4-4-2003

Count or Pointcount: Is Percent Octocoral Cover an Adequate Proxy for Octocoral Abundance?

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COUNT OR POINTCOUNT: IS PERCENT OCTOCORAL COVER AN ADEQUATE PROXY FOR OCTOCORAL ABUNDANCE?

by

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A thesis submitted in partial fulfillment
of the requirements for the degree of
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Date of Approval:
4 April 2003

Keywords: Octocoral, *Gorgonia ventalina*, Florida Keys, Percent Cover, Hurricane Georges

Acknowledgements

I would like to thank and acknowledge my major professor Dr. Pamela Hallock Muller for valuable input and much appreciated latitude. With her guidance, my skill as a writer and my capacity as a scientist have improved greatly. I would like to thank my committee members Walter Jaap, Dr. James Porter and Dr. George Yanev for valuable input. I am especially indebted to Keith Hackett for serving as a sounding board and counseling a rookie through statistics. Thanks to the entire 2002 CRMP field team who helped me conduct the in situ surveys, MK Callahan, Jim Kidney, Walt Jaap, Jim Porter, Cecilia Torres, Katie Sutherland, and especially Selena Kupfner. Much appreciation goes to a talented collection of friends and family for reviewing the many generations of this manuscript: Dr. Stephen Freedman, Keith Hackett, Karen Hug, Chris Koelling, Dr. Vladimir Kosmynin, Mary Lou Lybolt, Dr. John Lybolt, and Diane Rosenberg. Finally, I must thank my parents, Karen, and my friends for supporting and tolerating me throughout this endeavor.

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ABSTRACT

The Florida Keys Coral Reef Monitoring Project (CRMP) began video transect sampling in 1996 and has continuously monitored 107 Florida Keys stations through 2002. The video was downward pointing and produced images from which planar projection data were calculated to determine percent cover of living benthic organisms. An absence of data assessing correlation between octocoral percent cover and octocoral abundance motivated a study to compare octocoral percent cover with abundance data acquired from the same video transects. The methods employed to extract octocoral abundance data from videotape were validated. Temporal changes in octocoral abundance, size and taxonomic group were determined by examination of video transects of 28 randomly selected stations from 1996, 1998, 1999, and 2002. Size classes were defined as <10cm, 10-40cm, >40cm (short, medium and tall respectively). Taxonomic groups were *Gorgonia ventalina* and "other octocorals" in three size classes, and Scleraxonia. An *in situ* study assessed the accuracy of video-derived counts.

Average densities of *G. ventalina* and Scleraxonia were consistently about one colony/m^2. Other octocoral as a group averaged 7-9 colonies/m^2. When summarized by height, short and tall averaged about 1-2 colonies/m^2, while colonies between 10 and 40 cm in height consistently averaged about 6 colonies/m^2.

Hurricane Georges, in September 1998, impacted the octocoral assemblage. Abundance declined most at stations near the storm center and stations in shallower water. Storm impact was related to octocoral height. Tall octocorals were removed more

frequently than medium, short and encrusting forms. A dramatic increase of short individuals in 2002 is indicative of successful post-hurricane recruitment. By 2002, octocoral abundance had recovered to pre-hurricane levels.

This study demonstrated that abundance data can reliably be derived from archived video data, reinforcing the value of standardized video data archives. Octocoral abundance and octocoral percent cover are not strongly correlated because tall individuals disproportionately influence percent cover estimates. Nevertheless, trends in octocoral percent cover are reliable indicators of the trends in octocoral abundance.

1. INTRODUCTION

Coral reefs are among the most diverse ecosystems on the planet. The number of animal species identified on reefs is reported to be around 5000, but the actual number may be five times as high (Birkeland 1996). An economic assessment of south Florida's reefs revealed that reef users spent an estimated $4.4 billion from June 2000 to May 2001 (Johns et al. 2001). The same survey showed that reef users in south Florida are willing to pay an aggregated $228 million per year to protect the natural reefs in southeast Florida. The public perception that reefs are fragile and valuable in a financial context may encourage a much-needed conservation ethic. Despite the high diversity, productivity, and economic value of reefs, the total estimated area of coral reefs world wide is 284,300 sq km, an area just half the size of France (Bryant et al. 1998).

The World Resources Institute concluded that approximately 58% of coral reefs within the Caribbean are threatened (Bryant et al. 1998). Thirty percent of those reefs were estimated to be at high risk from the combined stresses of overfishing, pollution and sedimentation from land-based sources. Caribbean reefs are pressured by multiple stressors including overfishing, atmospheric CO_2 increase, ultraviolet radiation, diseases, pollutants, nutrification, African dust, sedimentation and climate change (Bryant et al. 1998; Porter et al. 1999; Aronson & Precht 2001; Hallock 2001; Harvell et al. 2001; Hayes et al. 2001; Porter et al. 2001; many others.). The synergistic impact of these multiple stressors is driving the decline of coral reefs.

Shallow-water benthic communities throughout the Caribbean basin are in the midst of a dramatic and unprecedented shift away from dominant scleractinian framework builders (Aronson & Precht 2001). The widespread decline of stony corals has implications for octocoral communities and octocoral-dependent animals. At one well studied reef, Grecian Rocks in the Florida Keys, octocorals have replaced stony coral as the dominant benthic organism (Lidz & Hallock 2000). Whether octocoral will replace stony coral as the dominant form of refuge space on reefs, or instead decline along with stony coral (Porter 2002), is an important question.

Given the increasing importance of octocorals in Caribbean reef communities, it will be useful to create reliable baseline data and establish methods to extract octocoral community data from archived sources. Many projects that collect areal cover data for octocoral do not collect abundance data from the same locations. How well areal cover data reflect actual abundance is not well understood. A better understanding of this correlation would immediately allow ecological assessments of octocorals using existing percent cover datasets. Further, if reliable octocoral abundance data can be collected from archived sources, baseline and long-term trend studies will be augmented.

INTRODUCTION TO OCTOCORALLIA OF THE CARIBBEAN

Conspicuous characteristics of western Atlantic coral communities are the abundance and diversity of octocorals. In depths from low tide to 25 m, octocorals are more abundant and diverse here than anywhere else in the world (Bayer 1961). Octocorals provide spatial variation and vertical relief that is essential fish habitat (Pugliese 1998).

Caribbean Octocoral Systematics

“The alcyonarian fauna of the West Indies are prolific and conspicuous and have been known for many years, with the natural result that a great many more species have been described than actually exist” (Bayer (1961), p.350). The science of octocoral classification shares notoriety with Porifera classification. The distinguishing characters of these organisms are so plastic that one set of systematic characters rarely applies to a species across its full geographic range. Because the organisms are difficult to classify, expert systematists are few, and taxonomy remains somewhat subjective. Positive identification for most species requires laboratory dissection and microscopic examination. The daunting prospect of consumptive sampling methods, follow-up laboratory work, and generally imprecise taxonomic keys confounds efforts to understand the biology and ecology of these animals (Bayer 1961).

Classified under the phylum Cnidaria, class Anthozoa, sub-class Octocorallia, order Alcyonacea, there are four suborders of Alcyonacea found in Atlantic waters: Stolonifera, Alcyoniina, Scleraxonia and Holaxonia. The shallow-water tropical and subtropical western Atlantic are dominated by the suborder Holaxonia, with a few representatives of the other suborders (Cairns et al. 1991). The word gorgonian, a reference to Holaxonia, is a colloquial synonym with the term octocoral when describing shallow West Indian communities.

Octocorallia share a number of common characters. Most notable are eight-tentacle polyps. All Octocorallia contain spicules, which are calcified skeletal elements ranging in size from 50ìm to 2000ìm. Holaxonia also share a number of common characters across the suborder. Most notable of these is an axial structure composed of the protein gorgonin. This axial structure may be more or less densely arranged in an organic matrix, but the protein gorgonin is omnipresent.

Octocoral taxonomy is based primarily on seven characters established by Bayer (1961), which are useful at different taxonomic levels:

- The size and shape of the colony depends on the extent and pattern of budding, and may be used to characterize groups in a general way.
- The pattern of branching is often highly characteristic of species and genera.
- The distribution of polyps on the branches is of variable importance and is dependent on the number and arrangement of gastrodermal canals.

- Dimorphism of polyps (the occurrence of two types of individuals, autozooids and siphonozooids) is characteristic of certain genera.
- The structure of the supporting axis varies as the density and composition of the gorgonin matrix changes. This character is useful for distinguishing families.
- Color is dependent on three causes: pigments in the tissues, intracellular symbiotic algae in the endoderm, and coloring of the calcareous spicules.
- Spicule size, shape, arrangement, and location within the organism must be noted to make full use of spicular classification. Spicules are the one character most useful in species-level identification, but cannot be used to the exclusion of the previous six characters. Identification of spicules requires special preservation, microscopic examination, and a specific descriptive vocabulary.

There are approximately 170 species of gorgonians in the West Indies. Of these, about 50 species are reef dwellers. Species distribution and abundance is such that about 25 species represent over 90% of individuals encountered in any West Indian reef (Cairns 1976).

Caribbean Octocoral Ecology

Physical factors affecting octocoral physiology and distribution have been well studied. In general, gorgonians exist in similar habitats as scleractinian corals but are able to tolerate a slightly wider range of conditions. For example, gorgonians survive in conditions where temperature is between 19^{o}C and 36^{o}C (with a few exceptions). Zooxanthellate scleractinia thrive where temperature is between 19^{o}C and 30^{o}C.

Gorgonians have a sharp lower end member for salinity tolerance. Except for two species tolerant of 17 S, gorgonians are absent where salinity is less than 32 S for any extended duration (Bayer 1961). Hypersaline conditions, however, have much less impact. Experiments have shown that individuals can survive up to 60 S for 12-hour periods (Bayer 1961). No stony coral known can tolerate these conditions (Porter et al. 1999).

Of the approximately 50 reef-dwelling octocoral species, fewer than 10 are azooxanthellate (Kinzie 1973). Light has the same impact on zooxanthellate gorgonians as on zooxanthellate scleractinians, providing energy for their symbionts. Illumination influences species composition to some degree. Zooxanthellate gorgonians are the only octocorals found above 16 m, with rare exception. Azooxanthellate gorgonians become increasingly frequent below 20 m (Goldberg 1973). Below 45 m, zooxanthellate gorgonians are rare.

In zooxanthellate octocorals, the symbionts are arranged intracellularly in the endoderm. Greater metabolic coupling between host and symbiont makes gorgonians more reliant on symbionts than are scleractinians (Kinzie 1973). The host is so dependent upon the symbionts for energy that predatory capability is diminished. Some Gorgonaceae taxa have lost most or all of their nematocysts and with them the ability to feed (Bayer 1961). Dark-box experiments reinforced this postulate by showing that zooxanthellate octocorals are likely to die under the same conditions of darkness that azooxanthellate octocorals and zooxanthellate scleractinians are likely to survive (Kinzie 1973). Further, zooxanthellate octocorals do not bleach by expulsion of zooxanthellae. When stressful conditions cause bleaching, the symbionts die *in situ* and their remains persist within the endoderm. When stressful conditions end, the octocoral is repopulated with zooxanthellae (Kinzie 1973).

Substrate availability and variety influence community composition. Diversity of gorgonian communities is strongly correlated with the diversity of available substratum. Shifting sediment smaller than coarse sand (2 mm) prevents settlement of all reef-dwelling octocorals (Kinzie 1973). Shifting sediment from large gravel (~40-60 mm) to cobble-sized (60-200 mm) is suitable for settlement of only the most plastic Scleraxonian species (*Erythropodium caribaeorum* and *Briareum asbestinum*). Remnants of *Acropora cervicornis* usually fall into this size range. For this reason, *A. cervicornis* stands effectively prevent settlement of most reef-dwelling octocorals (Kinzie 1973). Sediments larger than 200 mm are generally suitable for settlement of all octocorals, though any mobile substrate leaves the organism susceptible to toppling.

The hydrodynamic regime affects both octocoral density and species composition. Grain size and sediment depth, both influenced by water motion, control settlement and survival as described above. Typical hydrodynamic forces control the distribution of friable species and affect the orientation of fan-shaped octocorals (Kinzie 1973). Intense, episodic forces associated with storms alter the local environment, and cause octocoral mortality (Woodley et al. 1981). Such episodic events may alter the sediment regime and local current patterns. The impact of storms on octocoral assemblages differs with storm intensity, duration, water depth, and the initial character of the octocoral assemblage. Differential recruitment rates following a disturbance make it possible to gauge the frequency severe storms by species composition (Kinzie 1973).

Diversity of octocoral assemblages within reef zones is closely tied to the physical character of the zone. Comparison of the same reef zone across many locations reveals that the octocoral species composition is remarkably homogenous. Surveys of analogous reef zones across the Caribbean consistently reveal similar species lists (Goldberg 1973).

Kinzie (1973) found that the density of octocorals in Jamaica's Discovery Bay followed a strong inverse relationship with stony coral cover. The inverse correlation with stony coral cover was stronger than the positive correlation with available free space (Kinzie 1973). Historically, on southeast Florida reefs, octocoral density was inversely correlated with octocoral biomass (Goldberg 1973).

Octocorals share reproductive strategies with many stony corals. Most octocorals are gonochoric broadcast spawners. A study of gametogenic cycles in six species of gorgonians from southeast Florida indicated that five of the species have annual gametogenic cycles that consistently peak in month-long periods. Among these species, spawning is seasonally sequential rather than synchronous(Fitzsimmons 1996). There is a pelagic phase of varying length before the planulae settle. Colony formation and post-settlement growth is asexual. Growth rates are highest in the first five years of life. Bayer (1961) reported no evidence of death from old age. Mortality is driven by bioerosion of the holdfast (Goreau & Hartman 1963), abrasion (Kinzie 1973), predation (Lasker & Coffroth 1988), storms (Woodley et al. 1981), and disease (Harvell et al. 2001).

All octocorals produce calcified skeletal elements called spicules. After an alcyonarian dies and the organic matrix decomposes, the spicules are released. These coarse to fine grain (2000 ìm – 50 ìm) calcium carbonate particles contribute to reef-derived sediments. Caribbean octocoral habitats produce approximately 10^7 g $CaCO_3$ sediment ha^{-1} yr^{-1} (Bayer 1961).

