	7	0.10
7	RO	Reef overhang	10	0.14
8	FLE ALG	Dictyota sp.	8	0.11
9	MAS COR	Montastrea annularis	6	0.08
10	RO	Reef overhang	13	0.18
11	TURF ALG	Algal turf	9	0.13
12	ENC COR	Porites astreoides	4	0.06
13	TURF ALG	Algal turf	27	0.38
14	ENC COR	Porites astreoides	16	0.23
15	TURF ALG	Algal turf	37	0.52
16	FOL COR	Agaricia agaricites	18	0.25
17	GORG	Erythropodium caribaeorum	9	0.13
18	FLE ALG	Dictyota sp.	15	0.21
19	TURF ALG	Algal turf	46	0.65
20	BRA COR	Madracis decactis	5	0.07
21	TURF ALG	Algal turf	7	0.10
22	MAS COR	Siderastrea siderea	4	0.06
23	RO	Reef overhang	8	0.11
24	FOL COR	Agaricia grahamae	5	0.07
25	RO	Reef overhang	8	0.11
26	TURF ALG	Algal turf	17	0.24
27	FOL COR	Agaricia agaricites	3	0.04
28	TURF ALG	Algal turf	33	0.46
29	MAS COR	Montastrea annularis	15	0.21
30	RO	Reef overhang	15	0.21
31	TURF ALG	Algal turf	5	0.07
32	RO	Reef overhang	5	0.07
33	TURF ALG	Algal turf	6	0.08
34	FLE ALG	Lobophora variegata	7	0.10
35	TURF ALG	Algal turf	17	0.24
36	ERE SPO	Xestospongia muta	33	0.46
37	TURF ALG	Algal turf	14	0.20
38	ERE SPO	Erect sponge	5	0.07
39	ERE SPO	Erect sponge	2	0.03
40	RO	Reef overhang	7	0.10
41	MAS COR	Montastrea annularis	3	0.04

42	TURF ALG	Algal turf	18	0.25
43	MAS COR	<i>Siderastrea siderea</i>	6	0.08
44	CAL ALG	<i>Halimeda</i> sp.	3	0.04
45	TURF ALG	Algal turf	5	0.07
46	RO	Reef overhang	9	0.13
47	TURF ALG	Algal turf	40	0.56
48	RO	Reef overhang	6	0.08
49	TURF ALG	Algal turf	12	0.17
50	FOL COR	<i>Agaricia agaricites</i>	7	0.10
51	TURF ALG	Algal turf	4	0.06
52	RO	Reef overhang	3	0.04
53	MAS COR	<i>Montastrea annularis</i>	12	0.17
54	TURF ALG	Algal turf	25	0.35
55	FOL COR	<i>Agaricia agaricites</i>	3	0.04
56	RO	Reef overhang	7	0.10
57	FLE ALG	<i>Lobophora variegata</i>	16	0.23
58	TURF ALG	Algal turf	45	0.63
59	RO	Reef overhang	13	0.18
60	MAS COR	<i>Montastrea annularis</i>	27	0.38
61	MAS COR	<i>Montastrea cavernosa</i>	26	0.37
62	RO	Reef overhang	10	0.14
63	MAS COR	<i>Colpophyllia natans</i>	26	0.37
64	RO	Reef overhang	9	0.13
65	FOL COR	<i>Agaricia grahamae</i>	5	0.07
66	TURF ALG	Algal turf	69	0.97
67	RO	Reef overhang	25	0.35
68	TURF ALG	Algal turf	8	0.11
69	MAS COR	<i>Montastrea annularis</i>	39	0.55
70	TURF ALG	Algal turf	3	0.04

Gorgonians = 22

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

1.5 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
CANJILONES REEF, VIEQUES. July 2004

DEPTH: 15.2 m
RUGOSITY: 4.96 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	30	0.42
1	RO	Reef overhang	10	0.14
2	MAS COR	Montastrea annularis	6	0.08
3	CAL ALG	Halimeda sp.	3	0.04
4	MAS COR	Montastrea annularis	18	0.25
5	TURF ALG	Algal turf	11	0.15
6	RO	Reef overhang	10	0.14
7	ENC SPO	Encrusting sponge	6	0.08
8	MAS COR	Montastrea annularis	10	0.14
9	RO	Reef overhang	19	0.27
10	MAS COR	Mycetophyllia lamarckiana	7	0.10
11	TURF ALG	Algal turf	48	0.68
12	MAS COR	Montastrea annularis	48	0.68
13	FLE ALG	Dictyota sp.	15	0.21
14	TURF ALG	Algal turf	6	0.08
15	ENC COR	Porites astreoides	6	0.08
16	TURF ALG	Algal turf	14	0.20
17	RO	Reef overhang	19	0.27
18	BRA COR	Madracis decactis	3	0.04
19	TURF ALG	Algal turf	20	0.28
20	ENC COR	Siderastrea radians	7	0.10
21	TURF ALG	Algal turf	15	0.21
22	FLE ALG	Dictyota sp.	6	0.08
23	TURF ALG	Algal turf	28	0.39
24	RO	Reef overhang	27	0.38
25	TURF ALG	Algal turf	33	0.46
26	ERE SPO	Erect sponge	4	0.06
27	ERE SPO	Xestospongia muta	39	0.55
28	TURF ALG	Algal turf	8	0.11
29	RO	Reef overhang	22	0.31
30	MAS COR	Montastrea annularis	7	0.10
31	TURF ALG	Algal turf	5	0.07
32	MAS COR	Montastrea annularis	16	0.23
33	TURF ALG	Algal turf	7	0.10
34	MAS COR	Montastrea annularis	30	0.42
35	TURF ALG	Algal turf	14	0.20
36	RO	Reef overhang	8	0.11
37	TURF ALG	Algal turf	5	0.07
38	ENC COR	Porites astreoides	6	0.08
39	RO	Reef overhang	17	0.24
40	MAS COR	Montastrea annularis	26	0.37
41	TURF ALG	Algal turf	4	0.06

42	MAS COR	Montastrea cavernosa	5	0.07
43	TURF ALG	Algal turf	19	0.27
44	MAS COR	Montastrea cavernosa	3	0.04
45	RO	Reef overhang	18	0.25
46	TURF ALG	Algal turf	11	0.15
47	FOL COR	Agaricia grahamae	3	0.04
48	TURF ALG	Algal turf	4	0.06
49	RO	Reef overhang	10	0.14
50	MAS COR	Montastrea annularis	49	0.69
51	RO	Reef overhang	5	0.07
52	TURF ALG	Algal turf	40	0.56
53	RO	Reef overhang	15	0.21
54	MAS COR	Montastrea annularis	11	0.15
55	TURF ALG	Algal turf	8	0.11
56	MAS COR	Montastrea annularis	9	0.13
57	RO	Reef overhang	5	0.07
58	TURF ALG	Algal turf	11	0.15
59	RO	Reef overhang	12	0.17
60	SAND	Sand	18	0.25
61	RO	Reef overhang	5	0.07
62	MAS COR	Montastrea annularis	9	0.13
63	TURF ALG	Algal turf	5	0.07
64	MAS COR	Montastrea annularis	7	0.10
65	TURF ALG	Algal turf	30	0.42
66	MAS COR	Montastrea annularis	13	0.18
67	RO	Reef overhang	18	0.25
68	FLE ALG	Dictyota sp.	25	0.35
69	TURF ALG	Algal turf	6	0.08
70	MAS COR	Montastrea annularis	14	0.20
71	TURF ALG	Algal turf	9	0.13
72	GORG	Erythropodium caribaeorum	4	0.06
73	TURF ALG	Algal turf	18	0.25

Gorgonians = 27

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

2.1 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
PIRATA REEF, VIEQUES. July 2004

DEPTH: 12.1 m

RUGOSITY: 2.44 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	13	0.18
1	MAS COR	Montastrea annularis	10	0.14
2	RO	Reef overhang	11	0.15
3	TURF ALG	Algal turf	2	0.03
4	RO	Reef overhang	16	0.23
5	TURF ALG	Algal turf	25	0.35
6	RO	Reef overhang	10	0.14
7	FLE ALG	Dictyota sp.	7	0.10
8	TURF ALG	Algal turf	38	0.54
9	RO	Reef overhang	11	0.15
10	MAS COR	Montastrea annularis	11	0.15
11	TURF ALG	Algal turf	61	0.86
12	ERE SPO	Erect sponge	6	0.08
13	RO	Reef overhang	6	0.08
14	MAS COR	Montastrea annularis	3	0.04
15	TURF ALG	Algal turf	18	0.25
16	MAS COR	Montastrea annularis	23	0.32
17	RO	Reef overhang	28	0.39
18	TURF ALG	Algal turf	4	0.06
19	RO	Reef overhang	12	0.17
20	FOL COR	Agaricia sp.	9	0.13
21	MAS COR	Montastrea annularis	4	0.06
22	MAS COR	Montastrea annularis	5	0.07
23	RO	Reef overhang	5	0.07
24	MAS COR	Montastrea annularis	3	0.04
25	TURF ALG	Algal turf	27	0.38
26	ENC SPO	Encrusting sponge	7	0.10
27	MAS COR	Montastrea annularis	5	0.07
28	FOL COR	Agaricia agaricites	3	0.04
29	TURF ALG	Algal turf	3	0.04
30	MAS COR	Montastrea annularis	7	0.10
31	CAL ALG	Halimeda sp.	5	0.07
32	MAS COR	Montastrea annularis	4	0.06
33	ERE SPO	Erect sponge	2	0.03
34	TURF ALG	Algal turf	4	0.06
35	MAS COR	Montastrea annularis	4	0.06
36	RO	Reef overhang	26	0.37
37	TURF ALG	Algal turf	4	0.06
38	MAS COR	Sidersatrea siderea	17	0.24
39	TURF ALG	Algal turf	5	0.07
40	MAS COR	Diploria strigosa	8	0.11
41	TURF ALG	Algal turf	10	0.14

42	MAS COR	Montastrea annularis	3	0.04
43	FLE ALG	Dictyota sp.	6	0.08
44	TURF ALG	Algal turf	3	0.04
45	FOL COR	Agaricia agaricites	8	0.11
46	FLE ALG	Dictyota sp.	5	0.07
47	FOL COR	Agaricia agaricites	4	0.06
48	TURF ALG	Algal turf	32	0.45
49	RO	Reef overhang	16	0.23
50	TURF ALG	Algal turf	14	0.20
51	FOL COR	Agaricia agaricites	3	0.04
52	TURF ALG	Algal turf	11	0.15
53	ENC SPO	Encrusting sponge	4	0.06
54	RO	Reef overhang	16	0.23
55	TURF ALG	Algal turf	14	0.20
56	RO	Reef overhang	5	0.07
57	TURF ALG	Algal turf	7	0.10
58	GORG	Gorgonian base	3	0.04
59	TURF ALG	Algal turf	8	0.11
60	ERE SPO	Erect sponge	14	0.20
61	RO	Reef overhang	6	0.08
62	TURF ALG	Algal turf	7	0.10
63	GORG	Erythropodium caribaeorum	6	0.08
64	RO	Reef overhang	12	0.17
65	TURF ALG	Algal turf	9	0.13
66	RO	Reef overhang	10	0.14
67	FLE ALG	Dictyota sp.	10	0.14
68	TURF ALG	Algal turf	10	0.14
69	MAS COR	Montastrea annularis	5	0.07
70	MAS COR	Montastrea annularis	7	0.10
71	TURF ALG	Algal turf	44	0.62
72	RO	Reef overhang	7	0.10
73	TURF ALG	Algal turf	15	0.21
74	MAS COR	Diploria labyrinthiformis	5	0.07
75	TURF ALG	Algal turf	5	0.07
76	FOL COR	Agaricia agaricites	4	0.06
77	TURF ALG	Algal turf	27	0.38
78	RO	Reef overhang	6	0.08
79	MAS COR	Montastrea annularis	4	0.06
80	TURF ALG	Algal turf	8	0.11
81	MAS COR	Montastrea annularis	18	0.25