DESCRIPTION OF PRIMARY DATA SOURCE

The Florida Keys National Marine Sanctuary and Protection Act (HR5909) designated over 2,800 square nautical miles of coastal waters as the Florida Keys National Marine Sanctuary (FKNMS). The Sanctuary Protection Act mandated a comprehensive monitoring program to assess the effectiveness of the marine resource management. In cooperation with the National Oceanographic and Atmospheric Administration (NOAA), the U.S. Environmental Protection Agency (USEPA) and the State of Florida implemented a Water Quality Protection Program to monitor seagrass habitats, coral reefs and hardbottom communities, and water quality (Porter 2002). The Coral Reef Monitoring Project (CRMP) is the coral habitat component of the mandated Water Quality Protection Program.

Sampling site locations were chosen in 1994 using stratified random USEPA E-Map sampling procedures (Overton et al. 1991). Forty reef sites were selected within the

FKNMS and permanent station markers were installed in 1995 (Dustan et al. 1998). Annual sampling began in 1996 and continued through 2002. Three additional sites were installed in the Dry Tortugas in 1999 and sampling continued to 2002. At the peak of the project's geographic coverage, there were 172 stations among 43 sites (Fig. 1). During the full course of the CRMP, stations have been added and deleted from the annual survey list. Because the stainless steel station markers remain in the bottom, the potential exists to revisit any station at a later date. A total of 107 stations have been sampled each year in the interval 1996 to 2002. By habitat type there are 13 hardbottom, 29 patch, 39 shallow, and 26 deep reef stations.

Field sampling consists of a number of non-consumptive survey methods with follow-up laboratory work. This thesis will deal with only one CRMP method: video sampling for determination of percent cover of benthic categories. During follow-up laboratory work, the video imagery is analyzed for percent cover of the following benthic categories: stony coral (to species whenever possible), octocoral, zoanthid, sponge, macroalgae, seagrass, and substrate.

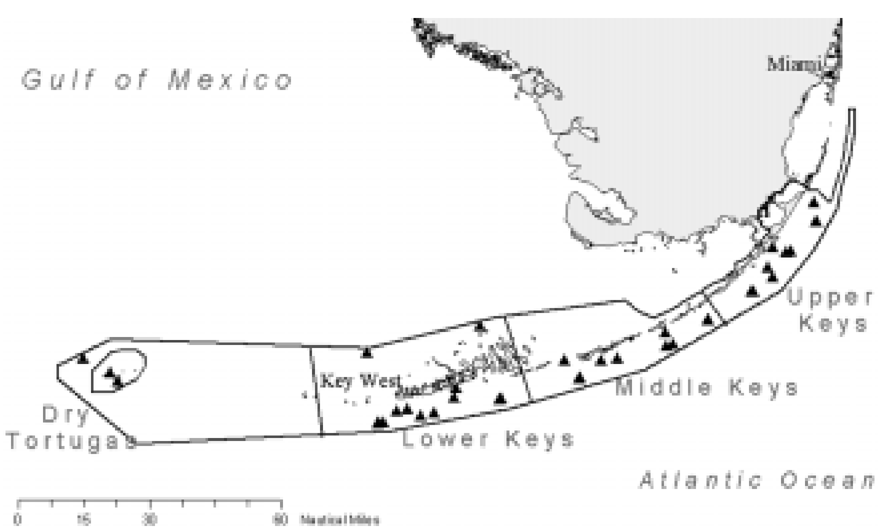

Figure 1. Distibution of CRMP sampling sites from Key Largo to Dry Tortugas.

METHODS APPLIED TO OCTOCORAL HABITAT CHARACTERIZATION

Two common methods of characterizing gorgonian communities are loosely categorized as abundance (number of colonies) and biomass. Sampling of octocoral abundance and diversity has been conducted using randomly placed quadrats along a prescribed depth contour (Goldberg 1973; Jaap et al. 1994) or within a defined habitat type. Kinzie (1973) scaled this method up to sample entire reef zones using a series of 5 x 105 m transects. Similar data have been obtained using line intercept methods (Jaap et al. 1994). Repeat census of permanent stations has been accomplished with long-term monitoring programs (Jaap et al. 2002).

Biomass data collection involves removing all the organisms within a discrete area and noting species, wet weight, and dry weight for each colony. Some projects combine biomass data collection with other parameters. Kinzie (1973) cleared an entire reef zone (94 m^2) of octocorals in an attempt to describe the effect of substrate diversity on octocoral diversity, density (#/m^2), and biomass. Goldberg (1973) used dry weight biomass to develop density (#/m^2) versus biomass (g/m^2) profiles for all species found at each of six reef zones sampled. Drawbacks to biomass methods include the inability to repeat-sample an area and the unacceptable environmental impact of denuding an area of octocorals. Area covered by octocoral colonies is used as a proxy for biomass particularly for flabellate forms (Kim & Harvell 2002).

Programs that directly target octocorals do not typically employ percent cover, planimetric, or remote-sensing survey methods. When such area cover methods are used, the collection of octocoral data is usually subordinate to other parameters. Consequently, the relationship between areal octocoral cover and either abundance or biomass is not well understood. Descriptions of octocoral habitat based on area covered are lacking, for good reason. Planar area sampling techniques are relatively expensive, labor intensive (Jaap & McField 2001), and are biased in favor of benthos that lie parallel to the overall topography. Planimetric sampling techniques have been applied to analyses of stony coral in a mixed habitat (Bohnsack 1979; Aronson et al. 1994; Jaap & McField 2001). However, Hackett (2002) conducted a review of planimetric techniques and found that the octocoral overstory can bias measurements of stony coral percent cover.

The goals of my project are to examine the relationship between abundance (#/m^2) and percent cover of octocorals as determined from planar projection CRMP video data, and to investigate changes in octocoral assemblages between 1996 and 2002. Specific questions addressed include:

1. How repeatable are octocoral counts acquired from video transects?
2. How similar are octocoral counts acquired from video and octocoral counts made *in situ* from the same stations?
3. How do octocoral abundance data acquired from video compare with octocoral percent cover data from the same stations?
4. Did octocoral assemblages change between 1996 and 2002?
5. Did hurricane Georges in 1998 impact octocoral assemblages?

SIGNIFICANCE

If the existing percent cover data are comparable to abundance data for octocorals, then the existing CRMP dataset provides the opportunity for assessment of octocoral community dynamics on an unprecedented scale of time and space. Secondarily, if video-derived abundance correlates to *in situ* abundance, then abundance-based habitat characterizations may be reliably conducted from standardized video data. Further, this undertaking reinforces the supplementary value of standardized video data archived in conjunction with a large-scale, long-term monitoring project.

2. METHODS

CRMP METHODS

Field sampling consists of a number of non-consumptive video and visual count survey methods with follow-up image analysis. This thesis will deal with only one CRMP method, video sampling for determination of percent cover of benthic categories. Three parallel video transects, each approximately 22 m long, comprise one station (Fig. 2). In the field, video of the sea floor is taken from a standard height of 40 cm, perpendicular to the benthos. The visible width of imagery taken from this height is 40 cm. Total average area of one video station is approximately 25 m^2 (Porter 2002).

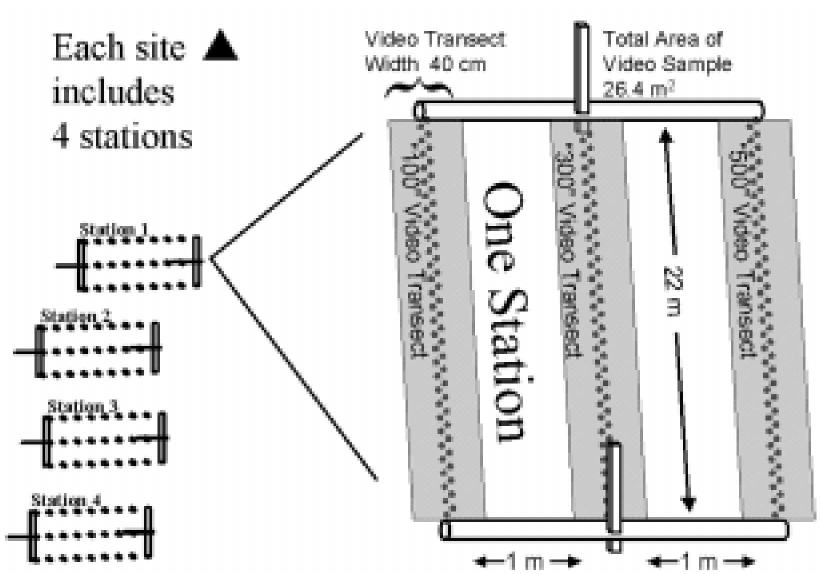

Figure 2. Layout of a typical CRMP site with enlarged view of an individual station.

During follow-up laboratory work, the video imagery is frame grabbed, random points are assigned to each image, and those points are analyzed. Images are grabbed to create a nearly seamless mosaic of the video transect. Depending on topography and actual length of transects, between 50 and 70 images are analyzed for each transect using the software package PointCount© for Coral Reefs (Dustan et al. 1998). The software places random points on the image and a qualified observer identifies the organisms that lie beneath the random points. Identifications are made in the following benthic categories: stony coral (to species whenever possible), octocoral, zoanthid, sponge, macroalgae, seagrass, diadema and substrate. These data are recorded in a tabular format. From these data, relative percent cover of stony corals, octocorals, zoanthids, sponges, macroalgae, seagrass, diadema and substrate (rock, rubble and sediment) are calculated for all stations (Porter et al., 2002). Data are analyzed by frame and then aggregated to station-level, the smallest spatial unit used for analyses (approximately $25m^2$).

STUDY METHODS

Station Selection

Three filters were used to provide a meaningful subset of the 107 available stations. First, only stations with greater than 5% octocoral cover were included. Second, regions with at least six stations in each of patch, shallow and deep habitat types were included. These constraints left 52 candidate stations in seven habitat types among the upper and middle keys to which the third filter was applied. Candidate stations in each of the seven habitat types were ranked by 1996 octocoral abundance (method described below) into three groups: 0^{th} to 25^{th} percentile, 25^{th} to 75^{th} percentile, and 75^{th} to 100^{th} percentile. One station was randomly selected from the lower and upper groups, and two stations were randomly selected from the middle group. These selection criteria provided 4 randomly selected stations at each of the seven habitat types: patch, shallow, and deep reef stations in the upper keys and hardbottom, patch, shallow, and deep reef stations in the middle keys (Fig. 3, Table 1).

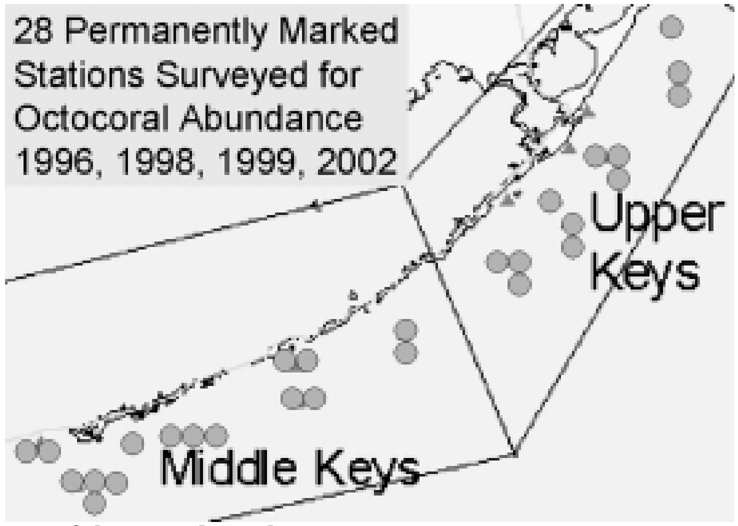

Figure 3. Locations of the 28 selected stations.

Table 1. Key characteristics of selected stations.

Site ID	Sitetype	Region	Site Name	Station	Area of Video Sample (m2)	Depth Min (m)	Depth Max (m)	Longitude (DD)	Latitude (DD)
302	Patch (P)	Upper (U)	Turtle	2	26.40	3	6	-80.2191	25.2947
322	Patch (P)	Upper (U)	Porter Patch	2	27.60	4	5	-80.3243	25.1032
323	Patch (P)	Upper (U)	Porter Patch	3	27.72	4	5	-80.3243	25.1032
331	Patch (P)	Upper (U)	Admiral	1	30.12	1	2	-80.3948	25.0447
503	Shallow (S)	Upper (U)	Carysfort (Shallow)	3	27.00	3	4	-80.2098	25.2222
513	Shallow (S)	Upper (U)	Grecian Rocks	3	26.76	4	8	-80.3069	25.1075
531	Shallow (S)	Upper (U)	Conch (Shallow)	1	26.40	5	6	-80.458	24.9553
533	Shallow (S)	Upper (U)	Conch (Shallow)	3	27.00	5	7	-80.4571	24.9562
702	Deep (D)	Upper (U)	Carysfort (Deep)	2	26.64	13	16	-80.2099	25.2208
721	Deep (D)	Upper (U)	Molasses (Deep)	1	26.52	12	14	-80.3756	25.0072
722	Deep (D)	Upper (U)	Molasses (Deep)	2	25.80	12	14	-80.3756	25.0072
733	Deep (D)	Upper (U)	Conch (Deep)	3	28.80	14	17	-80.4513	24.9519
141	Hardbottom (HB)	Middle (M)	Long Key	1	26.28	4	4	-80.784	24.7972
142	Hardbottom (HB)	Middle (M)	Long Key	2	26.40	4	4	-80.784	24.7972
152	Hardbottom (HB)	Middle (M)	Moser Channel	2	26.64	4	4	-81.1676	24.6891
154	Hardbottom (HB)	Middle (M)	Moser Channel	4	26.52	4	4	-81.1676	24.6891
341	Patch (P)	Middle (M)	W. Turtle Shoal	1	25.80	5	7	-80.9669	24.6993
343	Patch (P)	Middle (M)	W. Turtle Shoal	3	26.40	5	7	-80.9669	24.6993
344	Patch (P)	Middle (M)	W. Turtle Shoal	4	25.80	5	7	-80.9669	24.6993
354	Patch (P)	Middle (M)	Dustan Rocks	4	26.40	4	6	-81.0302	24.6895
541	Shallow (S)	Middle (M)	Alligator (Shallow)	1	26.40	4	5	-80.624	24.8457
554	Shallow (S)	Middle (M)	Tennessee (Shallow)	4	26.76	5	6	-80.7812	24.745
562	Shallow (S)	Middle (M)	Sombrero (Shallow)	2	23.40	5	6	-81.1092	24.6269
563	Shallow (S)	Middle (M)	Sombrero (Shallow)	3	24.24	4	6	-81.1092	24.6258
743	Deep (D)	Middle (M)	Alligator (Deep)	3	28.56	11	12	-80.6209	24.8452
753	Deep (D)	Middle (M)	Tennessee (Deep)	3	27.60	13	14	-80.7578	24.7527
763	Deep (D)	Middle (M)	Sombrero (Deep)	3	24.60	15	15	-81.1105	24.6231
764	Deep (D)	Middle (M)	Sombrero (Deep)	4	23.76	15	15	-81.1105	24.6231

Year Selection

Specific years were selected to address two questions. Did the octocoral assemblage change over the longest available time span? Did the octocoral assemblage change immediately after hurricane Georges, in September 1998? Years 1996, 1998, 1999, and 2002 were selected as best addressing these two questions.

In situ Octocoral Counts

In situ data were collected from 15 of the available 107 CRMP stations. *In situ* data collection included video data collection according to CRMP protocol and quantification of octocoral colonies within the same area sampled by the video camera. Using a hand-held framing device that replicated the video camera's field of view, the number of *Gorgonia ventalina* in three size classes, and the number of "other octocorals" in three size classes were collected. Size classes are defined as <10cm, 10-40cm, >40cm (short, medium and tall respectively). The scleraxonian category was not included in the *in situ* survey and video-derived scleraxonian data were not included in direct comparisons.

Video-Derived Octocoral Counts

Abundance estimation methods employed in this survey are based on elements most reliably drawn from CRMP videotape. Video was played on a color monitor and the number of octocorals in view was tallied. Only colonies with their holdfast obviously within the field of view were counted. Each station was counted twice using the census method outlined below. Video-derived abundance data are labeled by trial number (e.g. trial 1, trial 2). Abundance data were collected for each transect, and analyses applied at the station level (3 transects pooled). The total area sampled by video transects at each station varied from 23.4 m^2 to 30.1 m^2. Density was calculated for each individual station using the "area of video sample" data in Table 1 and is presented as "colonies/m^2".

Several parameters could be consistently quantified using the video data. Various combinations of these factors were tested for feasibility and consistency during real-time data collection. It was possible to reliably count from real-time playback the number of scleraxonians, the number of *Gorgonia ventalina* in the three size classes defined above, and the number of "other octocorals" in those three size classes. The delineations of size class from video are estimates, based on scaling items in the video image (e.g. chain link size and 40 cm average height of camera lens). Specific size classes were selected based on accuracy of determining the height of individuals from real-time playback. The scleraxonian group includes both species found in the sample area, *Erythropodium caribaeorum* and *Briareum asbestinum*.

Comparison of In Situ *and Video Counts*

Bray-Curtis similarity coefficients were calculated for *in situ* versus video-derived octocoral density (Bray & Curtis 1957). The similarity matrix was based on six categories: short, medium and tall *Gorgonia ventalina*, and short, medium and tall "other octocoral". The similarity matrix was calculated with no transformation and no standardization. These similarity coefficients, which were compared with average densities of all Octocorallia, are calculated for *in situ* data versus trial 1 data, *in situ* data versus trial 2 data, and trial 1 data versus trial 2 data.

Statistical Treatment of Video-Derived Abundance Data

Bray-Curtis similarity coefficients were calculated for video-derived octocoral abundance trial 1 versus trial 2. The similarity matrix was based on seven abundance categories: scleraxonian, short, medium and tall *Gorgonia ventalina*, and short, medium and tall "other octocoral". The similarity matrix was calculated with no transformation and no standardization.

Using guidelines based on *log* standard deviation and *log* mean specified in Clarke and Warwick (2001), a fourth-root transformation was selected as the appropriate transformation to normalize abundance data. This moderate transformation diminished the importance of abundant individuals (e.g. the profusion of medium "other octocoral"). The fourth-root transformation applied to raw abundance, not density, allowed application of the paired samples t-Test.

A two-tailed paired sample t-Test (Byrkit 1975) was used to test the hypothesis that changes in density over time were significantly different. Data were arranged into a matrix of ten geographical groups by 13 biotic groups. The ten geographical groups were: patch, shallow, and deep reefs in the upper keys and hardbottom, patch, shallow, and deep reefs in the middle keys, all upper keys stations, all middle keys stations, and all 28 stations. The 13 biotic groups were short, medium and tall *Gorgonia ventalina*, short, medium, and tall "other octocoral," Scleraxonia, total *G. ventalina*, total "other octocoral," total short colonies, total medium colonies, total tall colonies, and total all Octocorallia. The null hypothesis was H_o: $\mu_{year\ 1} = \mu_{year\ 2}$. The alternative hypothesis was H_a: $\mu_{year1} \neq \mu_{year\ 2}$. This analysis was conducted for four intervals at α=0.05.

H_o: $\mu_{1996} = \mu_{1998}$ versus H_a: $\mu_{1996} \neq \mu_{1998}$

H_o: $\mu_{1998} = \mu_{1999}$ versus H_a: $\mu_{1998} \neq \mu_{1999}$

H_o: $\mu_{1999} = \mu_{2002}$ versus H_a: $\mu_{1999} \neq \mu_{2002}$

H_o: $\mu_{1996} = \mu_{2002}$ versus H_a: $\mu_{1996} \neq \mu_{2002}$

The Chi-square test (Byrkit 1975) was used to test the hypothesis that the distribution of octocorals changed over space and time. The earlier data were defined as the "expected" distribution. For example, data from 1998 were fit to the distributions observed in 1996. The null hypothesis was that the two distributions were indistinguishable, H_o: $\chi_{1996} = \chi_{1998}$. Two analyses were conducted at α=0.01 among eight geographical groups in four intervals. The eight geographical groups were: patch, shallow, and deep reefs in the upper keys and hardbottom, patch, shallow, and deep reefs in the middle keys, and all 28 stations. The first Chi-square analyses tested change in the distribution of short, medium and tall *Gorgonia ventalina*, and short, medium and tall "other octocoral". The second Chi-square analyses tested the distribution of each biotic group among every station in each geographic group. The biotic groups were short, medium and tall *G. ventalina*, short, medium, and tall "other octocoral," Scleraxonia, total *G. ventalina*, total "other octocoral," total short colonies, total medium colonies, total tall colonies, and total all Octocorallia.

Statistical Treatments of Comparative Study of Video-Derived Abundance and Percent Cover

Assessment of the correlation between abundance and octocoral percent cover was conducted using three different analyses. First, Spearman's ρ test for independence applied Spearman's rank correlation to each single biotic category and to octocoral percent cover (S-Plus6 2001). In addition to ranking the correlations between abundance and percent cover, Spearman's ρ test for independence tests the null hypothesis that abundance and percent cover are mutually uncorrelated. Those significant ρ values calculated with this test are useful as discrete quantities. For the purposes of evaluating correlation between abundance and percent cover, only the rank order is considered. The second and third assessment of the correlation between abundance and octocoral percent cover was conducted using the BIOENV routine (Clarke & Warwick 2001). The first BIOENV analysis, BIOENV-Spearman, quantified the correlation between all possible combinations of abundance and octocoral percent cover data using Spearman's ρ rank correlation. The second BIOENV analysis, BIOENV-Kendall, quantified the correlation between every possible combination of abundance and percent cover using Kendall's τ rank correlation (Clarke & Warwick 2001). Both BIOENV routines were run using non-transformed data. Both BIOENV routines were run once with the seven biotic categories, and once with the single category "Total All Octocorallia."

3. RESULTS

IN SITU VERSUS VIDEO DATA

Octocoral abundance data collected *in situ* and from video transects were compared for 15 stations. *In situ* data, video data, and site descriptions are presented in APPENDIX I a, b. Bray-Curtis similarity coefficients were plotted against density of all Octocorallia in Figure 4.

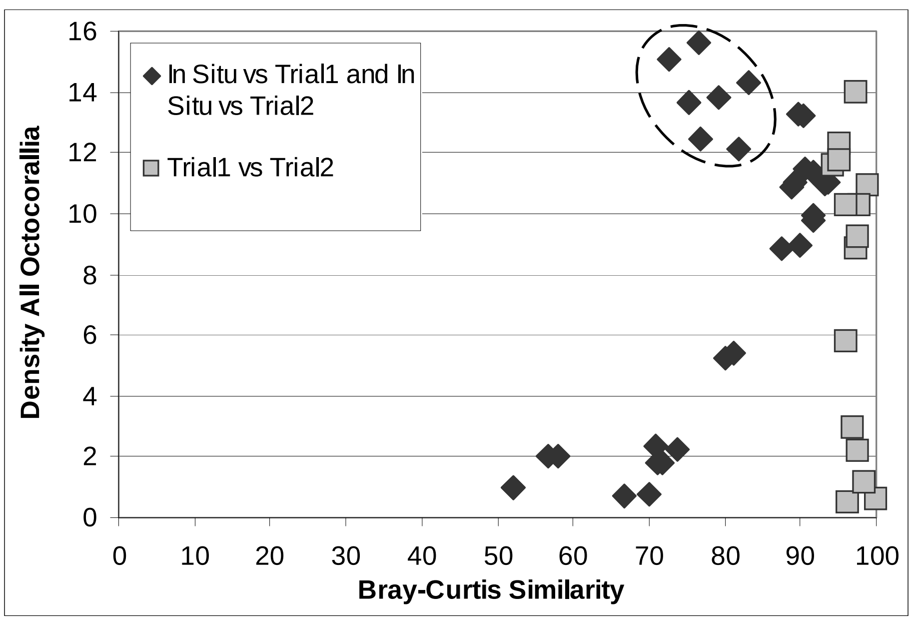

Figure 4. Bray-Curtis similarity coefficients for comparison of results between *in situ* and video-derived estimates of octocoral density, as well as for comparisons of repeated video trials.

Two features were immediately evident. First, the trial 1 versus trial 2 similarity coefficients are greater than 95% at all density values. This shows that the video-derived abundance measures were density-independent and highly repeatable. Second, *in situ* versus video similarity coefficients display attributes of both density-dependence and density-independence. The extreme lower and upper *in situ* versus video points have the character of density-independent dissimilarity because density is nearly unchanged as similarity fluctuates up to 20%. The eight anomalous points (two points are identical) representing higher densities are from one site, Alligator Shallow. Most of the data points for the *in situ* versus video comparison (66%) display a prominent linear density-dependent similarity trend.

VIDEO-DERIVED ABUNDANCE

All data from the video-derived octocoral abundance survey are presented in Appendix II. Comparisons were made between video-derived octocoral abundance trials 1 and 2 using Bray-Curtis similarity coefficients. Results of the Bray-Curtis similarity matrices are presented in Appendix III and summarized in Table 2. Similarity coefficients are plotted against Octocorallia density in Figure 5. All similarity coefficients exceeded 90%,

Table 2. Maximum and minimum Bray-Curtis similarity coefficients for video-derived abundance trials 1 and 2.

	1996	1998	1999	2002
Maximum	98.8	99.1	99.4	99.0
Minimum	93.7	95.0	92.8	91.6

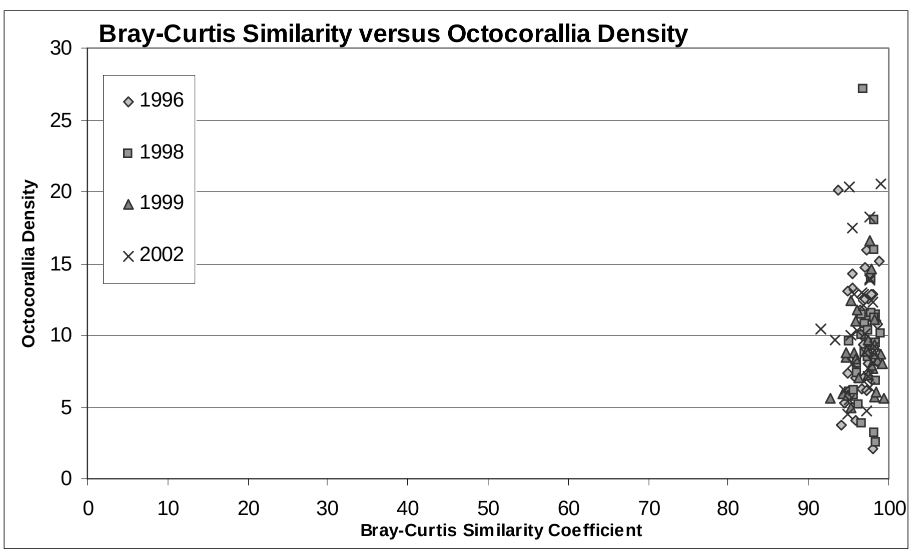

Figure 5. Bray-Curtis similarity coefficients for video-derived abundance trials 1 and 2, compared with octocoral density.

demonstrating that abundance data collected from video transects are consistent and density-independent.

Average densities of *Gorgonia ventalina* and Scleraxonia were consistently about one colony/m^2 (Fig. 6). Other octocoral as a group averaged 7-9 colonies/m^2 (Fig. 6). When summarized by height, (Fig. 7), short and tall averaged about 1-2 colonies/m^2, while colonies between 10 and 40 cm in height consistently averaged about 6 colonies/m^2. The

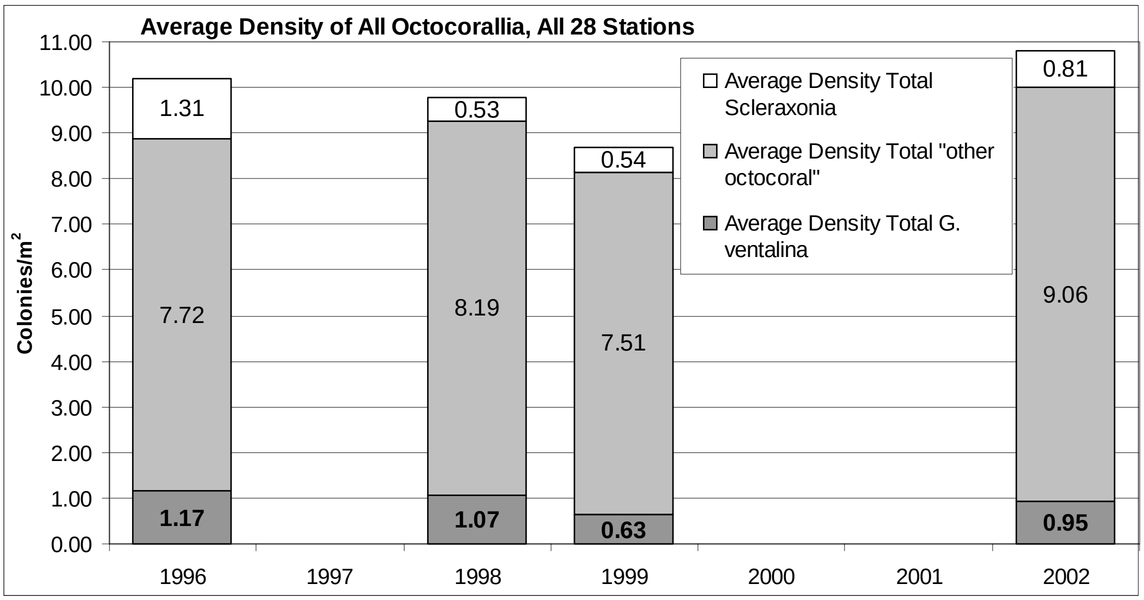

Figure 6. Average density of Octocorallia from the 28 stations examined.