Gorgonians = 35

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

Note: data collected to the last nail

2.2 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
PIRATA REEF, VIEQUES. July 2004

DEPTH: 12.1 m

RUGOSITY: 4.89 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	32	0.45
1	TURF ALG	Algal turf	6	0.08
2	BRA COR	Porites porites	34	0.48
3	TURF ALG	Algal turf	5	0.07
4	MAS COR	Montastrea annularis	8	0.11
5	RO	Reef overhang	10	0.14
6	TURF ALG	Algal turf	11	0.15
7	RO	Reef overhang	5	0.07
8	TURF ALG	Algal turf	51	0.72
9	MAS COR	Montastrea annularis	13	0.18
10	TURF ALG	Algal turf	38	0.54
11	GORG	Gorgonian base	4	0.06
12	TURF ALG	Algal turf	40	0.56
13	ERE SPO	Erect sponge	5	0.07
14	TURF ALG	Algal turf	33	0.46
15	ENC COR	Porites astreoides	5	0.07
16	MAS COR	Montastrea annularis	6	0.08
17	FLE ALG	Dictyota sp.	4	0.06
18	MAS COR	Isophyllia sinuosa	4	0.06
19	TURF ALG	Algal turf	9	0.13
20	FLE ALG	Dictyota sp.	5	0.07
21	TURF ALG	Algal turf	70	0.99
22	SAND	Sand	102	1.44
23	TURF ALG	Algal turf	26	0.37
24	RO	Reef overhang	6	0.08
25	MAS COR	Montastrea annularis	5	0.07
26	TURF ALG	Algal turf	12	0.17
27	MAS COR	Montastrea annularis	2	0.03
28	RO	Reef overhang	8	0.11
29	FOL COR	Agaricia sp.	5	0.07
30	SAND	Sand	17	0.24
31	RO	Reef overhang	10	0.14
32	TURF ALG	Algal turf	10	0.14
33	RO	Reef overhang	6	0.08
34	MAS COR	Siderastrea siderea	17	0.24
35	TURF ALG	Algal turf	41	0.58
36	MAS COR	Montastrea annularis	9	0.13
37	TURF ALG	Algal turf	4	0.06
38	RO	Reef overhang	6	0.08
39	TURF ALG	Algal turf	16	0.23
40	MAS COR	Montastrea annularis	2	0.03
41	FLE ALG	Dictyota sp.	5	0.07

42	TURF ALG	Algal turf	5	0.07
43	MAS COR	Montastrea annularis	4	0.06
44	RO	Reef overhang	8	0.11
45	MAS COR	Montastrea annularis	55	0.77
46	RO	Reef overhang	20	0.28
47	TURF ALG	Algal turf	18	0.25
48	BRA COR	Porites porites	3	0.04
49	ENC COR	Stephanocoenia michilini	5	0.07
50	RO	Reef overhang	9	0.13
51	MAS COR	Montastrea annularis	7	0.10
52	TURF ALG	Algal turf	6	0.08
53	FLE ALG	Dictyota sp.	6	0.08
54	MAS COR	Isophyllia sinuosa	6	0.08
55	FLE ALG	Dictyota sp.	3	0.04
56	MAS COR	Isophyllia sinuosa	6	0.08
57	TURF ALG	Algal turf	8	0.11
58	FOL COR	Agaricia agaricites	3	0.04
59	RO	Reef overhang	9	0.13
60	FOL COR	Agaricia sp.	6	0.08
61	TURF ALG	Algal turf	26	0.37
62	SAND	Sand	14	0.20
63	TURF ALG	Algal turf	19	0.27
64	RO	Reef overhang	6	0.08
65	ERE SPO	Erect sponge	7	0.10
66	TURF ALG	Algal turf	10	0.14
67	MAS COR	Montastrea cavernosa	38	0.54
68	RO	Reef overhang	5	0.07
69	TURF ALG	Algal turf	36	0.51
70	MAS COR	Montastrea annularis	2	0.03

Gorgonians = 30

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

PIRATA REEF, VIEQUES. July 2004

DEPTH: 12.1 m

RUGOSITY: 3.73 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	20	0.28
1	TURF ALG	Algal turf	17	0.24
2	BRA COR	Eusmilia fastigiata	3	0.04
3	FOL COR	Agaricia agaricites	8	0.11
4	GORG	Erythropodium caribaeorum	19	0.27
5	RO	Reef overhang	10	0.14
6	TURF ALG	Algal turf	14	0.20
7	RO	Reef overhang	10	0.14
8	FOL COR	Agaricia sp.	8	0.11
9	TURF ALG	Algal turf	10	0.14
10	FOL COR	Agaricia sp.	12	0.17
11	TURF ALG	Algal turf	5	0.07
12	ENC COR	Porites astreoides	4	0.06
13	TURF ALG	Algal turf	16	0.23
14	MAS COR	Montastrea annularis	4	0.06
15	TURF ALG	Algal turf	15	0.21
16	RO	Reef overhang	11	0.15
17	TURF ALG	Algal turf	56	0.79
18	RO	Reef overhang	25	0.35
19	FOL COR	Agaricia agaricites	4	0.06
20	TURF ALG	Algal turf	30	0.42
21	MAS COR	Montastrea cavernosa	6	0.08
22	RO	Reef overhang	40	0.56
23	TURF ALG	Algal turf	90	1.27
24	BRA COR	Porites porites	6	0.08
25	TURF ALG	Algal turf	67	0.94
26	RO	Reef overhang	6	0.08
27	TURF ALG	Algal turf	23	0.32
28	RO	Reef overhang	50	0.70
29	SAND	Sand	21	0.30
30	RO	Reef overhang	9	0.13
31	MAS COR	Montastrea cavernosa	23	0.32
32	TURF ALG	Algal turf	13	0.18
33	MAS COR	Montastrea annularis	15	0.21
34	TURF ALG	Algal turf	81	1.14
35	MAS COR	Montastrea annularis	5	0.07
36	TURF ALG	Algal turf	16	0.23
37	MAS COR	Montastrea annularis	13	0.18
38	MAS COR	Montastrea annularis	5	0.07
39	TURF ALG	Algal turf	134	1.89
40	RO	Reef overhang	12	0.17
41	TURF ALG	Algal turf	19	0.27
42	MAS COR	Montastrea cavernosa	5	0.07
43	TURF ALG	Algal turf	3	0.04
44	MAS COR	Montastrea cavernosa	4	0.06
45	TURF ALG	Algal turf	8	0.11

Gorgonians = 22

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

2.4 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
PIRATA REEF, VIEQUES. July 2004

DEPTH: 12.1 m
RUGOSITY: 5.51 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	61	0.86
1	MAS COR	Montastrea annularis	5	0.07
2	TURF ALG	Algal turf	5	0.07
3	MAS COR	Montastrea annularis	3	0.04
4	RO	Reef overhang	7	0.10
5	MAS COR	Montastrea annularis	10	0.14
6	TURF ALG	Algal turf	37	0.52
7	RO	Reef overhang	9	0.13
8	TURF ALG	Algal turf	21	0.30
9	MAS COR	Siderastrea siderea	9	0.13
10	TURF ALG	Algal turf	141	1.99
11	ZOAN	Palythoa caribaeorum	7	0.10
12	TURF ALG	Algal turf	14	0.20
13	MAS COR	Montastrea annularis	7	0.10
14	ENC COR	Porites astreoides	12	0.17
15	RO	Reef overhang	10	0.14
16	TURF ALG	Algal turf	6	0.08
17	ERE SPO	Erect sponge	2	0.03
18	TURF ALG	Algal turf	17	0.24
19	MAS COR	Montastrea annularis	33	0.46
20	RO	Reef overhang	20	0.28
21	ERE SPO	Erect sponge	16	0.23
22	MAS COR	Montastrea cavernosa	15	0.21
23	TURF ALG	Algal turf	27	0.38
24	MAS COR	Montastrea annularis	22	0.31
25	RO	Reef overhang	14	0.20
26	TURF ALG	Algal turf	8	0.11
27	MAS COR	Isophyllia rigida	4	0.06
28	TURF ALG	Algal turf	16	0.23
29	ENC COR	Siderastrea radians	4	0.06
30	TURF ALG	Algal turf	68	0.96
31	MAS COR	Dichocoenia stokesi	5	0.07
32	TURF ALG	Algal turf	2	0.03
33	MAS COR	Montastrea annularis	18	0.25
34	TURF ALG	Algal turf	11	0.15
35	MAS COR	Siderastrea siderea	11	0.15
36	TURF ALG	Algal turf	9	0.13
37	MAS COR	Isophyllia sinuosa	4	0.06
38	TURF ALG	Algal turf	31	0.44
39	BRA COR	Porites porites	10	0.14
40	TURF ALG	Algal turf	23	0.32

41	ENC COR	Porites astreoides	6	0.08
42	TURF ALG	Algal turf	18	0.25
43	ENC COR	Porites astreoides	3	0.04
44	RO	Reef overhang	6	0.08
45	TURF ALG	Algal turf	29	0.41
46	RO	Reef overhang	15	0.21
47	MAS COR	Montastrea annularis	17	0.24
48	FLE ALG	Dictyota sp.	10	0.14
49	MAS COR	Montastrea annularis	81	1.14
50	MAS COR	Meandrina meandrites	20	0.28
51	TURF ALG	Algal turf	40	0.56
52	ENC COR	Porites astreoides	12	0.17
53	TURF ALG	Algal turf	55	0.77
54	RO	Reef overhang	15	0.21
55	TURF ALG	Algal turf	6	0.08
56	FOL COR	Agaricia agaricites	14	0.20

Gorgonians = 27

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

3.1 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
BOYA ESPERANZA REEF, VIEQUES. July 2004

DEPTH: 9.5 m

RUGOSITY: 3.14 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	45	0.63
1	TURF ALG	Algal turf	15	0.21
2	RO	Reef overhang	21	0.30
3	TURF ALG	Algal turf	6	0.08
4	SAND	Sand	40	0.56
5	TURF ALG	Algal turf	28	0.39
6	MAS COR	Siderastres siderea	20	0.28
7	TURF ALG	Algal turf	61	0.86
8	BRA COR	Porites porites	3	0.04
9	TURF ALG	Algal turf	46	0.65
10	ENC COR	Porites astreoides	4	0.06
11	TURF ALG	Algal turf	9	0.13
12	MAS COR	Diploria labyrinthiformis	14	0.20
13	TURF ALG	Algal turf	33	0.46
14	ENC COR	Porites astreoides	5	0.07
15	TURF ALG	Algal turf	59	0.83
16	RO	Reef overhang	28	0.39
17	MAS COR	Montastrea annularis	6	0.08
18	TURF ALG	Algal turf	19	0.27
19	MAS COR	Montastrea annularis	4	0.06
20	TURF ALG	Algal turf	4	0.06
21	MAS COR	Montastrea annularis	2	0.03
22	TURF ALG	Algal turf	27	0.38
23	RO	Reef overhang	12	0.17
24	TURF ALG	Algal turf	50	0.70
25	BRA COR	Porites porites	8	0.11
26	RO	Reef overhang	4	0.06
27	MILLE	Millepora alcicornis	4	0.06
28	TURF ALG	Algal turf	5	0.07
29	MAS COR	Montastrea annularis	3	0.04
30	TURF ALG	Algal turf	51	0.72
31	ENC COR	Porites astreoides	5	0.07
32	TURF ALG	Algal turf	50	0.70
33	ZOAN	Palythoa caribaeorum	4	0.06
34	TURF ALG	Algal turf	75	1.06
35	ENC COR	Porites astreoides	13	0.18
36	TURF ALG	Algal turf	57	0.80
37	GORG	Gorgonian base	3	0.04
38	TURF ALG	Algal turf	86	1.21
39	MAS COR	Montastrea annularis	4	0.06

Gorgonians = 28

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

3.2 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
BOYA ESPERANZA REEF, VIEQUES. July 2004

DEPTH: 9.5 m
RUGOSITY: 3.37 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	18	0.25
1	MAS COR	Montastrea annularis	11	0.15
2	CAL ALG	Halimeda discoidea	5	0.07
3	MILLE	Millepora alcicornis	4	0.06
4	MAS COR	Montastrea annularis	5	0.07
5	TURF ALG	Algal turf	31	0.44
6	FOL COR	Agaricia agaricites	3	0.04
7	TURF ALG	Algal turf	21	0.30
8	MAS COR	Montastrea annularis	40	0.56
9	TURF ALG	Algal turf	11	0.15
10	MAS COR	Montastrea annularis	9	0.13
11	TURF ALG	Algal turf	12	0.17
12	CAL ALG	Halimeda sp.	6	0.08
13	MAS COR	Montastrea annularis	5	0.07
14	RO	Reef overhang	4	0.06
15	MAS COR	Montastrea annularis	5	0.07
16	TURF ALG	Algal turf	88	1.24
17	RO	Reef overhang	9	0.13
18	TURF ALG	Algal turf	26	0.37
19	RO	Reef overhang	14	0.20
20	TURF ALG	Algal turf	16	0.23
21	RO	Reef overhang	7	0.10
22	TURF ALG	Algal turf	16	0.23
23	MAS COR	Montastrea annularis	5	0.07
24	TURF ALG	Algal turf	10	0.14
25	CAL ALG	Halimeda sp.	4	0.06
26	ZOAN	Palythoa caribaeorum	5	0.07
27	CAL ALG	Halimeda sp.	16	0.23
28	RO	Reef overhang	6	0.08
29	TURF ALG	Algal turf	21	0.30
30	MAS COR	Montastrea annularis	26	0.37
31	MAS COR	Montastrea annularis	8	0.11
32	TURF ALG	Algal turf	6	0.08
33	MAS COR	Montastrea annularis	127	1.79
34	MAS COR	Montastrea annularis	8	0.11
35	TURF ALG	Algal turf	15	0.21
36	MAS COR	Montastrea annularis	10	0.14
37	CAL ALG	Halimeda sp.	9	0.13
38	MAS COR	Montastrea annularis	37	0.52
39	TURF ALG	Algal turf	5	0.07
40	MAS COR	Montastrea annularis	23	0.32
41	CAL ALG	Halimeda sp.	4	0.06
42	RO	Reef overhang	40	0.56

43	TURF ALG	Algal turf	82	1.15
44	FLE ALG	Dictyota sp.	6	0.08
45	TURF ALG	Algal turf	13	0.18
46	ENC COR	Porites astreoides	8	0.11
47	TURF ALG	Algal turf	23	0.32
48	TURF ALG	Algal turf	35	0.49
49	MAS COR	Montastrea annularis	6	0.08
50	TURF ALG	Algal turf	13	0.18
51	MAS COR	Montastrea annularis	6	0.08
52	TURF ALG	Algal turf	6	0.08

Gorgonians = 6

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

3.3 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
BOYA ESPERANZA REEF, VIEQUES. July 2004

DEPTH: 9.5 m
RUGOSITY: 4.49 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	52	0.73
1	TURF ALG	Algal turf	3	0.04
2	MAS COR	Montastrea annularis	12	0.17
3	TURF ALG	Algal turf	20	0.28
4	MAS COR	Montastrea annularis	45	0.63
5	RO	Reef overhang	9	0.13
6	TURF ALG	Algal turf	6	0.08
7	ASCI	Ascidian	4	0.06
8	RO	Reef overhang	5	0.07
9	MAS COR	Montastrea annularis	44	0.62
10	RO	Reef overhang	11	0.15
11	MAS COR	Montastrea annularis	10	0.14
12	TURF ALG	Algal turf	9	0.13
13	MAS COR	Montastrea annularis	5	0.07
14	TURF ALG	Algal turf	48	0.68
15	RO	Reef overhang	12	0.17
16	TURF ALG	Algal turf	7	0.10
17	MAS COR	Montastrea annularis	14	0.20
18	TURF ALG	Algal turf	4	0.06
19	GORG	Erythropodium caribaeorum	15	0.21
20	RO	Reef overhang	33	0.46
21	TURF ALG	Algal turf	14	0.20
22	GORG	Erythropodium caribaeorum	3	0.04
23	TURF ALG	Algal turf	7	0.10
24	MAS COR	Montastrea annularis	4	0.06
25	MAS COR	Montastrea annularis	82	1.15
26	TURF ALG	Algal turf	12	0.17
27	MAS COR	Montastrea annularis	2	0.03
28	TURF ALG	Algal turf	10	0.14
29	MAS COR	Montastrea annularis	30	0.42
30	TURF ALG	Algal turf	10	0.14
31	MAS COR	Montastrea annularis	30	0.42
32	FLE ALG	Dictyota sp.	3	0.04
33	MAS COR	Montastrea annularis	5	0.07
34	TURF ALG	Algal turf	2	0.03
35	MAS COR	Montastrea annularis	24	0.34
36	MAS COR	Montastrea annularis	25	0.35
37	RO	Reef overhang	43	0.61
38	TURF ALG	Algal turf	18	0.25
39	MAS COR	Montastrea annularis	7	0.10
40	TURF ALG	Algal turf	29	0.41
41	MAS COR	Montastrea cavernosa	9	0.13
42	TURF ALG	Algal turf	11	0.15
43	RO	Reef overhang	9	0.13

44	TURF ALG	Algal turf	5	0.07
45	MAS COR	Montastrea annularis	12	0.17
46	FLE ALG	Dictyota sp.	13	0.18
47	MAS COR	Montastrea annularis	14	0.20
48	TURF ALG	Algal turf	18	0.25
49	FOL COR	Agaricia agaricites	3	0.04
50	TURF ALG	Algal turf	81	1.14
51	MAS COR	Montastrea annularis	2	0.03
52	TURF ALG	Algal turf	12	0.17
53	MAS COR	Montastrea annularis	3	0.04
54	MAS COR	Montastrea annularis	4	0.06
55	ENC COR	Stephanocoenia michilini	11	0.15
56	TURF ALG	Algal turf	31	0.44
57	MAS COR	Montastrea annularis	6	0.08
58	TURF ALG	Algal turf	6	0.08
59	MAS COR	Montastrea annularis	12	0.17
60	TURF ALG	Algal turf	5	0.07
61	ENC COR	Siderastrea radians	4	0.06
62	TURF ALG	Algal turf	30	0.42

Gorgonians = 16

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

3.4 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
BOYA ESPERANZA REEF, VIEQUES. July 2004

DEPTH: 9.5 m

RUGOSITY: 3.24 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	50	0.70
1	MAS COR	Montastrea annularis	6	0.08
2	CAL ALG	Halimeda sp.	5	0.07
3	MAS COR	Montastrea annularis	20	0.28
4	FLE ALG	Dictyota sp.	4	0.06
5	TURF ALG	Algal turf	13	0.18
6	CAL ALG	Halimeda sp.	5	0.07
7	TURF ALG	Algal turf	12	0.17
8	BRA COR	Porites porites	3	0.04
9	TURF ALG	Algal turf	34	0.48
10	MAS COR	Montastrea annularis	6	0.08
11	TURF ALG	Algal turf	51	0.72
12	FLE ALG	Dictyota sp.	6	0.08
13	TURF ALG	Algal turf	25	0.35
14	ENC COR	Porites astreoides	16	0.23
15	TURF ALG	Algal turf	17	0.24
16	MAS COR	Montastrea annularis	6	0.08
17	TURF ALG	Algal turf	10	0.14
18	MAS COR	Montastrea annularis	9	0.13
19	TURF ALG	Algal turf	3	0.04
20	MAS COR	Montastrea annularis	12	0.17
21	ENC COR	Stephanocoenia michilini	3	0.04
22	RO	Reef overhang	15	0.21
23	TURF ALG	Algal turf	32	0.45
24	MAS COR	Montastrea annularis	18	0.25
25	TURF ALG	Algal turf	58	0.82
26	MAS COR	Montastrea annularis	10	0.14
27	RO	Reef overhang	3	0.04
28	TURF ALG	Algal turf	3	0.04
29	RO	Reef overhang	6	0.08
30	GORG	Gorgonian base	4	0.06
31	MAS COR	Montastrea annularis	6	0.08
32	TURF ALG	Algal turf	3	0.04
33	MAS COR	Montastrea annularis	4	0.06
34	MAS COR	Montastrea annularis	4	0.06
35	RO	Reef overhang	9	0.13
36	MAS COR	Montastrea annularis	17	0.24
37	TURF ALG	Algal turf	20	0.28
38	MAS COR	Montastrea annularis	20	0.28
39	TURF ALG	Algal turf	17	0.24
40	MAS COR	Montastrea annularis	27	0.38
41	TURF ALG	Algal turf	5	0.07
42	MAS COR	Montastrea annularis	63	0.89
43	TURF ALG	Algal turf	6	0.08

44	MAS COR	Montastrea annularis	30	0.42
45	TURF ALG	Algal turf	5	0.07
46	MAS COR	Montastrea annularis	28	0.39
47	CAL ALG	Halimeda sp.	20	0.28
48	RO	Reef overhang	19	0.27
49	FOL COR	Agaricia agaricites	4	0.06
50	TURF ALG	Algal turf	31	0.44
51	RO	Reef overhang	4	0.06
52	MAS COR	Colpophyllia natans	5	0.07
53	ENC COR	Porites astreoides	7	0.10
54	TURF ALG	Algal turf	6	0.08
55	RO	Reef overhang	9	0.13
56	TURF ALG	Algal turf	38	0.54
57	MAS COR	Siderastrea siderea	8	0.11
58	TURF ALG	Algal turf	18	0.25
59	MAS COR	Siderastrea siderea	8	0.11
60	TURF ALG	Algal turf	6	0.08
61	BRA COR	Porites porites	5	0.07
62	TURF ALG	Algal turf	6	0.08
63	BRA COR	Porites porites	3	0.04
64	TURF ALG	Algal turf	7	0.10
65	MAS COR	Isophyllia sinuosa	7	0.10