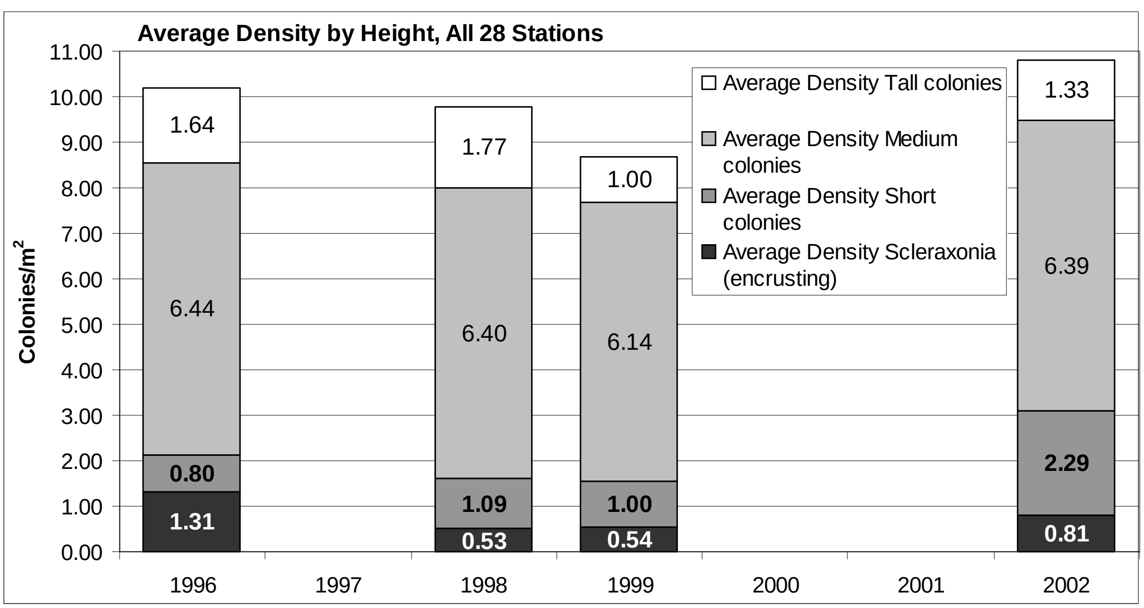

Figure 7. Average density of Octocorallia, summarized by colony height, from the 28 stations examined.

minimum possible density value is approximately 0.05 colonies/m^2 obtained from one colony at one station.

The average density of all Octocorallia surveyed was relatively stable fluctuating between a minimum density of 8.7 colonies/m^2 in 1998, and a maximum density of 10.8 colonies/m^2 in 2002 (Fig. 6). Scleraxonia and *Gorgonia ventalina* densities were more variable. The maximum average density of Scleraxonia was 1.3 colonies/m^2 in 1996, and the minimum density, 0.5 colonies/m^2, was found in both 1998 and 1999. The maximum average density of *G. ventalina* was 1.2 colonies/m^2 in 1996, and the minimum density was approximately half, 0.6 colonies/m^2, in 1999. The average density of medium individuals was remarkably stable in all years (Fig. 7). Finally, the density of short individuals in 2002 was more than double any other year.

Abundance of octocorals at the 28 stations examined is highly variable (Appendix II and IV) and the assemblage can be more thoroughly examined by splitting the 28 stations into smaller groups. Multi-dimensional scaling by region shows groups that are generally consistent within habitat type (Figures 8 and 9). These analyses confirm that habitat type is a meaningful descriptor of the octocoral assemblages in this study. Stress values of 0.03 and 0.09 indicate that the two-dimensional plots are good representations of multi-dimensional data, with no real chance of misinterpretation (Clarke & Warwick 2001).

Figure 8. MDS average abundance at upper keys stations, by habitat type.

Figure 9. MDS average abundance at middle keys stations, by habitat type.

Average *Gorgonia ventalina* density falls into three relatively distinct geographic groups (Table 3, Fig. 10). *G. ventalina* are uncommon at middle keys hardbottom stations. Deep stations and middle keys shallow stations form an intermediate group. Patch reefs and upper keys shallow reef stations have the highest abundances. The latter group represents 78% of all *G. ventalina* seen in the study.

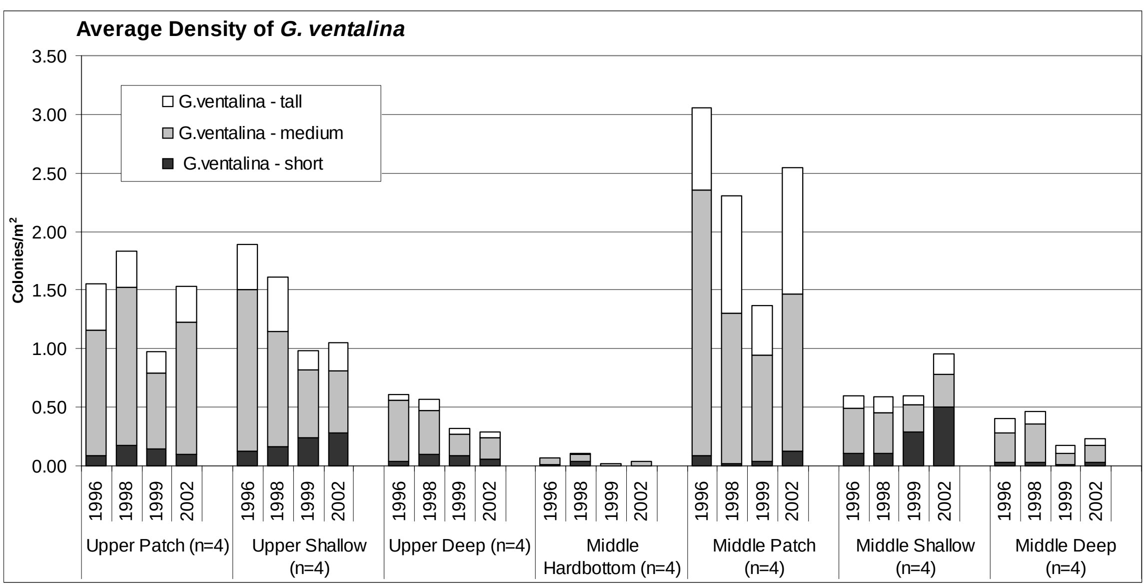

Figure 10. Average density of *G. ventalina*, by habitat type.

Average “other octocoral” density is relatively uniform across all seven geographic groups (Fig. 11). This uniformity is driven by the homogeneity of medium “other octocoral” (Table 3). In each group, the average density of short “other octocorals” was highest in 2002.

Average density of tall “other octocorals” at patch reefs was approximately double the density found on any other habitat type.

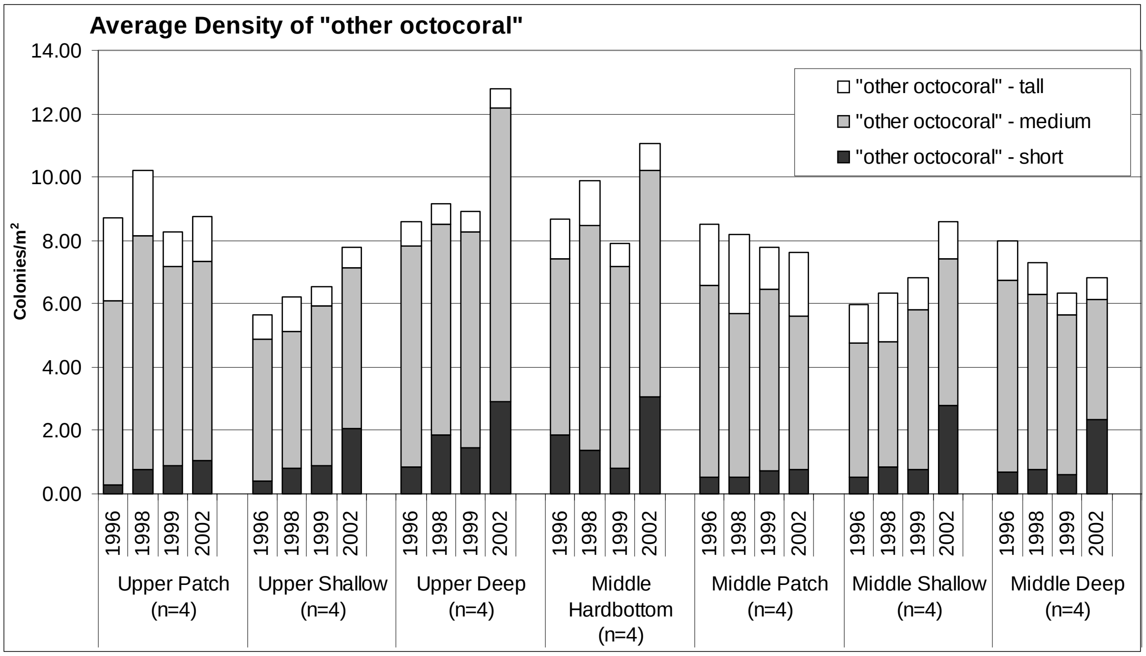

Figure 11. Average density of “other octocoral”, by habitat type.

Figure 12 depicts average density of the three main biotic categories among the seven geographic groups. Overall, the distributions seen in Figure 12 are a reflection of

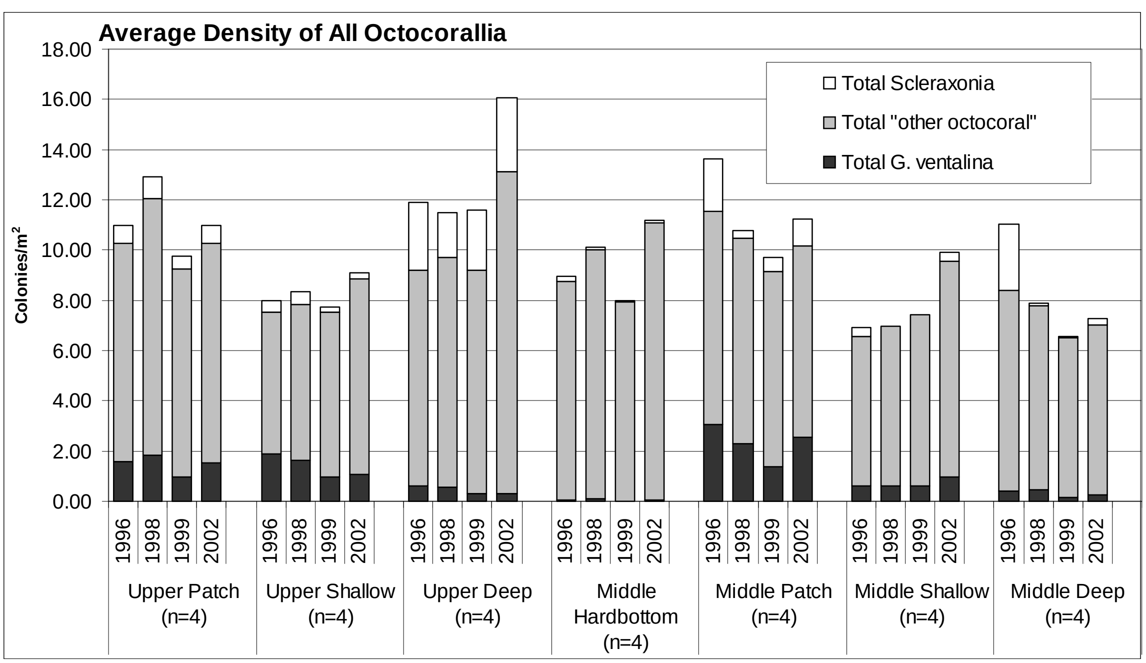

Figure 12. Average density of the three main biotic categories, by habitat type.

medium “other octocoral” density (Fig. 11). This reinforces the suggestion that distribution of medium “other octocoral” is independent of geographic group; the other six biotic categories display higher dependence on geography and habitat type.

Table 3. Average octocoral density by habitat type and region.