Gorgonians = 24

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

3.5 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
BOYA ESPERANZA REEF, VIEQUES. July 2004

DEPTH: 9.5 m

RUGOSITY: 4.23 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	40	0.56
1	RO	Reef overhang	10	0.14
2	CAL ALG	Halimeda sp.	3	0.04
3	MAS COR	Montastrea annularis	34	0.48
4	TURF ALG	Algal turf	4	0.06
5	MAS COR	Montastrea annularis	28	0.39
6	TURF ALG	Algal turf	14	0.20
7	MAS COR	Montastrea annularis	34	0.48
8	TURF ALG	Algal turf	12	0.17
9	MAS COR	Montastrea annularis	56	0.79
10	TURF ALG	Algal turf	7	0.10
11	MAS COR	Montastrea annularis	30	0.42
12	TURF ALG	Algal turf	15	0.21
13	CAL ALG	Halimeda sp.	12	0.17
14	RO	Reef overhang	9	0.13
15	CAL ALG	Halimeda sp.	15	0.21
16	TURF ALG	Algal turf	26	0.37
17	GORG	Gorgonian base	4	0.06
18	MAS COR	Siderastrea siderea	11	0.15
19	RO	Reef overhang	6	0.08
20	MAS COR	Montastrea cavernosa	30	0.42
21	TURF ALG	Algal turf	196	2.76
22	ENC COR	Stephanocoenia michilini	4	0.06
23	TURF ALG	Algal turf	87	1.23
24	RO	Reef overhang	5	0.07
25	ERE SPO	Erect sponge	3	0.04
26	TURF ALG	Algal turf	46	0.65
27	RO	Reef overhang	9	0.13
28	TURF ALG	Algal turf	17	0.24
29	RO	Reef overhang	11	0.15
30	FLE ALG	Dictyota sp.	11	0.15
31	TURF ALG	Algal turf	10	0.14
32	RO	Reef overhang	14	0.20
33	FLE ALG	Dictyota sp.	6	0.08
34	MAS COR	Montastrea annularis	83	1.17
35	MAS COR	Montastrea cavernosa	7	0.10
36	TURF ALG	Algal turf	58	0.82
37	MAS COR	Siderastrea siderea	11	0.15
38	TURF ALG	Algal turf	3	0.04
39	MAS COR	Montastrea cavernosa	6	0.08
40	TURF ALG	Algal turf	10	0.14
41	FLE ALG	Dictyota sp.	13	0.18

Gorgonians = 26

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

4.1 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
WEST OF CABALLO BLANCO REEF, VIEQUES. July 2004

DEPTH: 4.5 m
RUGOSITY: 6.55 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	26	0.37
1	TURF ALG	Algal turf	38	0.54
2	MAS COR	Montastrea annularis	7	0.10
3	RO	Reef overhang	47	0.66
4	TURF ALG	Algal turf	22	0.31
5	ENC COR	Siderastrea radians	5	0.07
6	RO	Reef overhang	16	0.23
7	MAS COR	Montastrea annularis	6	0.08
8	RO	Reef overhang	4	0.06
9	MAS COR	Montastrea annularis	9	0.13
10	TURF ALG	Algal turf	18	0.25
11	RO	Reef overhang	18	0.25
12	MAS COR	Montastrea annularis	12	0.17
13	TURF ALG	Algal turf	8	0.11
14	RO	Reef overhang	18	0.25
15	MAS COR	Montastrea annularis	23	0.32
16	RO	Reef overhang	31	0.44
17	TURF ALG	Algal turf	21	0.30
18	ERE SPO	Erect sponge	6	0.08
19	SAND	Sand	10	0.14
20	RO	Reef overhang	6	0.08
21	TURF ALG	Algal turf	6	0.08
22	MAS COR	Montastrea annularis	14	0.20
23	RO	Reef overhang	10	0.14
24	TURF ALG	Algal turf	14	0.20
25	RO	Reef overhang	8	0.11
26	ENC SPO	Encrusting sponge	6	0.08
27	RO	Reef overhang	24	0.34
28	MAS COR	Montastrea annularis	71	1.00
29	RO	Reef overhang	9	0.13
30	TURF ALG	Algal turf	20	0.28
31	RO	Reef overhang	6	0.08
32	TURF ALG	Algal turf	54	0.76
33	FOL COR	Agaricia agaricites	2	0.03
34	TURF ALG	Algal turf	29	0.41
35	MAS COR	Montastrea annularis	9	0.13
36	TURF ALG	Algal turf	40	0.56
37	RO	Reef overhang	35	0.49
38	MAS COR	Montastrea annularis	166	2.34
39	TURF ALG	Algal turf	10	0.14
40	RO	Reef overhang	18	0.25

41	TURF ALG	Algal turf	10	0.14
42	RO	Reef overhang	6	0.08
43	ENC COR	Porites astreoides	13	0.18
44	MAS COR	Montastrea annularis	8	0.11
45	TURF ALG	Algal turf	19	0.27
46	CAL ALG	Halimeda tuna	4	0.06
47	MAS COR	Montastrea annularis	18	0.25
48	TURF ALG	Algal turf	12	0.17
49	MAS COR	Montastrea annularis	60	0.85
50	TURF ALG	Algal turf	38	0.54
51	MAS COR	Siderastrea siderea	20	0.28
52	TURF ALG	Algal turf	40	0.56
53	MAS COR	Siderastrea siderea	10	0.14
54	CAL ALG	Halimeda tuna	15	0.21

Gorgonians = 16

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

4.2 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
WEST OF CABALLO BLANCO REEF, VIEQUES. July 2004

DEPTH: 4.5 m
RUGOSITY: 5.54 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	30	0.42
1	TURF ALG	Algal turf	19	0.27
2	MAS COR	Montastrea annularis	33	0.46
3	RO	Reef overhang	38	0.54
4	TURF ALG	Algal turf	16	0.23
5	RO	Reef overhang	18	0.25
6	TURF ALG	Algal turf	28	0.39
7	MAS COR	Dichocoenia stokesii	19	0.27
8	TURF ALG	Algal turf	40	0.56
9	RO	Reef overhang	32	0.45
10	MAS COR	Montastrea annularis	28	0.39
11	TURF ALG	Algal turf	6	0.08
12	MAS COR	Montastrea annularis	25	0.35
13	RO	Reef overhang	20	0.28
14	SAND	Sand	38	0.54
15	RO	Reef overhang	14	0.20
16	FLE ALG	Dictyota sp.	6	0.08
17	CAL ALG	Halimeda monile	6	0.08
18	TURF ALG	Algal turf	3	0.04
19	MAS COR	Siderastrea siderea	18	0.25
20	TURF ALG	Algal turf	23	0.32
21	RO	Reef overhang	8	0.11
22	MAS COR	Montastrea cavernosa	5	0.07
23	TURF ALG	Algal turf	113	1.59
24	RO	Reef overhang	10	0.14
25	MAS COR	Montastrea annularis	32	0.45
26	RO	Reef overhang	10	0.14
27	TURF ALG	Algal turf	12	0.17
28	RO	Reef overhang	23	0.32
29	MAS COR	Montastrea annularis	11	0.15
30	MAS COR	Montastrea annularis	8	0.11
31	RO	Reef overhang	12	0.17
32	TURF ALG	Algal turf	6	0.08
33	MAS COR	Diploria labyrinthiformis	65	0.92
34	TURF ALG	Algal turf	11	0.15
35	RO	Reef overhang	9	0.13
36	MAS COR	Siderastrea siderea	17	0.24
37	TURF ALG	Algal turf	27	0.38
38	ENC COR	Porites astreoides	7	0.10
39	TURF ALG	Algal turf	3	0.04
40	ENC COR	Porites astreoides	3	0.04
41	FLE ALG	Dictyota sp.	5	0.07

42	TURF ALG	Algal turf	70	0.99
43	RO	Reef overhang	12	0.17
44	CAL ALG	Halimeda tuna	3	0.04
45	TURF ALG	Algal turf	44	0.62
46	RO	Reef overhang	6	0.08
47	MAS COR	Montastrea annularis	16	0.23
48	RO	Reef overhang	10	0.14
49	TURF ALG	Algal turf	30	0.42
50	RO	Reef overhang	11	0.15
51	MAS COR	Montastrea annularis	8	0.11
52	TURF ALG	Algal turf	16	0.23
53	FOL COR	Agaricia agaricites	2	0.03
54	MAS COR	Montastrea annularis	4	0.06
55	TURF ALG	Algal turf	14	0.20

Gorgonians = 11

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

4.3 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
WEST OF CABALLO BLANCO REEF, VIEQUES. July 2004

DEPTH: 4.5 m

RUGOSITY: 7.31 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	9	0.13
1	MAS COR	Montastrea annularis	30	0.42
2	RO	Reef overhang	21	0.30
3	TURF ALG	Algal turf	9	0.13
4	RO	Reef overhang	40	0.56
5	MAS COR	Montastrea annularis	36	0.51
6	RO	Reef overhang	44	0.62
7	CAL ALG	Halimeda tuna	6	0.08
8	TURF ALG	Algal turf	33	0.46
9	MAS COR	Montastrea annularis	19	0.27
10	RO	Reef overhang	27	0.38
11	TURF ALG	Algal turf	23	0.32
12	RO	Reef overhang	23	0.32
13	MAS COR	Montastrea annularis	5	0.07
14	RO	Reef overhang	6	0.08
15	MAS COR	Montastrea annularis	37	0.52
16	RO	Reef overhang	37	0.52
17	TURF ALG	Algal turf	17	0.24
18	CAL ALG	Halimeda tuna	5	0.07
19	TURF ALG	Algal turf	18	0.25
20	RO	Reef overhang	11	0.15
21	MAS COR	Montastrea annularis	5	0.07
22	TURF ALG	Algal turf	8	0.11
23	MAS COR	Montastrea annularis	10	0.14
24	RO	Reef overhang	23	0.32
25	MAS COR	Montastrea annularis	50	0.70
26	TURF ALG	Algal turf	10	0.14
27	MAS COR	Montastrea annularis	23	0.32
28	RO	Reef overhang	23	0.32
29	TURF ALG	Algal turf	17	0.24
30	RO	Reef overhang	63	0.89
31	MAS COR	Montastrea annularis	10	0.14
32	RO	Reef overhang	22	0.31
33	TURF ALG	Algal turf	18	0.25
34	RO	Reef overhang	15	0.21
35	MAS COR	Montastrea annularis	9	0.13
36	TURF ALG	Algal turf	30	0.42
37	MAS COR	Montastrea annularis	4	0.06
38	RO	Reef overhang	36	0.51
39	TURF ALG	Algal turf	26	0.37
40	RO	Reef overhang	13	0.18
41	MAS COR	Montastrea annularis	35	0.49

42	RO	Reef overhang	16	0.23
43	MAS COR	Montastrea annularis	23	0.32
44	TURF ALG	Algal turf	59	0.83
45	MAS COR	Montastrea annularis	12	0.17
46	CAL ALG	Halimeda tuna	4	0.06
47	TURF ALG	Algal turf	19	0.27
48	MAS COR	Montastrea annularis	10	0.14
49	TURF ALG	Algal turf	12	0.17
50	BRA COR	Porites porites	25	0.35
51	TURF ALG	Algal turf	37	0.52
52	CAL ALG	Halimeda tuna	6	0.08
53	TURF ALG	Algal turf	13	0.18
54	CAL ALG	Halimeda tuna	8	0.11
55	RO	Reef overhang	10	0.14
56	CAL ALG	Halimeda tuna	13	0.18
57	RO	Reef overhang	16	0.23
58	TURF ALG	Algal turf	23	0.32
59	RO	Reef overhang	8	0.11
60	TURF ALG	Algal turf	9	0.13

Gorgonians = 3

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

4.4 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
WEST OF CABALLO BLANCO REEF, VIEQUES. July 2004

DEPTH: 4.5 m

RUGOSITY: 5.24 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	18	0.25
1	MAS COR	Montastrea annularis	8	0.11
2	RO	Reef overhang	8	0.11
3	MAS COR	Montastrea annularis	6	0.08
4	RO	Reef overhang	3	0.04
5	MAS COR	Montastrea annularis	4	0.06
6	RO	Reef overhang	14	0.20
7	TURF ALG	Algal turf	11	0.15
8	RO	Reef overhang	4	0.06
9	ENC COR	Porites astreoides	9	0.13
10	TURF ALG	Algal turf	5	0.07
11	FLE ALG	Dictyota sp.	5	0.07
12	TURF ALG	Algal turf	4	0.06
13	RO	Reef overhang	15	0.21
14	FLE ALG	Dictyota sp.	6	0.08
15	TURF ALG	Algal turf	4	0.06
16	RO	Reef overhang	30	0.42
17	MAS COR	Montastrea annularis	10	0.14
18	TURF ALG	Algal turf	10	0.14
19	MAS COR	Montastrea annularis	10	0.14
20	RO	Reef overhang	12	0.17
21	TURF ALG	Algal turf	13	0.18
22	RO	Reef overhang	9	0.13
23	FLE ALG	Dictyota sp.	5	0.07
24	MAS COR	Montastrea annularis	23	0.32
25	RO	Reef overhang	15	0.21
26	TURF ALG	Algal turf	17	0.24
27	ENC COR	Siderastrea radians	4	0.06
28	RO	Reef overhang	4	0.06
29	MAS COR	Montastrea annularis	9	0.13
30	RO	Reef overhang	5	0.07
31	MAS COR	Montastrea annularis	22	0.31
32	RO	Reef overhang	20	0.28
33	TURF ALG	Algal turf	5	0.07
34	RO	Reef overhang	8	0.11
35	MAS COR	Montastrea annularis	10	0.14
36	TURF ALG	Algal turf	3	0.04
37	MAS COR	Montastrea annularis	10	0.14
38	TURF ALG	Algal turf	3	0.04
39	MAS COR	Montastrea annularis	4	0.06
40	TURF ALG	Algal turf	120	1.69
41	MAS COR	Montastrea annularis	6	0.08

42	TURF ALG	Algal turf	15	0.21
43	RO	Reef overhang	9	0.13
44	TURF ALG	Algal turf	15	0.21
45	CAL ALG	Halimeda tuna	5	0.07
46	RO	Reef overhang	5	0.07
47	MAS COR	Montastrea annularis	30	0.42
48	RO	Reef overhang	7	0.10
49	MILLE	Millepora alcicornis	6	0.08
50	TURF ALG	Algal turf	31	0.44
51	FLE ALG	Dictyota sp.	7	0.10
52	CAL ALG	Halimeda tuna	4	0.06
53	TURF ALG	Algal turf	6	0.08
54	RO	Reef overhang	10	0.14
55	MAS COR	Montastrea annularis	6	0.08
56	TURF ALG	Algal turf	13	0.18
57	ENC COR	Siderastrea radians	4	0.06
58	TURF ALG	Algal turf	31	0.44
59	TURF ALG	Algal turf	26	0.37
60	MAS COR	Montastrea annularis	40	0.56
61	TURF ALG	Algal turf	6	0.08
62	MAS COR	Montastrea annularis	28	0.39
63	TURF ALG	Algal turf	5	0.07
64	RO	Reef overhang	10	0.14
65	TURF ALG	Algal turf	83	1.17
66	ENC COR	Siderastrea radians	3	0.04
67	CAL ALG	Halimeda monile	4	0.06
68	TURF ALG	Algal turf	36	0.51
69	RO	Reef overhang	5	0.07
70	TURF ALG	Algal turf	23	0.32
71	RO	Reef overhang	13	0.18
72	TURF ALG	Algal turf	16	0.23
73	RO	Reef overhang	5	0.07
74	MAS COR	Montastrea annularis	16	0.23
75	MAS COR	Montastrea annularis	15	0.21
76	FLE ALG	Dictyota sp.	4	0.06
77	TURF ALG	Algal turf	29	0.41

Gorgonians = 13

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

4.5 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
WEST OF CABALLO BLANCO REEF, VIEQUES. July 2004

DEPTH: 4.5 m

RUGOSITY: 4.83 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	28	0.39
1	RO	Reef overhang	25	0.35
2	MAS COR	Montastrea annularis	5	0.07
3	TURF ALG	Algal turf	25	0.35
4	ERE SPO	Erect sponge	3	0.04
5	TURF ALG	Algal turf	15	0.21
6	SAND	Sand	23	0.32
7	MAS COR	Diploria strigosa	44	0.62
8	RO	Reef overhang	5	0.07
9	SAND	Sand	5	0.07
10	RO	Reef overhang	15	0.21
11	MAS COR	Montastrea annularis	10	0.14
12	TURF ALG	Algal turf	44	0.62
13	FLE ALG	Dictyota sp.	10	0.14
14	TURF ALG	Algal turf	11	0.15
15	ENC COR	Porites astreoides	10	0.14
16	RO	Reef overhang	6	0.08
17	TURF ALG	Algal turf	20	0.28
18	RO	Reef overhang	21	0.30
19	MAS COR	Montastrea annularis	17	0.24
20	CAL ALG	Halimeda tuna	6	0.08
21	TURF ALG	Algal turf	9	0.13
22	CAL ALG	Halimeda tuna	5	0.07
23	TURF ALG	Algal turf	20	0.28
24	CAL ALG	Halimeda tuna	5	0.07
25	FLE ALG	Dictyota sp.	5	0.07
26	TURF ALG	Algal turf	6	0.08
27	RO	Reef overhang	31	0.44
28	SILT	Silt	60	0.85
29	RO	Reef overhang	26	0.37
30	MAS COR	Montastrea annularis	4	0.06
31	TURF ALG	Algal turf	21	0.30
32	MAS COR	Montastrea annularis	4	0.06
33	TURF ALG	Algal turf	10	0.14
34	MAS COR	Montastrea annularis	18	0.25
35	RO	Reef overhang	12	0.17
36	TURF ALG	Algal turf	24	0.34
37	ENC COR	Siderastrea radians	3	0.04
38	TURF ALG	Algal turf	70	0.99
39	CAL ALG	Halimeda monile	5	0.07
40	TURF ALG	Algal turf	23	0.32
41	MAS COR	Siderastrea siderea	19	0.27

42	TURF ALG	Algal turf	20	0.28
43	CAL ALG	Halimeda monile	3	0.04
44	TURF ALG	Algal turf	57	0.80
45	GORG	Erythropodium caribaeorum	5	0.07
46	TURF ALG	Algal turf	6	0.08
47	MAS COR	Montastrea annularis	37	0.52
48	MAS COR	Montastrea annularis	8	0.11
49	MAS COR	Montastrea annularis	6	0.08
50	RO	Reef overhang	6	0.08
51	CAL ALG	Halimeda monile	17	0.24
52	MAS COR	Montastrea annularis	21	0.30
53	TURF ALG	Algal turf	4	0.06
54	MAS COR	Montastrea annularis	4	0.06
55	RO	Reef overhang	6	0.08
56	TURF ALG	Algal turf	5	0.07
57	MAS COR	Colpophyllia natans	6	0.08
58	RO	Reef overhang	8	0.11
59	TURF ALG	Algal turf	35	0.49
60	CAL ALG	Halimeda tuna	6	0.08
61	TURF ALG	Algal turf	6	0.08
62	CAL ALG	Halimeda tuna	5	0.07
63	TURF ALG	Algal turf	10	0.14
64	CAL ALG	Halimeda tuna	4	0.06
65	TURF ALG	Algal turf	10	0.14
66	RO	Reef overhang	15	0.21
67	MAS COR	Montastrea annularis	15	0.21

Gorgonians = 19

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

5.1 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
Mosquito Reef, Vieques. July 2004

DEPTH: **10.6 m**

RUGOSITY: 3.56 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Colpophyllia natans	38	0.54
1	MAS COR	Montastrea annularis	10	0.14
2	TURF ALG	Algal turf	11	0.15
3	MAS COR	Montastrea annularis	9	0.13
4	TURF ALG	Algal turf	23	0.32
5	ENC COR	Siderastrea radians	4	0.06
6	TURF ALG	Algal turf	3	0.04
7	ENC COR	Siderastrea radians	8	0.11
8	TURF ALG	Algal turf	50	0.70
9	MAS COR	Montastrea annularis	10	0.14
10	TURF ALG	Algal turf	15	0.21
11	MAS COR	Montastrea annularis	11	0.15
12	MAS COR	Montastrea annularis	20	0.28
13	TURF ALG	Algal turf	13	0.18
14	MAS COR	Siderastrea siderea	10	0.14
15	TURF ALG	Algal turf	40	0.56
16	ENC COR	Porites astreoides	4	0.06
17	RO	Reef overhang	8	0.11
18	TURF ALG	Algal turf	30	0.42
19	RO	Reef overhang	13	0.18
20	GORG	Gorg base	5	0.07
21	TURF ALG	Algal turf	5	0.07
22	ENC COR	Porites astreoides	9	0.13
23	ERE SPO	Erect sponge	4	0.06
24	RO	Reef overhang	4	0.06
25	TURF ALG	Algal turf	70	0.99
26	RO	Reef overhang	11	0.15
27	TURF ALG	Algal turf	35	0.49
28	RO	Reef overhang	34	0.48
29	MAS COR	Montastrea annularis	3	0.04
30	TURF ALG	Algal turf	68	0.96
31	MAS COR	Montastrea annularis	70	0.99
32	TURF ALG	Algal turf	129	1.82
33	MAS COR	Montastrea annularis	21	0.30
34	TURF ALG	Algal turf	47	0.66
35	ANTHO	Bartholomea annularis	3	0.04
36	TURF ALG	Algal turf	6	0.08
37	MILLE	Millepora alcornis	2	0.03
38	TURF ALG	Algal turf	12	0.17
39	ERE SPO	Erect sponge	4	0.06
40	RO	Reef overhang	26	0.37
41	ENC COR	Porites astreoides	8	0.11