Average Density	Year	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total *G. ventalina*	Total "other octocoral"	Total Scleraxonia	Total All Octocorallia
Upper Patch (n=4)	1996	0.09	1.07	0.39	0.29	5.79	2.62	1.55	8.70	0.75	10.99
	1998	0.18	1.35	0.31	0.79	7.37	2.07	1.83	10.23	0.85	12.91
	1999	0.15	0.64	0.18	0.90	6.27	1.12	0.97	8.29	0.53	9.79
	2002	0.09	1.13	0.31	1.07	6.26	1.44	1.53	8.76	0.67	10.97
Upper Shallow (n=4)	1996	0.13	1.37	0.39	0.42	4.49	0.74	1.89	5.64	0.44	7.97
	1998	0.17	0.98	0.46	0.80	4.33	1.07	1.61	6.21	0.53	8.34
	1999	0.24	0.59	0.16	0.90	5.04	0.61	0.98	6.55	0.20	7.73
	2002	0.28	0.53	0.24	2.07	5.07	0.67	1.05	7.80	0.25	9.10
Upper Deep (n=4)	1996	0.04	0.51	0.05	0.85	6.98	0.75	0.61	8.58	2.72	11.91
	1998	0.10	0.37	0.10	1.86	6.63	0.67	0.57	9.17	1.74	11.47
	1999	0.09	0.19	0.05	1.47	6.81	0.63	0.32	8.91	2.38	11.61
	2002	0.06	0.18	0.05	2.90	9.28	0.62	0.29	12.80	2.95	16.05
Middle Hardbottom (n=4)	1996	0.01	0.06	0.00	1.85	5.56	1.25	0.07	8.66	0.20	8.93
	1998	0.04	0.06	0.01	1.39	7.09	1.41	0.11	9.89	0.10	10.10
	1999	0.00	0.02	0.00	0.81	6.37	0.73	0.02	7.91	0.03	7.96
	2002	0.00	0.04	0.00	3.05	7.16	0.84	0.04	11.05	0.10	11.19
Middle Patch (n=4)	1996	0.09	2.26	0.71	0.52	6.05	1.94	3.06	8.51	2.07	13.64
	1998	0.02	1.28	1.00	0.54	5.16	2.48	2.30	8.18	0.30	10.78
	1999	0.03	0.91	0.42	0.72	5.73	1.34	1.37	7.79	0.55	9.71
	2002	0.13	1.33	1.08	0.76	4.86	2.00	2.55	7.62	1.07	11.24
Middle Shallow (n=4)	1996	0.11	0.38	0.11	0.54	4.22	1.19	0.60	5.96	0.37	6.92
	1998	0.11	0.34	0.14	0.83	3.96	1.56	0.59	6.35	0.04	6.99
	1999	0.29	0.23	0.08	0.78	5.05	0.97	0.60	6.80	0.00	7.40
	2002	0.50	0.28	0.17	2.76	4.67	1.16	0.95	8.59	0.36	9.90
Middle Deep (n=4)	1996	0.03	0.25	0.13	0.68	6.08	1.23	0.41	7.98	2.66	11.05
	1998	0.03	0.32	0.11	0.77	5.53	1.00	0.46	7.30	0.14	7.90
	1999	0.01	0.10	0.06	0.61	5.03	0.69	0.17	6.33	0.06	6.56
	2002	0.03	0.14	0.06	2.35	3.80	0.65	0.23	6.80	0.24	7.27
All Upper Stations (n=12)	1996	0.09	0.99	0.28	0.52	5.75	1.37	1.35	7.64	1.30	10.29
	1998	0.15	0.90	0.29	1.15	6.11	1.27	1.34	8.53	1.04	10.91
	1999	0.16	0.47	0.13	1.09	6.04	0.78	0.76	7.91	1.04	9.71
	2002	0.14	0.61	0.20	2.01	6.87	0.91	0.96	9.79	1.29	12.04
All Middle Stations (n=16)	1996	0.06	0.74	0.24	0.90	5.48	1.40	1.03	7.78	1.32	10.13
	1998	0.05	0.50	0.31	0.89	5.43	1.61	0.87	7.93	0.15	8.94
	1999	0.08	0.31	0.14	0.73	5.55	0.93	0.54	7.21	0.16	7.91
	2002	0.17	0.45	0.33	2.23	5.12	1.16	0.94	8.52	0.44	9.90
All Stations (n=28)	1996	0.07	0.85	0.26	0.73	5.60	1.39	1.17	7.72	1.31	10.20
	1998	0.09	0.67	0.30	1.00	5.72	1.47	1.07	8.19	0.53	9.78
	1999	0.12	0.38	0.14	0.88	5.76	0.87	0.63	7.51	0.54	8.68
	2002	0.16	0.52	0.27	2.14	5.87	1.05	0.95	9.06	0.81	10.82

Some of the inter-annual changes observed in Figures 10, 11, and 12 are of relatively large magnitude. Yet, the average of each geographic group masks much of the station-level variability and hinders assessment of significance of change. In order to understand the character of the data more fully, descriptive statistics were calculated, including mean, standard error, median, mode, standard deviation, sample variance, kurtosis, skewness, range, minimum, maximum, sum, count, and 95% confidence level. Descriptive statistics for each habitat type and for all stations are presented for 1996, 1998, 1999, 2002, and all years (Appendix IVa, b, c, d, e) respectively. Variance is relatively high for many of the biotic categories. This property is typical of ecological data and prevents application of parametric analyses without data transformation (Clarke & Warwick 2001).

Hypothesis testing for significant change over time was conducted using a two-tailed paired sample t-Test. I compared octocoral abundance data over four intervals: 1998 versus 1996, 1999 versus 1998, 2002 versus 1999, and 2002 versus 1996. For each interval, I compared abundances of octocorals in 10 geographical categories and 13 biotic groups.

First, t-Tests were used to compare 1996 and 1998 abundance data. Of 130 possible outcomes, 16 were significantly different (Table 4). Ten of the declines in abundance and four increases in abundance were significant (Table 5). About half of the biotic groups in middle keys patch reef stations changed significantly, and five of the seven significant outcomes were declines in abundance. Also notable are 60 to 90 percent declines in Scleraxonia abundance (Table 5).

Second, t-Tests were used to compare 1998 and 1999 abundance data. Of the 130 possible outcomes, 29 were significantly different (Table 6). Twenty-six of the declines in abundance and three of the increases were significant (Table 7). Nearly all significant changes in the year following hurricane Georges were abundance decreases. More than half of the 26 significant declines occurred in a tall biotic group. Every significant increase occurred in short or encrusting biotic groups. Again, about half of the biotic groups in middle keys patch reef stations changed significantly, and most of the seven significant outcomes were declines in abundance (Table 7).

Third, t-Tests were used to compare 1999 and 2002 abundance data. Of the 130 possible outcomes, 28 were significantly different (Table 8). One of the declines in abundance and 27 of the increases were significant (Table 9). Significant increases in short biotic groups were approximately two to five-fold. Again, about half of the biotic groups in middle keys patch reef stations changed significantly. In the 1999 to 2002 interval, every middle keys patch reef change was an increase in abundance (Table 9).

Fourth, t-Tests were used to compare 1996 and 2002 abundance data. Of the 130 possible outcomes, 38 were significantly different (Table 10). Fourteen of the declines in abundance and 24 of the increases were significant (Table 11). Among short biotic groups, all of the 15 significant changes were increases. Conversely, among tall biotic groups, all of the eight significant changes were decreases (Table 11).

Table 4. *p*-values for two-tailed paired sample t-Test, testing the assumption that abundances are equal between 1996 and 1998. Shaded blocks indicate significant differences (α=0.05).

Test for change 1996 versus 1998	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total *G. ventalina*	Total "other octocoral"	Total Scleraxonia	Total short colonies	Total medium colonies	Total tall colonies	Total All Octocorallia
Upper Patch	0.137	0.454	0.097	0.189	0.123	0.147	0.639	0.264	0.865	**0.048**	0.070	**0.017**	0.307
Upper Shallow	0.699	**0.049**	0.928	0.258	0.524	0.239	0.221	0.605	0.531	0.676	**0.048**	0.459	0.904
Upper Deep	0.347	0.582	0.786	0.250	0.556	0.372	0.695	0.930	0.106	0.114	0.365	0.574	0.500
Middle Hardbottom	0.391	0.675	0.391	0.114	0.295	0.644	0.794	0.432	0.223	0.846	0.358	0.282	0.436
Middle Patch	0.171	**0.043**	0.132	0.769	0.143	**0.011**	**0.047**	0.386	**0.001**	0.186	**0.010**	**0.005**	**0.018**
Middle Shallow	0.530	0.628	0.479	0.121	0.800	0.144	0.833	0.279	0.111	0.993	0.925	0.844	0.489
Middle Deep	0.530	0.248	0.292	0.908	0.131	0.378	0.346	0.267	0.106	0.496	0.762	0.202	0.151
All Upper Stations	0.366	0.241	0.607	**0.015**	0.936	0.743	0.502	0.450	0.947	**0.023**	0.444	0.530	0.859
All Middle Stations	0.162	0.185	0.774	0.581	0.829	0.286	0.533	0.435	**0.000**	0.291	0.465	0.424	0.225
All Stations	0.617	0.069	0.906	**0.022**	0.821	0.516	0.354	0.265	**0.004**	0.426	0.288	0.828	0.316

Table 5. Summary of significant two-tailed paired sample t-Test results where abundance in 1996 ≠ 1998 at α=0.05, combined with relative magnitude of change from 1996 to 1998.

Station Group	Biotic Category	Direction of change	Relative Magnitude of Change	p-value (α=0.05)
Upper Patch	Total short colonies	Increase	156%	**0.048**
Upper Patch	Total tall colonies	Decrease	21%	**0.017**
Upper Shallow	*G.ventalina* - medium	Decrease	28%	**0.049**
Upper Shallow	Total medium colonies	Decrease	9%	**0.048**
Middle Patch	*G.ventalina* - medium	Decrease	44%	**0.043**
Middle Patch	"other octocoral" - tall	Increase	28%	**0.011**
Middle Patch	Total *G. ventalina*	Decrease	25%	**0.047**
Middle Patch	Total Scleraxonia	Decrease	85%	**0.001**
Middle Patch	Total medium colonies	Decrease	23%	**0.010**
Middle Patch	Total tall colonies	Increase	32%	**0.005**
Middle Patch	Total All Octocorallia	Decrease	21%	**0.018**
All Upper Stations	"other octocoral" - short	Increase	122%	**0.015**
All Upper Stations	Total short colonies	Increase	115%	**0.023**
All Middle Stations	Total Scleraxonia	Decrease	89%	**0.000**
All Stations	"other octocoral" - short	Increase	36%	**0.022**
All Stations	Total Scleraxonia	Decrease	60%	**0.004**

Table 6. *p*-values for two-tailed paired sample t-Test, testing the assumption that abundances are equal between 1998 and 1999. Shaded blocks indicate significant differences (α=0.05).

Test for change 1998 versus 1999	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total *G. ventalina*	Total "other octocoral"	Total Scleraxonia	Total short colonies	Total medium colonies	Total tall colonies	Total All Octocorallia
Upper Patch	0.769	0.088	**0.016**	0.227	0.860	**0.004**	**0.015**	0.488	0.263	0.376	0.158	**0.000**	0.213
Upper Shallow	0.338	**0.012**	**0.014**	0.363	0.299	**0.015**	0.069	0.478	0.093	0.190	0.993	**0.000**	0.848
Upper Deep	0.774	0.722	0.451	0.906	0.583	0.972	0.780	0.689	0.153	0.979	0.498	0.421	0.760
Middle Hardbottom	0.391	0.424	0.391	**0.043**	**0.032**	**0.050**	0.602	**0.014**	0.215	0.097	0.536	0.051	**0.015**
Middle Patch	0.624	**0.023**	**0.010**	0.234	0.065	**0.000**	**0.008**	0.089	**0.035**	0.991	0.432	**0.000**	**0.037**
Middle Shallow	**0.019**	0.165	0.711	0.608	0.284	**0.003**	0.973	0.517	0.391	**0.036**	0.591	0.639	0.540
Middle Deep	0.848	0.811	0.391	0.600	0.580	0.272	0.901	0.249	0.238	0.736	0.673	0.142	**0.031**
All Upper Stations	0.356	0.300	0.563	0.205	0.306	**0.006**	0.232	0.684	0.210	0.138	0.890	0.071	0.787
All Middle Stations	0.692	0.856	0.168	0.730	0.383	**0.000**	0.822	0.346	0.197	0.793	0.775	**0.000**	0.115
All Stations	0.424	0.421	0.160	0.570	0.166	**0.000**	0.380	0.817	0.079	0.332	0.904	**0.000**	0.236

Table 7. Summary of significant two-tailed paired sample t-Test results where abundance in 1998 ≠ 1999 at α=0.05, combined with relative magnitude of change from 1998 to 1999.

Station Group	Biotic Category	Direction of change	Relative Magnitude of Change	p-value (α=0.05)
Upper Patch	*G.ventalina* - tall	Decrease	41%	**0.016**
Upper Patch	"other octocoral" - tall	Decrease	46%	**0.004**
Upper Patch	Total *G. ventalina*	Decrease	47%	**0.015**
Upper Patch	Total tall colonies	Decrease	45%	**0.000**
Upper Shallow	*G.ventalina* - medium	Decrease	41%	**0.012**
Upper Shallow	*G.ventalina* - tall	Decrease	65%	**0.014**
Upper Shallow	"other octocoral" - tall	Decrease	44%	**0.015**
Upper Shallow	Total tall colonies	Decrease	50%	**0.000**
Middle Hardbottom	"other octocoral" - short	Decrease	42%	**0.043**
Middle Hardbottom	"other octocoral" - medium	Decrease	10%	**0.032**
Middle Hardbottom	"other octocoral" - tall	Decrease	48%	**0.050**
Middle Hardbottom	Total "other octocoral"	Decrease	20%	**0.014**
Middle Hardbottom	Total All Octocorallia	Decrease	21%	**0.015**
Middle Patch	*G.ventalina* - medium	Decrease	28%	**0.023**
Middle Patch	*G.ventalina* - tall	Decrease	58%	**0.010**
Middle Patch	"other octocoral" - tall	Decrease	46%	**0.000**
Middle Patch	Total *G. ventalina*	Decrease	40%	**0.008**
Middle Patch	Total Scleraxonia	Increase	81%	**0.035**
Middle Patch	Total tall colonies	Decrease	49%	**0.000**
Middle Patch	Total All Octocorallia	Decrease	10%	**0.037**
Middle Shallow	*G.ventalina* - short	Increase	169%	**0.019**
Middle Shallow	"other octocoral" - tall	Decrease	38%	**0.003**
Middle Shallow	Total short colonies	Increase	14%	**0.036**
Middle Deep	Total All Octocorallia	Decrease	17%	**0.031**
All Upper Stations	"other octocoral" - tall	Decrease	38%	**0.006**
All Middle Stations	"other octocoral" - tall	Decrease	42%	**0.000**
All Middle Stations	Total tall colonies	Decrease	44%	**0.000**
All Stations	"other octocoral" - tall	Decrease	41%	**0.000**
All Stations	Total tall colonies	Decrease	43%	**0.000**

Table 8. *p*-values for two-tailed paired sample t-Test, testing the assumption that abundances are equal between 1999 and 2002. Shaded blocks indicate significant differences (α=0.05).