42	TURF ALG	Algal turf	6	0.08
43	RO	Reef overhang	5	0.07
44	ERE SPO	Erect sponge	6	0.08
45	FLE ALG	Dictyota sp.	14	0.20
46	TURF ALG	Algal turf	4	0.06
47	BRA COR	Porites porites	3	0.04
48	RO	Reef overhang	4	0.06
49	ENC SPO	Encrusting sponge	6	0.08
50	GORG	Erythropodium caribaeorum	4	0.06
51	TURF ALG	Algal turf	5	0.07

Gorgonians = 22

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

5.2 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
Mosquito Reef, Vieques. July 2004

DEPTH: 10.6 m

RUGOSITY: 4.37 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	82	1.15
1	ENC COR	Porites astreoides	5	0.07
2	TURF ALG	Algal turf	42	0.59
3	RO	Reef overhang	10	0.14
4	TURF ALG	Algal turf	36	0.51
5	RO	Reef overhang	7	0.10
6	RUBB	Porites rubble	32	0.45
7	BRA COR	Porites porites	16	0.23
8	RUBB	Porites rubble	25	0.35
9	TURF ALG	Algal turf	76	1.07
10	RO	Reef overhang	9	0.13
11	MAS COR	Montastrea annularis	20	0.28
12	RO	Reef overhang	3	0.04
13	MAS COR	Montastrea annularis	6	0.08
14	FLE ALG	Dictyota sp.	6	0.08
15	TURF ALG	Algal turf	10	0.14
16	MAS COR	Montastrea annularis	10	0.14
17	TURF ALG	Algal turf	4	0.06
18	ERE SPO	Erect sponge	4	0.06
19	TURF ALG	Algal turf	13	0.18
20	MAS COR	Montastrea annularis	4	0.06
21	RO	Reef overhang	14	0.20
22	TURF ALG	Algal turf	51	0.72
23	MAS COR	Siderastrea siderea	5	0.07
24	RO	Reef overhang	5	0.07
25	TURF ALG	Algal turf	53	0.75
26	RO	Reef overhang	18	0.25
27	BRA COR	Porites divaricata	4	0.06
28	TURF ALG	Algal turf	6	0.08
29	MAS COR	Montastrea annularis	10	0.14
30	TURF ALG	Algal turf	5	0.07
31	MAS COR	Montastrea annularis	13	0.18
32	TURF ALG	Algal turf	3	0.04
33	ENC COR	Porites astreoides	6	0.08
34	TURF ALG	Algal turf	2	0.03
35	ENC COR	Porites astreoides	16	0.23
36	MAS COR	Montastrea annularis	6	0.08
37	TURF ALG	Algal turf	4	0.06
38	GORG	Erythropodium caribbaeorum	7	0.10
39	MAS COR	Montastrea annularis	10	0.14
40	MAS COR	Montastrea annularis	3	0.04
41	ENC COR	Porites astreoides	4	0.06

42	RO	Reef overhang	5	0.07
43	MAS COR	Montastrea annularis	4	0.06
44	TURF ALG	Algal turf	5	0.07
45	ENC COR	Porites astreoides	3	0.04
46	TURF ALG	Algal turf	3	0.04
47	MAS COR	Montastrea annularis	10	0.14
48	MAS COR	Montastrea annularis	4	0.06
49	TURF ALG	Algal turf	5	0.07
50	RO	Reef overhang	28	0.39
51	MAS COR	Montastrea annularis	11	0.15
52	TURF ALG	Algal turf	33	0.46
53	RO	Reef overhang	12	0.17
54	ENC SPO	Encrusting sponge	15	0.21
55	RO	Reef overhang	14	0.20
56	MAS COR	Montastrea annularis	5	0.07
57	RO	Reef overhang	28	0.39
58	MAS COR	Colpophyllia natans	58	0.82
59	TURF ALG	Algal turf	34	0.48
60	MAS COR	Colpophyllia natans	6	0.08
61	RO	Reef overhang	5	0.07
62	MAS COR	Montastrea annularis	2	0.03
63	TURF ALG	Algal turf	53	0.75
64	BRA COR	Porites porites	6	0.08
65	TURF ALG	Algal turf	6	0.08

Gorgonians = 11

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

5.3 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
Mosquito Reef, Vieques. July 2004

DEPTH: 10.6 m

RUGOSITY: 3.30 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea annularis	25	0.35
1	RO	Reef overhang	5	0.07
2	MAS COR	Montastrea annularis	84	1.18
3	RO	Reef overhang	10	0.14
4	TURF ALG	Algal turf	8	0.11
5	MAS COR	Colpophyllia natans	26	0.37
6	MAS COR	Montastrea annularis	3	0.04
7	TURF ALG	Algal turf	19	0.27
8	RO	Reef overhang	4	0.06
9	TURF ALG	Algal turf	5	0.07
10	MAS COR	Colpophyllia natans	23	0.32
11	MAS COR	Montastrea annularis	43	0.61
12	TURF ALG	Algal turf	6	0.08
13	MAS COR	Montastrea annularis	11	0.15
14	TURF ALG	Algal turf	16	0.23
15	MAS COR	Montastrea annularis	36	0.51
16	TURF ALG	Algal turf	2	0.03
17	GORG	Erythropodium caribaeorum	4	0.06
18	BRA COR	Porites porites	55	0.77
19	RO	Reef overhang	11	0.15
20	MAS COR	Montastrea annularis	18	0.25
21	RO	Reef overhang	2	0.03
22	ENC COR	Porites astreoides	6	0.08
23	MAS COR	Montastrea annularis	39	0.55
24	RO	Reef overhang	8	0.11
25	TURF ALG	Algal turf	20	0.28
26	GORG	Erythropodium caribaeorum	4	0.06
27	MAS COR	Montastrea annularis	15	0.21
28	TURF ALG	Algal turf	7	0.10
29	GORG	Erythropodium caribaeorum	16	0.23
30	TURF ALG	Algal turf	28	0.39
31	ERE SPO	Erect sponge	6	0.08
32	RO	Reef overhang	7	0.10
33	TURF ALG	Algal turf	25	0.35
34	GORG	Gorgonian base	4	0.06
35	TURF ALG	Algal turf	30	0.42
36	MAS COR	Siderastrea siderea	10	0.14
37	RO	Reef overhang	11	0.15
38	TURF ALG	Algal turf	3	0.04
39	RO	Reef overhang	15	0.21
40	TURF ALG	Algal turf	15	0.21
41	RO	Reef overhang	14	0.20

42	MAS COR	Montastrea annularis	8	0.11
43	TURF ALG	Algal turf	14	0.20
44	MAS COR	Montastrea annularis	18	0.25
45	RO	Reef overhang	20	0.28
46	MAS COR	Colpophyllia natans	10	0.14
47	TURF ALG	Algal turf	41	0.58
48	MAS COR	Montastrea annularis	9	0.13
49	TURF ALG	Algal turf	47	0.66
50	BRA COR	Porites porites	3	0.04
51	TURF ALG	Algal turf	38	0.54
52	GORG	Erythropodium caribaeorum	4	0.06
53	ENC COR	Porites astreoides	8	0.11
54	RO	Reef overhang	4	0.06
55	FLE ALG	Dictyota sp.	5	0.07
56	ENC SPO	Encrusting sponge	4	0.06
57	TURF ALG	Algal turf	12	0.17

Gorgonians = 7

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

5.4 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
Mosquito Reef, Vieques. July 2004.

DEPTH: 10.6 m

RUGOSITY: 3.75 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea cavernosa	14	0.20
1	TURF ALG	Algal turf	3	0.04
2	MAS COR	Montastrea annularis	4	0.06
3	MAS COR	Montastrea annularis	15	0.21
4	TURF ALG	Algal turf	5	0.07
5	MAS COR	Montastrea cavernosa	6	0.08
6	RO	Reef overhang	6	0.08
7	MAS COR	Mycetophyllia ferox	15	0.21
8	TURF ALG	Algal turf	22	0.31
9	RO	Reef overhang	12	0.17
10	FLE ALG	Dictyota sp.	4	0.06
11	GORG	Erythropodium caribaeorum	3	0.04
12	MAS COR	Montastrea annularis	16	0.23
13	TURF ALG	Algal turf	50	0.70
14	MAS COR	Montastrea cavernosa	8	0.11
15	ENC COR	Porites astreoides	10	0.14
16	TURF ALG	Algal turf	30	0.42
17	BRA COR	Porites porites	4	0.06
18	GORG	Erythropodium caribaeorum	4	0.06
19	TURF ALG	Algal turf	8	0.11
20	MAS COR	Montastrea cavernosa	14	0.20
21	TURF ALG	Algal turf	18	0.25
22	GORG	Erythropodium caribaeorum	9	0.13
23	RO	Reef overhang	6	0.08
24	TURF ALG	Algal turf	15	0.21
25	MAS COR	Montastrea annularis	3	0.04
26	TURF ALG	Algal turf	15	0.21
27	GORG	Briareum asbestinum	9	0.13
28	RO	Reef overhang	21	0.30
29	TURF ALG	Algal turf	40	0.56
30	RO	Reef overhang	22	0.31
31	MAS COR	Montastrea annularis	9	0.13
32	MAS COR	Montastrea annularis	10	0.14
33	MAS COR	Montastrea annularis	35	0.49
34	MAS COR	Montastrea cavernosa	36	0.51
35	TURF ALG	Algal turf	6	0.08
36	MAS COR	Mycetophyllia lamarckiana	8	0.11
37	MAS COR	Colpophyllia natans	21	0.30
38	TURF ALG	Algal turf	2	0.03
39	ENC COR	Porites astreoides	8	0.11
40	RO	Reef overhang	6	0.08
41	FOL COR	Agaricia agaricites	8	0.11

42	TURF ALG	Algal turf	12	0.17
43	MAS COR	Montastrea cavernosa	24	0.34
44	RO	Reef overhang	14	0.20
45	TURF ALG	Algal turf	3	0.04
46	ENC COR	Porites astreoides	6	0.08
47	ERE SPO	Erect sponge	2	0.03
48	TURF ALG	Algal turf	5	0.07
49	MAS COR	Mycetophyllia lamarckiana	6	0.08
50	RO	Reef overhang	5	0.07
51	TURF ALG	Algal turf	19	0.27
52	MAS COR	Colpophyllia natans	20	0.28
53	TURF ALG	Algal turf	5	0.07
54	ERE SPO	Erect sponge	8	0.11
55	RO	Reef overhang	5	0.07
56	TURF ALG	Algal turf	29	0.41
57	ERE SPO	Erect sponge	2	0.03
58	RO	Reef overhang	16	0.23
59	MAS COR	Montastrea annularis	6	0.08
60	TURF ALG	Algal turf	42	0.59
61	RO	Reef overhang	11	0.15
62	ENC COR	Porites astreoides	13	0.18
63	TURF ALG	Algal turf	3	0.04
64	MAS COR	Montastrea annularis	12	0.17
65	RO	Reef overhang	10	0.14
66	TURF ALG	Algal turf	12	0.17
67	ENC COR	Porites astreoides	4	0.06
68	TURF ALG	Algal turf	14	0.20
69	BRA COR	Porites porites	5	0.07
70	TURF ALG	Algal turf	7	0.10
71	ENC COR	Porites astreoides	13	0.18
72	ERE SPO	Erect sponge	5	0.07
73	SAND	Sand	5	0.07
74	MAS COR	Montastrea cavernosa	9	0.13
75	TURF ALG	Algal turf	64	0.90

Gorgonians = 13

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

5.5 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
Mosquito Reef, Vieques. July 2004

DEPTH: 10.6 m

RUGOSITY: 4.11 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	2	0.03
1	MAS COR	Colpophyllia natans	26	0.37
2	TURF ALG	Algal turf	30	0.42
3	RO	Reef overhang	6	0.08
4	TURF ALG	Algal turf	4	0.06
5	ENC COR	Stephanocoenia michilini	3	0.04
6	TURF ALG	Algal turf	26	0.37
7	MAS COR	Montastrea annularis	8	0.11
8	MAS COR	Montastrea annularis	9	0.13
9	TURF ALG	Algal turf	4	0.06
10	RO	Reef overhang	10	0.14
11	TURF ALG	Algal turf	6	0.08
12	ERE SPO	Erect sponge	3	0.04
13	MAS COR	Montastrea annularis	4	0.06
14	TURF ALG	Algal turf	23	0.32
15	RO	Reef overhang	17	0.24
16	MAS COR	Montastrea annularis	16	0.23
17	TURF ALG	Algal turf	6	0.08
18	MAS COR	Montastrea annularis	19	0.27
19	MAS COR	Siderastrea siderea	32	0.45
20	RO	Reef overhang	18	0.25
21	TURF ALG	Algal turf	39	0.55
22	GORG	Erythropodium caribaeorum	5	0.07
23	TURF ALG	Algal turf	45	0.63
24	MAS COR	Montastrea annularis	30	0.42
25	MAS COR	Montastrea annularis	30	0.42
26	ENC COR	Porites astreoides	5	0.07
27	TURF ALG	Algal turf	12	0.17
28	GORG	Erythropodium caribaeorum	16	0.23
29	MAS COR	Montastrea annularis	5	0.07
30	TURF ALG	Algal turf	9	0.13
31	MAS COR	Montastrea cavernosa	9	0.13
32	ENC COR	Porites astreoides	4	0.06
33	RO	Reef overhang	7	0.10
34	MAS COR	Montastrea annularis	10	0.14
35	RO	Reef overhang	4	0.06
36	ENC COR	Porites astreoides	4	0.06
37	MAS COR	Montastrea annularis	8	0.11
38	TURF ALG	Algal turf	3	0.04
39	MAS COR	Montastrea annularis	6	0.08
40	TURF ALG	Algal turf	12	0.17
41	RO	Reef overhang	14	0.20

42	TURF ALG	Algal turf	41	0.58
43	ENC COR	Siderastrea radians	5	0.07
44	TURF ALG	Algal turf	3	0.04
45	ENC COR	Siderastrea radians	4	0.06
46	TURF ALG	Algal turf	41	0.58
47	GORG	Gorgonian base	2	0.03
48	TURF ALG	Algal turf	22	0.31
49	MAS COR	Montastrea cavernosa	6	0.08
50	RO	Reef overhang	5	0.07
51	TURF ALG	Algal turf	14	0.20
52	ENC COR	Siderastrea radians	9	0.13
53	RO	Reef overhang	12	0.17
54	GORG	Erythropodium caribaeorum	5	0.07
55	RO	Reef overhang	7	0.10
56	MAS COR	Colpophyllia natans	40	0.56
57	RO	Reef overhang	6	0.08
58	TURF ALG	Algal turf	15	0.21
59	MAS COR	Montastrea annularis	4	0.06
60	RO	Reef overhang	11	0.15
61	FOL COR	Leptoseris cucullata	7	0.10
62	RO	Reef overhang	12	0.17
63	GORG	Erythropodium caribaeorum	12	0.17
64	TURF ALG	Algal turf	7	0.10
65	GORG	Erythropodium caribaeorum	6	0.08
66	RO	Reef overhang	23	0.32
67	GORG	Erythropodium caribaeorum	6	0.08
68	TURF ALG	Algal turf	11	0.15
69	MAS COR	Montastrea annularis	23	0.32
70	RO	Reef overhang	2	0.03
71	MAS COR	Montastrea cavernosa	11	0.15
72	TURF ALG	Algal turf	50	0.70
73	MILLE	Millepora alcicornis	4	0.06
74	TURF ALG	Algal turf	10	0.14
75	ENC SPO	Encrusting sponge	4	0.06
76	TURF ALG	Algal turf	4	0.06
77	MAS COR	Montastrea annularis	2	0.03
78	TURF ALG	Algal turf	7	0.10

Gorgonians = 13

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

6.1 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 1,
ARRECIFE CORONAS, VIEQUES. July 2004

DEPTH: 10.6 m

RUGOSITY: 7.62 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	10	0.14
1	BRA COR	Madracis decactis	4	0.06
2	TURF ALG	Algal turf	6	0.08
3	RO	Reef overhang	31	0.44
4	BRA COR	Madracis decactis	5	0.07
5	TURF ALG	Algal turf	16	0.23
6	RO	Reef overhang	11	0.15
7	TURF ALG	Algal turf	95	1.34
8	MAS COR	Montastrea cavernosa	18	0.25
9	TURF ALG	Algal turf	8	0.11
10	RO	Reef overhang	16	0.23
11	MAS COR	Montastrea annularis	10	0.14
12	RO	Reef overhang	4	0.06
13	MAS COR	Montastrea annularis	22	0.31
14	MAS COR	Montastrea annularis	31	0.44
15	MAS COR	Montastrea cavernosa	41	0.58
16	RO	Reef overhang	5	0.07
17	ENC GOR	Erythropodium caribaeorum	5	0.07
18	RO	Reef overhang	5	0.07
19	MAS COR	Montastrea annularis	6	0.08
20	RO	Reef overhang	26	0.37
21	SILT	Silt	9	0.13
22	ENC GOR	Erythropodium caribaeorum	10	0.14
23	MAS COR	Montastrea annularis	60	0.85
24	TURF ALG	Algal turf	9	0.13
25	MAS COR	Siderastrea siderea	25	0.35
26	RO	Reef overhang	9	0.13
27	MAS COR	Montastrea cavernosa	17	0.24
28	TURF ALG	Algal turf	4	0.06
29	ERE SPO	Erect sponge	3	0.04
30	TURF ALG	Algal turf	3	0.04
31	ENC COR	Stephanocoenia michilini	4	0.06
32	TURF ALG	Algal turf	11	0.15
33	ENC GOR	Erythropodium caribaeorum	9	0.13
34	RO	Reef overhang	19	0.27
35	MAS COR	Montastrea annularis	32	0.45
36	TURF ALG	Algal turf	50	0.70
37	MAS COR	Montastrea annularis	4	0.06
38	RO	Reef overhang	4	0.06
39	MAS COR	Montastrea annularis	11	0.15
40	RO	Reef overhang	15	0.21
41	TURF ALG	Algal turf	16	0.23

42	MAS COR	Montastrea annularis	5	0.07
43	RO	Reef overhang	32	0.45
44	MAS COR	Montastrea cavernosa	6	0.08
45	RO	Reef overhang	11	0.15
46	TURF ALG	Algal turf	31	0.44
47	RO	Reef overhang	16	0.23
48	FOL COR	Agaricia agaricites	4	0.06
49	ENC GOR	Erythropodium caribaeorum	5	0.07
50	GORG	Gorgonian base	4	0.06
51	RO	Reef overhang	56	0.79
52	MAS COR	Montastrea annularis	8	0.11
53	SILT	Silt	10	0.14
54	TURF ALG	Algal turf	103	1.45
55	RO	Reef overhang	14	0.20
56	TURF ALG	Algal turf	17	0.24
57	RO	Reef overhang	5	0.07
58	TURF ALG	Algal turf	26	0.37
59	ENC COR	Stephanocoenia michilini	7	0.10
60	TURF ALG	Algal turf	2	0.03
61	ERE SPO	Erect sponge	14	0.20
62	TURF ALG	Algal turf	24	0.34
63	MAS COR	Montastrea annularis	5	0.07
64	RO	Reef overhang	22	0.31
65	SILT	Silt	62	0.87
66	RO	Reef overhang	40	0.56
67	TURF ALG	Algal turf	18	0.25
68	MAS COR	Montastrea annularis	5	0.07

Gorgonians = 25

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

6.2 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 2,
ARRECIFE CORONAS, VIEQUES. July 2004

DEPTH: XX.X m

RUGOSITY: 4.49 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	42	0.59
1	ERE SPO	Erect sponge	5	0.07
2	TURF ALG	Algal turf	23	0.32
3	ERE SPO	Erect sponge	5	0.07
4	RO	Reef overhang	10	0.14
5	ENC COR	Porites astreoides	16	0.23
6	RO	Reef overhang	6	0.08
7	MAS COR	Siderastrea siderea	5	0.07
8	RO	Reef overhang	8	0.11
9	TURF ALG	Algal turf	6	0.08
10	RO	Reef overhang	4	0.06
11	FOL COR	Agaricia humilis	6	0.08
12	TURF ALG	Algal turf	24	0.34
13	ENC SPO	Encrusting sponge	4	0.06
14	FOL COR	Agaricia agaricites	4	0.06
15	RO	Reef overhang	6	0.08
16	MILLE	Millepora alcornis	4	0.06
17	RO	Reef overhang	7	0.10
18	ENC COR	Porites astreoides	9	0.13
19	FOL COR	Agaricia humilis	8	0.11
20	ENC COR	Porites astreoides	8	0.11
21	ENC COR	Porites astreoides	4	0.06
22	TURF ALG	Algal turf	19	0.27
23	MAS COR	Dichocoenia stokesi	2	0.03
24	TURF ALG	Algal turf	56	0.79
25	ENC GOR	Erythropodium caribaeorum	4	0.06
26	TURF ALG	Algal turf	20	0.28
27	MAS COR	Montastrea cavernosa	9	0.13
28	TURF ALG	Algal turf	10	0.14
29	RO	Reef overhang	12	0.17
30	GORG	Gorgonian base	4	0.06
31	TURF ALG	Algal turf	8	0.11
32	ERE SPO	Erect sponge	14	0.20
33	ENC SPO	Encrusting sponge	4	0.06
34	ERE SPO	Erect sponge	8	0.11
35	RO	Reef overhang	22	0.31
36	TURF ALG	Algal turf	11	0.15
37	ERE SPO	Erect sponge	3	0.04
38	RO	Reef overhang	8	0.11
39	MAS COR	Siderastrea siderea	34	0.48
40	RO	Reef overhang	5	0.07
41	TURF ALG	Algal turf	16	0.23