Test for change 1999 versus 2002	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total *G. ventalina*	Total "other octocoral"	Total Scleraxonia	Total short colonies	Total medium colonies	Total tall colonies	Total All Octocorallia
Upper Patch	0.404	0.051	**0.004**	0.161	0.600	0.300	**0.014**	0.948	0.439	0.880	0.268	**0.010**	0.526
Upper Shallow	0.934	0.138	0.658	0.108	0.811	0.933	0.724	0.086	0.575	0.314	0.131	0.654	0.117
Upper Deep	0.362	0.440	0.507	**0.023**	0.081	0.968	0.569	**0.048**	0.341	0.822	0.961	0.476	0.118
Middle Hardbottom	no colo	0.304	no colo	0.222	0.223	0.265	0.304	0.158	0.721	0.203	0.431	0.238	0.145
Middle Patch	0.111	**0.012**	**0.038**	0.909	0.181	**0.011**	**0.009**	0.614	**0.023**	0.120	0.758	**0.002**	**0.016**
Middle Shallow	0.153	0.665	0.199	0.175	0.505	0.261	0.151	0.611	0.184	**0.031**	0.453	0.055	0.230
Middle Deep	0.597	0.527	0.391	**0.000**	**0.043**	0.492	0.731	0.427	0.667	0.064	0.189	0.283	0.149
All Upper Stations	0.324	0.271	0.741	**0.003**	0.415	0.462	0.199	**0.030**	0.833	0.337	0.421	0.959	**0.016**
All Middle Stations	**0.037**	0.306	0.390	**0.003**	0.088	**0.022**	0.608	0.136	0.111	**0.000**	0.107	0.086	**0.003**
All Stations	0.227	0.122	0.754	**0.000**	0.439	**0.031**	0.301	**0.011**	0.128	**0.000**	0.083	0.273	**0.000**

Table 9. Summary of significant two-tailed paired sample t-Test results where abundance in 1999 $\neq$ 2002 at α=0.05, combined with relative magnitude of change from 1999 to 2002.

Station Group	Biotic Category	Direction of change	Relative Magnitude of Change	p-value (α=0.05)
Upper Patch	*G.ventalina* - tall	Increase	70%	**0.004**
Upper Patch	Total *G. ventalina*	Increase	58%	**0.014**
Upper Patch	Total tall colonies	Increase	34%	**0.010**
Upper Deep	"other octocoral" - short	Increase	98%	**0.023**
Upper Deep	Total "other octocoral"	Increase	44%	**0.048**
Middle Patch	*G.ventalina* - medium	Increase	46%	**0.012**
Middle Patch	*G.ventalina* - tall	Increase	157%	**0.038**
Middle Patch	"other octocoral" - tall	Increase	50%	**0.011**
Middle Patch	Total *G. ventalina*	Increase	86%	**0.009**
Middle Patch	Total Scleraxonia	Increase	96%	**0.023**
Middle Patch	Total tall colonies	Increase	75%	**0.002**
Middle Patch	Total All Octocorallia	Increase	16%	**0.016**
Middle Shallow	Total short colonies	Increase	204%	**0.031**
Middle Deep	"other octocoral" - short	Increase	287%	**0.000**
Middle Deep	"other octocoral" - medium	Decrease	25%	**0.043**
All Upper Stations	"other octocoral" - short	Increase	85%	**0.003**
All Upper Stations	Total "other octocoral"	Increase	24%	**0.030**
All Upper Stations	Total All Octocorallia	Increase	24%	**0.016**
All Middle Stations	*G.ventalina* - short	Increase	97%	**0.037**
All Middle Stations	"other octocoral" - short	Increase	206%	**0.003**
All Middle Stations	"other octocoral" - tall	Increase	25%	**0.022**
All Middle Stations	Total short colonies	Increase	195%	**0.000**
All Middle Stations	Total All Octocorallia	Increase	25%	**0.003**
All Stations	"other octocoral" - short	Increase	142%	**0.000**
All Stations	"other octocoral" - tall	Increase	21%	**0.031**
All Stations	Total "other octocoral"	Increase	21%	**0.011**
All Stations	Total short colonies	Increase	130%	**0.000**
All Stations	Total All Octocorallia	Increase	25%	**0.000**

Table 10. *p*-values for two-tailed paired sample t-Test, testing the assumption that abundances are equal between 1996 and 2002. Shaded blocks indicate significant differences (α=0.05).

Test for change 1996 versus 2002	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total *G. ventalina*	Total "other octocoral"	Total Scleraxonia	Total short colonies	Total medium colonies	Total tall colonies	Total All Octocorallia
Upper Patch	0.554	0.539	0.362	**0.003**	0.209	**0.019**	0.969	0.820	0.593	**0.033**	0.241	**0.019**	0.745
Upper Shallow	0.713	0.059	0.335	**0.032**	0.244	0.536	0.103	0.108	0.660	0.087	0.154	0.224	0.289
Upper Deep	0.391	0.554	1.000	**0.007**	**0.031**	0.549	0.742	**0.004**	0.885	**0.026**	0.752	0.839	**0.022**
Middle Hardbottom	0.391	0.259	no colo	0.669	0.213	0.100	0.283	**0.030**	0.418	0.784	0.501	0.109	**0.019**
Middle Patch	0.184	0.053	0.254	0.217	0.235	0.757	0.097	0.300	**0.027**	**0.046**	**0.016**	0.207	0.085
Middle Shallow	0.052	0.279	0.939	**0.019**	0.301	0.997	0.114	0.060	0.397	**0.001**	0.724	0.948	0.069
Middle Deep	1.000	0.640	0.298	**0.000**	0.136	**0.026**	0.908	0.412	**0.000**	0.185	0.240	**0.035**	0.169
All Upper Stations	0.398	0.077	0.326	**0.000**	**0.007**	**0.028**	0.204	**0.008**	0.595	**0.000**	0.323	0.065	**0.047**
All Middle Stations	0.223	0.068	0.689	**0.001**	0.816	**0.023**	0.980	0.226	**0.002**	**0.003**	0.104	0.108	0.942
All Stations	0.129	**0.010**	0.282	**0.000**	0.334	**0.001**	0.395	**0.008**	**0.005**	**0.000**	0.067	**0.014**	0.277

Table 11. Summary of significant two-tailed paired sample t-Test results where abundance in 1996 ≠ 2002 at α=0.05, combined with relative magnitude of change from 1996 to 2002.

Station Group	Biotic Category	Direction of change	Relative Magnitude of Change	p-value (α=0.05)
Upper Patch	"other octocoral" - short	Increase	271%	**0.003**
Upper Patch	"other octocoral" - tall	Decrease	45%	**0.019**
Upper Patch	Total short colonies	Increase	209%	**0.033**
Upper Patch	Total tall colonies	Decrease	42%	**0.019**
Upper Shallow	"other octocoral" - short	Increase	397%	**0.032**
Upper Deep	"other octocoral" - short	Increase	242%	**0.007**
Upper Deep	"other octocoral" - medium	Increase	33%	**0.031**
Upper Deep	Total "other octocoral"	Increase	49%	**0.004**
Upper Deep	Total short colonies	Increase	232%	**0.026**
Upper Deep	Total All Octocorallia	Increase	35%	**0.022**
Middle Hardbottom	Total "other octocoral"	Increase	28%	**0.030**
Middle Hardbottom	Total All Octocorallia	Increase	25%	**0.019**
Middle Patch	Total Scleraxonia	Decrease	48%	**0.027**
Middle Patch	Total short colonies	Increase	48%	**0.046**
Middle Patch	Total medium colonies	Decrease	26%	**0.016**
Middle Shallow	"other octocoral" - short	Increase	409%	**0.019**
Middle Shallow	Total short colonies	Increase	402%	**0.001**
Middle Deep	"other octocoral" - short	Increase	248%	**0.000**
Middle Deep	"other octocoral" - tall	Decrease	47%	**0.026**
Middle Deep	Total Scleraxonia	Decrease	91%	**0.000**
Middle Deep	Total tall colonies	Decrease	47%	**0.035**
All Upper Stations	"other octocoral" - short	Increase	289%	**0.000**
All Upper Stations	"other octocoral" - medium	Increase	19%	**0.007**
All Upper Stations	"other octocoral" - tall	Decrease	34%	**0.028**
All Upper Stations	Total "other octocoral"	Increase	28%	**0.008**
All Upper Stations	Total short colonies	Increase	258%	**0.000**
All Upper Stations	Total All Octocorallia	Increase	17%	**0.047**
All Middle Stations	"other octocoral" - short	Increase	149%	**0.001**
All Middle Stations	"other octocoral" - tall	Decrease	17%	**0.023**
All Middle Stations	Total Scleraxonia	Decrease	67%	**0.002**
All Middle Stations	Total short colonies	Increase	151%	**0.003**
All Stations	*G.ventalina* - medium	Decrease	39%	**0.010**
All Stations	"other octocoral" - short	Increase	191%	**0.000**
All Stations	"other octocoral" - tall	Decrease	24%	**0.001**
All Stations	Total "other octocoral"	Increase	17%	**0.008**
All Stations	Total Scleraxonia	Decrease	39%	**0.005**
All Stations	Total short colonies	Increase	185%	**0.000**
All Stations	Total tall colonies	Decrease	19%	**0.014**

Chi-square tests complement the t-Tests. Paired sample t-Tests tested the equality of the average density between years. Within each class, Chi-square tested the density distribution patterns between years. Analyses presented in Table 12 tested the distribution of sizes (short, medium, tall). The null hypothesis is that the distribution of sizes is indistinguishable between years. When the distribution is significantly different, abundance of one or more of the three size classes may be significantly different. Analyses presented in Table 13 test the distribution of one biotic category among all stations in a habitat type. The null hypothesis is that the distribution is indistinguishable between years. When the distribution is significantly different, abundance at one or more of the stations may be significantly different. Chi-square is inapplicable when the "actual" and "expected" distributions include any zero values. The notation "NA" denotes these cases.

Table 12. Chi-square test of change in octocoral distribution by size class (α=0.01). Shading indicates significant changes.

Chi -square Change in Average Distribution (α=0.01)		Short-Medium-Tall *G. ventalina*	Short-Medium-Tall "other octocoral"
Upper Patch Stations	chi 98 vs. 96	**0.003**	**0.000**
	chi 99 vs. 98	0.095	**0.000**
	chi 02 vs. 99	**0.004**	**0.008**
	chi 02 vs. 96	0.302	**0.000**
Upper Shallow Stations	chi 98 vs. 96	**0.003**	**0.000**
	chi 99 vs. 98	**0.000**	**0.000**
	chi 02 vs. 99	0.073	**0.000**
	chi 02 vs. 96	**0.000**	**0.000**
Upper Deep Stations	chi 98 vs. 96	**0.000**	**0.000**
	chi 99 vs. 98	0.452	**0.010**
	chi 02 vs. 99	0.734	**0.000**
	chi 02 vs. 96	**0.001**	**0.000**
Middle Hard bottom Stations	chi 98 vs. 96	NA	**0.000**
	chi 99 vs. 98	0.318	**0.000**
	chi 02 vs. 99	NA	**0.000**
	chi 02 vs. 96	NA	**0.000**
Middle Patch Stations	chi 98 vs. 96	**0.000**	**0.000**
	chi 99 vs. 98	**0.004**	**0.000**
	chi 02 vs. 99	**0.000**	**0.000**
	chi 02 vs. 96	**0.000**	**0.000**
Middle Shallow Stations	chi 98 vs. 96	0.564	**0.000**
	chi 99 vs. 98	**0.000**	**0.000**
	chi 02 vs. 99	0.148	**0.000**
	chi 02 vs. 96	**0.000**	**0.000**
Middle Deep Stations	chi 98 vs. 96	0.445	0.049
	chi 99 vs. 98	0.318	0.033
	chi 02 vs. 99	0.210	**0.000**
	chi 02 vs. 96	0.536	**0.000**
All 28 Stations	chi 98 vs. 96	**0.005**	0.021
	chi 99 vs. 98	**0.009**	**0.000**
	chi 02 vs. 99	0.033	**0.000**
	chi 02 vs. 96	**0.000**	**0.000**

Distributions of *Gorgonia ventalina* sizes were nearly split between distributions that were indistinguishable and distributions that were significantly different. Middle patch stations were the only location where distributions of *G. ventalina* sizes were significantly different in every interval. The significantly different distributions of *G. ventalina* sizes are clearly driven by different rates of decline 1996 to 1999 and partial recovery by 2002 (Table 3, 5, 7, 9, 11, Fig. 10). Distributions of "other octocoral" sizes were significantly different in 29 of 32 results. It is clear that differences in the distribution of short and medium "other

Table 13. Chi-square change in distribution (α=0.01) of one biotic category over all 4 stations by one habitat type. Shading indicates significant changes.