42	ENC COR	Porites astreoides	14	0.20
43	RO	Reef overhang	21	0.30
44	SAND	Sand	7	0.10
45	RO	Reef overhang	27	0.38
46	ENC GOR	Erythropodium caribaeorum	8	0.11
47	TURF ALG	Algal turf	60	0.85
48	MAS COR	Montastrea annularis	4	0.06
49	TURF ALG	Algal turf	12	0.17
50	ERE SPO	Erect sponge	2	0.03
51	TURF ALG	Algal turf	67	0.94
52	FOL COR	Agaricia agaricites	3	0.04
53	TURF ALG	Algal turf	57	0.80
54	RO	Reef overhang	14	0.20
55	TURF ALG	Algal turf	98	1.38
56	RO	Reef overhang	7	0.10
57	MAS COR	Montastrea annularis	8	0.11
58	RO	Reef overhang	11	0.15
59	ENC SPO	Encrusting sponge	23	0.32
60	TURF ALG	Algal turf	9	0.13
61	MAS COR	Montastrea cavernosa	14	0.20
62	RO	Reef overhang	10	0.14
63	TURF ALG	Algal turf	57	0.80
64	MAS COR	Montastrea cavernosa	8	0.11
65	TURF ALG	Algal turf	5	0.07

Gorgonians = 26

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

6.3 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 3,
ARRECIFE CORONAS, VIEQUES. July 2004

DEPTH: 10.6 m

RUGOSITY: 3.68 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	ENC COR	Porites astreoides	10	0.14
1	TURF ALG	Algal turf	38	0.54
2	RO	Reef overhang	7	0.10
3	ENC COR	Siderastrea siderea	12	0.17
4	TURF ALG	Algal turf	5	0.07
5	MAS COR	Montastrea cavernosa	30	0.42
6	RO	Reef overhang	4	0.06
7	FOL COR	Agaricia agaricites	5	0.07
8	TURF ALG	Algal turf	23	0.32
9	ENC COR	Siderastrea radians	5	0.07
10	TURF ALG	Algal turf	39	0.55
11	RO	Reef overhang	6	0.08
12	TURF ALG	Algal turf	25	0.35
13	RO	Reef overhang	37	0.52
14	TURF ALG	Algal turf	13	0.18
15	GORG	Gorgonian base	2	0.03
16	RO	Reef overhang	30	0.42
17	TURF ALG	Algal turf	20	0.28
18	RO	Reef overhang	30	0.42
19	TURF ALG	Algal turf	23	0.32
20	MAS COR	Montastrea annularis	6	0.08
21	TURF ALG	Algal turf	5	0.07
22	RO	Reef overhang	15	0.21
23	TURF ALG	Algal turf	22	0.31
24	ERE SPO	Erect sponge	3	0.04
25	TURF ALG	Algal turf	5	0.07
26	ENC COR	Porites astreoides	6	0.08
27	ENC COR	Porites astreoides	5	0.07
28	ENC COR	Porites astreoides	6	0.08
29	TURF ALG	Algal turf	17	0.24
30	BRA COR	Eusmilia fastigiata	3	0.04
31	TURF ALG	Algal turf	28	0.39
32	RO	Reef overhang	4	0.06
33	MAS COR	Montastrea cavernosa	16	0.23
34	TURF ALG	Algal turf	6	0.08
35	GORG	Gorgonian base	4	0.06
36	RO	Reef overhang	15	0.21
37	TURF ALG	Algal turf	18	0.25
38	RO	Reef overhang	5	0.07
39	TURF ALG	Algal turf	52	0.73
40	RO	Reef overhang	28	0.39
41	MAS COR	Montastrea annularis	24	0.34

42	TURF ALG	Algal turf	7	0.10
43	MAS COR	Montastrea annularis	4	0.06
44	TURF ALG	Algal turf	31	0.44
45	MAS COR	Montastrea annularis	9	0.13
46	RO	Reef overhang	27	0.38
47	TURF ALG	Algal turf	22	0.31
48	ENC COR	Stephanocoenia michilini	5	0.07
49	TURF ALG	Algal turf	6	0.08
50	MAS COR	Montastrea cavernosa	3	0.04
51	TURF ALG	Algal turf	27	0.38
52	MAS COR	Montastrea annularis	10	0.14
53	ENC COR	Porites astreoides	12	0.17
54	TURF ALG	Algal turf	42	0.59
55	ENC COR	Siderastrea radians	4	0.06
56	TURF ALG	Algal turf	56	0.79
57	MAS COR	Montastrea cavernosa	2	0.03
58	RO	Reef overhang	10	0.14
59	TURF ALG	Algal turf	37	0.52

Gorgonians = 30

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

6.4 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 4,
ARRECIFE CORONAS, VIEQUES. July 2004

DEPTH: 10.6 m

RUGOSITY: 3.73 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	MAS COR	Montastrea cavernosa	20	0.28
1	TURF ALG	Algal turf	17	0.24
2	RO	Reef overhang	16	0.23
3	SILT	Silt	16	0.23
4	RO	Reef overhang	6	0.08
5	TURF ALG	Algal turf	39	0.55
6	ERE SPO	Erect sponge	3	0.04
7	TURF ALG	Algal turf	28	0.39
8	ERE SPO	Erect sponge	3	0.04
9	TURF ALG	Algal turf	9	0.13
10	MAS COR	Montastrea cavernosa	9	0.13
11	RO	Reef overhang	5	0.07
12	TURF ALG	Algal turf	23	0.32
13	GORG	Erythropodium caribaeorum	10	0.14
14	TURF ALG	Algal turf	14	0.20
15	MAS COR	Montastrea annularis	5	0.07
16	RO	Reef overhang	5	0.07
17	TURF ALG	Algal turf	36	0.51
18	ERE SPO	Erect sponge	6	0.08
19	RO	Reef overhang	5	0.07
20	TURF ALG	Algal turf	38	0.54
21	RO	Reef overhang	6	0.08
22	ENC COR	Porites astreoides	4	0.06
23	TURF ALG	Algal turf	3	0.04
24	MAS COR	Montastrea annularis	9	0.13
25	GORG	Gorgonian base	6	0.08
26	TURF ALG	Algal turf	31	0.44
27	MAS COR	Siderastrea siderea	14	0.20
28	RO	Reef overhang	21	0.30
29	MAS COR	Montastrea annularis	27	0.38
30	MAS COR	Montastrea annularis	22	0.31
31	MAS COR	Montastrea annularis	7	0.10
32	TURF ALG	Algal turf	5	0.07
33	GORG	Erythropodium caribaeorum	10	0.14
34	MAS COR	Montastrea annularis	12	0.17
35	ENC COR	Porites astreoides	4	0.06
36	TURF ALG	Algal turf	6	0.08
37	ERE SPO	Erect sponge	6	0.08
38	TURF ALG	Algal turf	20	0.28
39	FOL COR	Agaricia agaricites	8	0.11
40	MAS COR	Siderastrea siderea	3	0.04
41	RO	Reef overhang	11	0.15

42	TURF ALG	Algal turf	6	0.08
43	ENC COR	Porites astreoides	31	0.44
44	TURF ALG	Algal turf	24	0.34
45	MAS COR	Montastrea annularis	6	0.08
46	FOL COR	Agaricia agaricites	4	0.06
47	RO	Reef overhang	6	0.08
48	TURF ALG	Algal turf	5	0.07
49	MAS COR	Montastrea annularis	9	0.13
50	RO	Reef overhang	12	0.17
51	TURF ALG	Algal turf	4	0.06
52	RO	Reef overhang	19	0.27
53	TURF ALG	Algal turf	62	0.87
54	RO	Reef overhang	16	0.23
55	TURF ALG	Algal turf	41	0.58
56	ENC COR	Porites astreoides	9	0.13
57	RO	Reef overhang	10	0.14
58	TURF ALG	Algal turf	16	0.23
59	MAS COR	Siderastrea siderea	4	0.06
60	RO	Reef overhang	8	0.11
61	TURF ALG	Algal turf	4	0.06
62	RO	Reef overhang	6	0.08
63	MAS COR	Montastrea cavernosa	6	0.08
64	TURF ALG	Algal turf	30	0.42
65	MAS COR	Colpophyllia natans	14	0.20
66	TURF ALG	Algal turf	26	0.37
67	MAS COR	Siderastrea siderea	6	0.08
68	TURF ALG	Algal turf	24	0.34
69	MAS COR	Montastrea annularis	9	0.13
70	TURF ALG	Algal turf	10	0.14

Gorgonians = 23

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

6.5 REEF BENTHIC COMMUNITY PROFILE ALONG LINEAR TRANSECT 5,
ARRECIFE CORONAS, VIEQUES. July 2004

DEPTH: 10.6 m

RUGOSITY: 3.38 m

TRANSITION	SUBSTRATE CODE	TAXA	CHAIN LINKS	LINEAR COVER (m)
0	TURF ALG	Algal turf	19	0.27
1	ENC COR	Siderastrea radians	3	0.04
2	TURF ALG	Algal turf	4	0.06
3	MAS COR	Montastrea cavernosa	9	0.13
4	ENC SPO	Encrusting sponge	11	0.15
5	MAS COR	Montastrea cavernosa	16	0.23
6	TURF ALG	Algal turf	8	0.11
7	RO	Reef overhang	7	0.10
8	MAS COR	Montastrea cavernosa	6	0.08
9	TURF ALG	Algal turf	3	0.04
10	MAS COR	Montastrea annularis	12	0.17
11	MAS COR	Montastrea annularis	4	0.06
12	MAS COR	Montastrea cavernosa	22	0.31
13	MAS COR	Montastrea cavernosa	10	0.14
14	TURF ALG	Algal turf	4	0.06
15	ENC COR	Porites astreoides	9	0.13
16	MAS COR	Montastrea cavernosa	6	0.08
17	ENC GOR	Erythropodium caribaeorum	4	0.06
18	MAS COR	Montastrea cavernosa	14	0.20
19	TURF ALG	Algal turf	6	0.08
20	MAS COR	Montastrea annularis	10	0.14
21	MAS COR	Montastrea annularis	18	0.25
22	TURF ALG	Algal turf	8	0.11
23	MAS COR	Montastrea annularis	7	0.10
24	TURF ALG	Algal turf	5	0.07
25	MAS COR	Montastrea annularis	18	0.25
26	TURF ALG	Algal turf	22	0.31
27	ENC GOR	Erythropodium caribaeorum	6	0.08
28	TURF ALG	Algal turf	4	0.06
29	RO	Reef overhang	7	0.10
30	TURF ALG	Algal turf	225	3.17
31	RO	Reef overhang	6	0.08
32	TURF ALG	Algal turf	18	0.25
33	ENC COR	Siderastrea radians	6	0.08
34	RO	Reef overhang	7	0.10
35	TURF ALG	Algal turf	16	0.23
36	ENC GOR	Erythropodium caribaeorum	5	0.07
37	TURF ALG	Algal turf	10	0.14
38	MAS COR	Montastrea cavernosa	3	0.04
39	TURF ALG	Algal turf	12	0.17
40	MAS COR	Montastrea annularis	8	0.11
41	TURF ALG	Algal turf	20	0.28

42	RO	Reef overhang	9	0.13
43	TURF ALG	Algal turf	28	0.39
44	MAS COR	Montastrea annularis	9	0.13
45	TURF ALG	Algal turf	29	0.41
46	ENC COR	Siderastrea radians	8	0.11
47	TURF ALG	Algal turf	124	1.75
48	MAS COR	Siderastrea siderea	4	0.06
49	TURF ALG	Algal turf	78	1.10
50	MAS COR	Diploria strigosa	8	0.11
51	TURF ALG	Algal turf	17	0.24
52	RO	Reef overhang	6	0.08
53	TURF ALG	Algal turf	12	0.17

Gorgonians = 24

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