Chi-square Change in Average Distribution (α=0.01)		*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total G. ventalina	Total Other Octocorals	Total All Octocorals
Upper Patch Stations	chi 98 vs. 96	NA	0.109	0.871	**0.000**	**0.008**	0.038	**0.000**	0.023	**0.001**	**0.000**
	chi 99 vs. 98	NA	0.157	0.823	**0.000**	**0.000**	0.689	**0.000**	0.599	**0.000**	**0.000**
	chi 02 vs. 99	0.357	**0.002**	0.106	0.116	**0.000**	0.017	0.075	0.017	**0.000**	**0.000**
	chi 02 vs. 96	NA	**0.001**	0.398	**0.000**	0.351	0.052	**0.008**	0.026	0.035	**0.002**
Upper Shallow Stations	chi 98 vs. 96	**0.009**	0.271	**0.000**	**0.000**	0.022	**0.002**	NA	0.110	**0.001**	0.041
	chi 99 vs. 98	NA	0.938	0.782	**0.007**	**0.000**	0.663	0.280	0.285	**0.000**	**0.000**
	chi 02 vs. 99	**0.000**	**0.004**	0.769	**0.000**	0.112	0.163	**0.000**	**0.000**	**0.002**	**0.000**
	chi 02 vs. 96	**0.000**	**0.001**	**0.009**	**0.000**	**0.000**	**0.000**	NA	**0.003**	**0.000**	**0.000**
Upper Deep Stations	chi 98 vs. 96	NA	NA	NA	**0.000**	**0.000**	0.234	**0.000**	**0.000**	**0.000**	**0.000**
	chi 99 vs. 98	NA	NA	NA	**0.000**	**0.000**	**0.002**	0.012	NA	**0.000**	**0.000**
	chi 02 vs. 99	NA	0.243	0.295	0.063	**0.000**	0.033	**0.000**	0.184	**0.000**	**0.000**
	chi 02 vs. 96	NA	NA	NA	**0.002**	**0.000**	**0.005**	**0.000**	**0.000**	**0.000**	**0.003**
Middle Hard bottom Stations	chi 98 vs. 96	NA	NA	NA	0.159	**0.000**	**0.005**	NA	NA	**0.000**	**0.000**
	chi 99 vs. 98	NA	NA	NA	0.108	0.659	0.069	NA	NA	0.186	0.124
	chi 02 vs. 99	NA	0.411	NA	**0.000**	**0.008**	0.562	NA	0.411	**0.000**	**0.000**
	chi 02 vs. 96	NA	NA	NA	**0.000**	**0.000**	0.042	NA	NA	**0.001**	0.012
Middle Patch Stations	chi 98 vs. 96	0.083	0.031	0.013	0.560	**0.007**	0.486	0.279	0.262	0.231	0.032
	chi 99 vs. 98	NA	0.575	0.388	0.015	0.435	0.811	0.025	0.495	0.771	0.457
	chi 02 vs. 99	NA	0.588	**0.003**	**0.002**	**0.000**	0.581	0.119	0.144	0.035	0.446
	chi 02 vs. 96	0.017	0.031	**0.000**	**0.003**	**0.000**	0.463	0.076	0.248	**0.000**	**0.000**
Middle Shallow Stations	chi 98 vs. 96	NA	0.787	NA	**0.000**	0.010	**0.004**	NA	**0.004**	**0.000**	0.030
	chi 99 vs. 98	NA	0.394	NA	**0.000**	**0.000**	0.824	NA	**0.000**	**0.000**	**0.000**
	chi 02 vs. 99	**0.000**	0.014	NA	**0.000**	**0.000**	0.145	NA	**0.000**	**0.000**	**0.000**
	chi 02 vs. 96	NA	0.176	NA	**0.000**	**0.000**	0.014	NA	**0.000**	**0.000**	**0.000**
Middle Deep Stations	chi 98 vs. 96	NA	NA	NA	**0.005**	0.585	**0.000**	**0.000**	NA	0.011	**0.000**
	chi 99 vs. 98	NA	NA	NA	0.057	**0.000**	0.013	0.019	NA	**0.002**	0.244
	chi 02 vs. 99	NA	**0.009**	NA	0.016	0.018	0.530	NA	0.136	0.051	0.201
	chi 02 vs. 96	NA	NA	NA	0.735	**0.000**	0.060	0.683	NA	**0.000**	**0.000**
All 7 Habitat Types	chi 98 vs. 96	**0.001**	**0.000**	0.040	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
	chi 99 vs. 98	**0.000**	0.045	0.632	**0.000**	**0.000**	**0.003**	**0.000**	**0.000**	**0.000**	**0.000**
	chi 02 vs. 99	**0.000**	**0.001**	0.014	**0.000**	**0.000**	0.010	NA	**0.000**	**0.000**	**0.000**
	chi 02 vs. 96	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

octocoral" (Table 13) drove most of the significant "other octocoral" results in Table 12. Further, most of the significantly different size distributions are due to increases in the density of short "other octocoral" (Table 5, 7, 9, 11).

For results presented in Table 13, the null hypothesis is that the distribution of biota at all four stations in a habitat type is indistinguishable between years. The alternative hypothesis is that one or more of the stations are changing independently. Middle shallow, upper shallow and upper deep stations stand out with the most significantly different distributions, 67 of 95 results. This indicates that biota at one or more of the four stations in each habitat type are changing independently of the others in most cases. Middle patch stations stand out with the fewest significantly different distributions, nine of 38 results. This indicates that the distributions of all biota among middle patch stations are indistinguishable in most intervals.

VIDEO-DERIVED ABUNDANCE VERSUS PERCENT COVER

Coral Reef Monitoring Project (CRMP) percent cover data for stations listed in Table 1 are presented in Appendix V. Plots of octocoral percent cover versus video-derived octocoral density (Appendix VI) suggested direct relationships in some cases.

Assessment of the correlation between video-derived abundance and percent cover as measured by PointCount was conducted using three different analyses. First, Spearman's ρ test for independence used Spearman's ρ to rank the correlation between each single biotic category and octocoral percent cover. Complete results are presented in Appendix VII and summarized in Table 14. Second, BIOENV-Spearman analyses used Spearman's ρ to rank the correlation between all possible combinations of abundance and octocoral percent cover data. Complete results of BIOENV-Spearman are presented in Appendix VIIIa and summarized in Table 14. Third, BIOENV-Kendall analyses used Kendall's τ to rank the correlation between all possible combinations of abundance and octocoral percent cover data. Complete results of the BIOENV-Kendall analyses are presented in Appendix VIIIb and summarized in Table 14.

For all three analyses, the highest correlation involves a tall biotic category in 14 of 15 cases. The highest correlation is never between Total All Octocorallia and percent cover. The lowest correlation involves short or encrusting octocorals in every case. The rankings from all three analyses are identical on 12 of 40 rank possibilities. Abundance of tall octocorals usually exhibits higher correlation to percent cover than abundance of short or encrusting octocorals. The results from all three analyses are identical that the highest

Table 14. Summary of three correlation analyses presenting ranked correlation between abundance and percent cover. Shading indicates significant ρ values (Hypothesis testing conducted only for S-PLUS Spearman ρ test for independence).

Year	S-PLUS Spearman *rho* test for independence	*rho*	BIOENV-Spearman single variable correlation	*rho*	BIOENV-Kendall single variable correlation	*tau*
1996	*G.ventalina* - medium	**0.717**	"other octocoral" - tall	0.262	"other octocoral" - tall	0.173
1996	"other octocoral" - tall	**0.650**	*G.ventalina* - medium	0.226	*G.ventalina* - medium	0.155
1996	*G.ventalina* - tall	**0.635**	Total All Octocorallia	0.128	Total All Octocorallia	0.087
1996	Total All Octocorallia	**0.577**	*G.ventalina* - tall	0.033	*G.ventalina* - tall	0.025
1996	*G.ventalina* - short	**0.460**	"other octocoral" - medium	0.014	"other octocoral" - medium	0.011
1996	"other octocoral" - medium	**0.389**	*G.ventalina* - short	-0.020	*G.ventalina* - short	-0.016
1996	Scleraxonia	0.213	Scleraxonia	-0.072	Scleraxonia	-0.049
1996	"other octocoral" - short	-0.070	"other octocoral" - short	-0.117	"other octocoral" - short	-0.078
1998	"other octocoral" - tall	**0.789**	"other octocoral" - tall	0.530	"other octocoral" - tall	0.367
1998	*G.ventalina* - tall	**0.643**	Total All Octocorallia	0.244	Total All Octocorallia	0.161
1998	*G.ventalina* - medium	**0.632**	"other octocoral" - medium	0.157	"other octocoral" - medium	0.106
1998	Total All Octocorallia	**0.606**	*G.ventalina* - tall	0.107	*G.ventalina* - tall	0.078
1998	"other octocoral" - medium	0.320	*G.ventalina* - medium	0.076	*G.ventalina* - medium	0.053
1998	"other octocoral" - short	0.216	"other octocoral" - short	0.015	"other octocoral" - short	0.011
1998	*G.ventalina* - short	0.179	*G.ventalina* - short	-0.002	*G.ventalina* - short	-0.002
1998	Scleraxonia	0.136	Scleraxonia	-0.073	Scleraxonia	-0.050
1999	"other octocoral" - tall	**0.847**	"other octocoral" - tall	0.514	"other octocoral" - tall	0.353
1999	*G.ventalina* - medium	**0.760**	Total All Octocorallia	0.334	Total All Octocorallia	0.228
1999	*G.ventalina* - tall	**0.646**	*G.ventalina* - medium	0.318	*G.ventalina* - medium	0.214
1999	Total All Octocorallia	**0.605**	"other octocoral" - medium	0.208	*G.ventalina* - short	0.146
1999	Scleraxonia	**0.421**	*G.ventalina* - short	0.201	"other octocoral" - medium	0.138
1999	"other octocoral" - medium	**0.392**	"other octocoral" - short	0.121	"other octocoral" - short	0.080
1999	*G.ventalina* - short	0.284	*G.ventalina* - tall	0.102	*G.ventalina* - tall	0.076
1999	"other octocoral" - short	0.239	Scleraxonia	0.010	Scleraxonia	0.006
2002	*G.ventalina* - tall	**0.791**	"other octocoral" - tall	0.415	"other octocoral" - tall	0.282
2002	*G.ventalina* - medium	**0.789**	*G.ventalina* - medium	0.294	*G.ventalina* - medium	0.216
2002	"other octocoral" - tall	**0.719**	*G.ventalina* - tall	0.256	*G.ventalina* - tall	0.196
2002	Scleraxonia	**0.522**	Total All Octocorallia	0.135	Total All Octocorallia	0.091
2002	Total All Octocorallia	**0.467**	"other octocoral" - medium	0.077	"other octocoral" - medium	0.053
2002	"other octocoral" - medium	0.292	"other octocoral" - short	0.012	"other octocoral" - short	0.006
2002	*G.ventalina* - short	0.288	*G.ventalina* - short	-0.016	*G.ventalina* - short	-0.014
2002	"other octocoral" - short	**-0.407**	Scleraxonia	-0.034	Scleraxonia	-0.024
All Years	"other octocoral" - tall	**0.743**	"other octocoral" - tall	0.401	"other octocoral" - tall	0.272
All Years	*G.ventalina* - medium	**0.718**	*G.ventalina* - medium	0.219	*G.ventalina* - medium	0.152
All Years	*G.ventalina* - tall	**0.683**	Total All Octocorallia	0.180	Total All Octocorallia	0.121
All Years	Total All Octocorallia	**0.557**	*G.ventalina* - tall	0.136	*G.ventalina* - tall	0.102
All Years	Scleraxonia	**0.338**	"other octocoral" - medium	0.055	"other octocoral" - medium	0.037
All Years	"other octocoral" - medium	**0.332**	*G.ventalina* - short	0.028	*G.ventalina* - short	0.020
All Years	*G.ventalina* - short	**0.256**	Scleraxonia	0.006	Scleraxonia	0.005
All Years	"other octocoral" - short	-0.040	"other octocoral" - short	-0.041	"other octocoral" - short	-0.027

correlation in 1998, 1999, and all years is tall "other octocoral". The only case where all three analyses diverge is the fourth and fifth ranks in 1999.

The results from all three analyses are identical that correlation coefficients are lowest in 1996. The single lowest ρ value is –0.41 for short "other octocoral" in 2002. This ρ value is significant in Spearman's ρ test for independence (α=0.05). Negative correlation coefficients do not necessarily indicate an inverse linear correlation. Negative coefficients calculated in these analyses may indicate a non-linear positive correlation as well.

The highest correlation coefficient in Table 14 is 0.85, but most are well below 0.50. Interdependent systems have correlation coefficients around 0.75 or better. Correlation coefficients for Total All Octocorallia are between 0.47 and 0.61. This means that Octocorallia abundance only explains approximately half of the octocoral percent cover signal.

4. DISCUSSION

The objectives of this study were both methodological and ecological. The first major goal was to determine if octocoral abundance could be reliably obtained from video transects. The second goal was to utilize abundance data to assess temporal changes in the octocoral community. The principal goal was to determine how octocoral abundance data compared with percent cover data from the same transects. All three goals were achieved, though the limitations and implications require further discussion.

ASSESSMENT OF METHODS

Video-Derived Octocoral Counts

All video derived octocoral counts were > 90% repeatable (Appendix III) and independent of density (Fig. 5). This study demonstrated a video-derived octocoral abundance assessment method that is precise and relatively rapid. The successful use of preexisting data reinforced the substantial value of archived video data.

In Situ *vs. Video-Derived Octocoral Counts*

When video-derived counts are compared with *in situ* counts (Fig. 4) features of both density-dependent and density-independent dissimilarity are observed. Both can be attributed to methodological error and methods-related bias. Should further investigation show the density-dependent error to be consistent, a correction model may be developed for the data.

Density-independent differences between the *in situ* and video-derived data are attributable to differences in area sampled. The video sampling area is determined by camera height from the bottom. At 40 cm high, the video transect is exactly 40 cm wide. In field applications, camera height is an operator-determined moving average over inherently rugose substrates. The *in situ* survey was a 40 cm belt transect centered over the video transect line. The belt transect was 40 cm wide regardless of rugosity. Any or all of these factors – camera operator skill, rugosity, and water movement – may contribute to differences in area sampled.

Density-dependent differences between *in situ* and video-derived abundances (Fig.4) are attributable to two principal differences between methods. First, an unavoidable flaw in video survey methods is that short individuals in the shadow of tall individuals are not visible to the camera, though they are visible to an *in situ* observer. Second, visual resolution is substantially better *in situ* than on the video screen. The shortest octocorals observed *in situ* were approximately 1 cm tall, while the shortest octocorals observed on video were approximately 2.5 cm tall. All eight of the anomalous points circled in Figure 4 are from Alligator Shallow stations where the density of short individuals was triple that at the other stations counted *in situ*.

Differences in resolution and shadowing of short individuals are critical; nearly three times as many short octocorals were counted in the *in situ* surveys as in the video surveys of the same stations. The effect of counting more short individuals *in situ*, if omnipresent, should result in an inverse density-dependent error. Two-thirds of the data points in this comparison suggest linear density-dependence. Further *in situ* surveys are likely to reinforce this density-dependent relationship and methodological differences could be corrected *post facto* using a refined model. In the meantime, one must recognize that the video-derived counts under sample short octocorals.

Biases to data

One potential bias in the video data that could influence counts of short colonies is camera resolution. In 2000, the CRMP upgraded the video camera, which approximately doubled the resolution of individual frames (Hackett 2002). Though Hackett (2002) confirmed that scleractinian percent cover measures were unaffected by this change in resolution, the use of full-motion video for data collection was not tested. I anticipated the potential bias and made special note of the character of the short colonies observed in 2002. The character of short colonies did not appreciably change between old and new camera systems, and the estimated minimum detectable height was 2.5 cm for all years.

Furthermore, the resolution increase between cameras was only apparent when viewing still frames not when viewing the full-motion video. In fact, full-motion video from the original camera system was noticeably clearer than from the new camera system, despite lower resolution. This unexpected difference is due to frame rate. The original system records 29 frames per second. The new system records 15 frames per second. Frame rate needs to be faster than 25 frames per second for a human to see it as “full-motion.” At 15 frames per second, video from the new system had a jerky appearance and was more difficult to process for abundance.

ECOLOGICAL RESULTS – ABUNDANCE

Study Results Compared to Other Octocoral Surveys in the Northern Caribbean

Abundances of octocorals at stations examined in this study are highly variable (Appendix II and IV), but well within the range found at comparable sites in Florida and the northern Caribbean (Table 15). Average *Gorgonia ventalina* density was higher in this study than that reported by Goldberg (1973), Kinzie (1973), and Wheaton & Jaap (1988). The average density of Scleraxonia in this study is similar to that seen by Wheaton and Jaap (1988) and Goldberg (1973). All three of these studies found low Scleraxonia densities compared to those reported by Kinzie (1973) and Jaap et al. (2002) (Table 15).

One other study (Table 15) conducted repeat sampling at permanently marked

Table 15. Summary data from selected octocoral abundance surveys in the northern Caribbean.

Habitat Type	Average density (colonies/m^2)	% composition *G. ventalina*	% composition Scleraxonia	Interannual Change	Reference, Date(s) of Research, Location
Hardbottom	8-11	1	1	Average 14%, Maximum increase 40%, Maximum decline 21%	Lybolt, Most years sampled from 1996 to 2002, Upper and Middle Florida Keys
Patch Reef	10-14	17	8	Average -4%, Maximum increase 14%, Maximum decline 18%	Lybolt, Most years sampled from 1996 to 2002, Upper and Middle Florida Keys
Patch Reef	15	1.7	1.7	--	Goldberg 1973, Palm Beach County, Florida
Patch Reef	1.6-3.8	--	--	Average 63%, Maximum increase 138%, Maximum decline 0%	Jaap et. al., Most years sampled from 1989 to 2002, Dry Tortugas, Florida
Lagoon	1.5	5	20	--	Kinzie 1970, Discovery Bay, Jamaica
Shallow Acropora cervicornis zone	3.6	3	92	--	Kinzie 1970, Discovery Bay, Jamaica
Shallow platform	17-43	--	39	Average 9%, Maximum increase 47%, Maximum decline 42%	Jaap et. al., Most years sampled from 1989 to 2002, Dry Tortugas, Florida
Shallow forereef	10.6	--	64	--	Kinzie 1970, Discovery Bay, Jamaica
Shallow forereef	9	7	4	--	Wheaton and Jaap, 1983, Looe Key, Florida
Shallow forereef	7-10	13	3	Average 14%, Maximum increase 28%, Maximum decline 1%	Lybolt, Most years sampled from 1996 to 2002, Upper and Middle Florida Keys
Deep forereef	2.2	5	15	--	Kinzie 1970, Discovery Bay, Jamaica
Deep platform	15	7.5	3.3	--	Goldberg 1973, Palm Beach County, Florida
Deep forereef	17-34	0.4	1.3-5.6	--	Goldberg 1973, Palm Beach County, Florida
Deep forereef	10-24	12	18	Average 15%, Maximum increase 55%, Maximum decline 15%	Jaap et. al., Most years sampled from 1989 to 2002, Dry Tortugas, Florida
Deep forereef	7-16	4	14	Average 2%, Maximum increase 28%, Maximum decline 16%	Lybolt, Most years sampled from 1996 to 2002, Upper and Middle Florida Keys

stations, Jaap et. al. (2002). This study spanned a longer period, but both Jaap et. al. (2002) and this thesis include abundance data from 1996 to 2002. Relative change between average densities is roughly equivalent between the two studies and reinforces the conclusion that octocoral assemblages are dynamic in time. It is particularly interesting that both studies documented an increase in density over time, even though Jaap et. al. (2002) started sampling eight years before I did.

Overall, my study found that *Gorgonia ventalina* density declined 19% between 1996 and 2002. All Octocorallia increased by 6% in the same interval. Though neither of these changes are statistically significant, the similarity between overall results of my study and that of Jaap et al. (2002), conducted over roughly the same interval and region, complements overall results of my study.

Assemblage In 1996

The average density of all Octocorallia in 1996 was 10.2 colonies/m^2. Three quarters of 1996 abundance, 7.7 colonies/m^2, were “other octocoral”. *Gorgonia ventalina* and Scleraxonia abundance were similar, 1.2 colonies/m^2 and 1.3 colonies/m^2 respectively. Distribution of *G. ventalina* size (Table 16) was 6% short, 72% medium and 22% tall (0.07, 0.85, and 0.26 colonies/m^2 respectively). Distribution of *G. ventalina* was distinctly different among different habitat types (Fig. 10). “Other octocoral” size distribution was similar to *G. ventalina*, though density was six-fold higher. Average size distribution of “other octocoral” was 10% short, 73% medium, and 18% tall (0.7, 5.6, and 1.4 colonies/m^2 respectively). “Other octocoral” distribution among habitat type was remarkably uniform (Table 3, Fig. 11).

Table 16. Percent composition of each biotic category.

	Percent of Total *G. ventalina*			Percent of "other octocoral"			Percent of Total Octocorallia		
	G.ventalina - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total *G. ventalina*	Total "other octocoral"	Total Scleraxonia
1996	6%	72%	22%	10%	73%	18%	11%	76%	13%
1998	9%	63%	28%	12%	70%	18%	11%	84%	5%
1999	18%	60%	22%	12%	77%	12%	7%	87%	6%
2002	17%	55%	29%	24%	65%	12%	9%	84%	7%

Abundances in 1996 and 1998

Abundances in 1998 have greater than 1996 for most biotic categories. However, substantial decreases in two categories drove a small overall decline. Medium *Gorgonia ventalina* density decreased sharply in 1998, particularly at middle keys patch reefs (Fig. 10, Table 3 and 5). The size distribution of *G. ventalina* changed significantly at every upper keys habitat type (Table 12). This reflects a relatively distinct change in community size/age composition associated with a decline in abundance of medium *G. ventalina* colonies. Scleraxonia abundance in 1998 was 60% less than 1996. Scleraxonia density remained at approximately half of the 1996 level for the remainder of the survey (Table 3). The 1996 to 1998 decline was driven almost exclusively by declines at middle patch and middle deep stations where scleraxonians were essentially eliminated.

Macroalgae percent cover was highest in 1998 (Appendix V) (Wheaton 2001) and a plausible suggestion is that high macroalgae cover obscured Scleraxonia, accounting for their 60% decline. Two facets of abundance data refute this suggestion. First, macroalgae cover in 1999 was back to the same level as 1996. If macroalgae obscured live Scleraxonia colonies in 1998, the 1999 abundance should be higher than 1998 abundance. Average Scleraxonia abundance was essentially unchanged between 1998 and 1999 (Table 3 and 6). Second, if macroalgae obscured Scleraxonia in 1998, then some of the short individuals of other taxa should also have been obscured in 1998. However, average abundance of short individuals increased sharply from 0.8 colonies/m^2 in 1996 to 1.08 colonies/m^2 in 1998.

Abundances in 1998 and 1999: Inferences about Hurricane Georges

Changes between 1998 and 1999 reflect, in part, the effects of Hurricane Georges. This slow-moving storm subjected portions of the middle and lower keys to hurricane-force winds for 20 hours. Hurricane Georges crossed the reef tract near Eastern Sambo and made landfall in Key West on the morning of 25 September 1998 with maximum sustained winds of 90 knots. Typical storm surge sizes in the Keys were 1.5 to 2 m (Guiney 1999). The 1998 field data were collected at least a month before hurricane Georges crossed the reef tract.

Most significant changes between 1998 and 1999 were decreases in abundance (Table 7). Three-quarters of all abundance measures were less in 1999 than in 1998 (Appendix II) and declines were not uniformly distributed throughout the study area. Most of the significant declines were in the tall category, and were found in the middle keys; only one of 26 significant declines occurred at a deep reef. The only significant changes in *Gorgonia ventalina* abundance were declines found in the middle keys. Tall "other octocoral" decreased 54% (p=0.000) at all middle keys stations (Table 7). This differential mortality strongly implies that tall octocoral colonies are selectively removed by storm energy. Scleraxonia densities reinforce this conclusion as the densities of these encrusting octocorals was unchanged (Fig. 7, Table 3 and 6).

An important result of the BIOENV routines show a different aspect of the dramatic 1998 to 1999 shift, before and after hurricane Georges (Table 7, Fig. 10). In 1996 and 1998, tall *Gorgonia ventalina* was the fourth ranked correlation with percent octocoral cover (Table 14). Tall *G. ventalina* had higher correlations than more abundant categories despite the fact that tall *G. ventalina* accounted for only 3% of the total Octocorallia abundance. In 1999, tall *G. ventalina* dropped to the seventh ranked correlation with percent cover. By 2002 tall *G. ventalina* rose to third ranking.

The interpretations of these analyses are twofold. First, following hurricane Georges tall *Gorgonia ventalina* had the lowest recorded correlation with percent cover and was a much less prominent component of the percent cover signal. Correlation rebounded by 2002 and once again tall *G. ventalina* was a disproportionately large component of the percent cover signal. This indicates that tall *G. ventalina* were especially hard-hit by Hurricane Georges, but recovered by 2002. Second, between 1998 and 1999 the actual change in tall *G. ventalina* abundance was a scant 1.5% of the total Octocorallia abundance. Yet, in 1999 tall *G. ventalina* was a much less prominent component of percent cover. The major implication is that octocoral percent cover is sensitive to very small changes in the abundance of tall *G. ventalina*. This sensitivity is due to two aspects of *G. ventalina* colonies. First, the flabellate shape of *G. ventalina* inflates the apparent area covered, particularly when the fan is oriented perpendicularly to the transect. Second, *G. ventalina* colonies orient themselves perpendicularly to the dominant direction of water motion.

CRMP transects are oriented from offshore to inshore, so most *G. ventalina* colonies encountered are perpendicular to the video transects.

Chi-square tests of the distribution of abundances revealed fewer significantly different distributions between 1998 and 1999 than in any other interval (Table 13). Given the dramatic changes in abundance attributable to hurricane Georges (Figs. 10, 11, 12, Table 6 and 7) the distribution results in Table 13 are unexpected. These distribution analyses suggest that hurricane Georges affected stations across all habitat types in a uniform manner.

T-Test and Chi-square analyses show a regional disparity in 1999 versus 1998 (Table 7, 12, and 13). The number of significant changes between 1998 and 1999 at middle keys stations was about twice the number of significant changes at upper keys stations. Hurricane Georges was most intense in the middle and lower keys. This regional disparity reinforces the conclusion that most differences are attributable to Hurricane Georges.

Abundance comparing 1999 and 2002

Average Octocorallia abundance in 2002 was the highest recorded in the survey, 10.8 colonies/m^2. The next highest value was 10.2 colonies/m^2, recorded in 1996. Summarizing all measures from Appendix II, twice as many abundance measures increased as decreased from 1999 to 2002. At most of the 28 stations, the density of short colonies in 2002 was double the density in 1999 (Fig. 10, 11, Appendix II). Overall density of tall *Gorgonia ventalina* doubled, an increase driven entirely by changes at middle patch stations (Table 3, Fig. 10). This significant increase in tall *G. ventalina* (Table 9) drove a significant change in the distribution of *G. ventalina* sizes at middle patch stations (Table 12).

Chi-square tests confirmed that none of the tall "other octocoral" distributions were distinguishable (Table 13), despite the fact that tall "other octocoral" density increased at five of seven habitat types (Table 3). This means that, where increases occurred, all stations within each habitat type increased uniformly.

Overall changes, 1996 to 2002

Though the abundance of all Octocorallia in 2002 was very close to the value for 1996, the distribution of density among biotic categories was distinctly different in every case (Table 12 and 13). The difference was echoed in different percent composition of biotic categories (Table 16).

Total *Gorgonia ventalina* density decreased at six of the habitat types, and declined 20% overall (Table 3). Variance among samples (Appendix IV) was too great to detect statistical significance of the declines. Only one of the 40 *G. ventalina* t-Test outcome was significant. Inspection of the *p*-values in Table 10 reveals seven outcomes that would be significant at $\alpha=0.10$. Six of these seven $\alpha=0.10$ outcomes are declines, on the order of 40%. The only increase among these borderline cases is a five-fold increase in the abundance of short *G. ventalina* at middle keys shallow stations $p=0.052$ (Table 10).

Declines in density of *Gorgonia ventalina* are only partly attributable to impacts of Hurricane Georges. Significant declines, particularly between 1996 and 1998, are partly attributable to the fungal disease Aspergillosis (Kim & Harvell 2002). The 1996 to 1998 interval includes the 1997 mass-bleaching event and several disease outbreaks (Harvell et al. 1999; Acosta 2001; Cervino et al. 2001; Porter et al. 2001; Kim & Harvell 2002; and many others). Possible explanations for the declines in *G. ventalina* abundance (Table 3, 5, 7, 9, 11, 16) support biotic stressors such as disease more than abiotic factors such as the hurricane.

The average density of short colonies in 2002 was more than double that seen in any other year (Fig. 7). At nearly every station, the density of short colonies was greater in 2002 than in 1996. At most of the stations, the density of short colonies in 2002 was the highest recorded value of all four years (Fig. 10, 11, Appendix II). The significant increase ($p=0.000$) of short individuals was nearly three-fold at all 28 stations (Table 11). Significant increases were not constrained to any particular region or habitat type (Table

10). Further, distribution of short “other octocoral” was significantly different at six of the habitat types. This indicates that short “other octocoral” abundance was dynamic at the station level as well as by habitat type.

The observed increase in short colonies likely indicates community response following Hurricane Georges. Scouring by the hurricane removed most of the macroalgae, which may have obscured some short colonies in 1996 and 1998 surveys and probably competed with octocoral recruits. Most of the stations retained the 1999 ‘freshly scoured’ appearance in 2002, four years after the storm. One aspect of the data counters the interpretation that the increase of short individuals is a post-hurricane recruitment event. Many upper and middle patch reef stations exhibited an incremental increase in abundance of short colonies between 1996 and 2002 (Appendix II), rather than a dramatic increase in the years following the hurricane.

Hypothesis testing summarized in Tables 12 and 13 showed that distribution of every biotic category among habitat types, and every size distribution was significantly different between 1996 and 2002. This is the only time interval where change in distribution is significantly different in every biotic category. While some aspects of assemblage distribution are significantly changed in only one year, all aspects of octocoral assemblage distribution can significantly change in six years.

ABUNDANCE VS PERCENT COVER.

Video-Derived Abundance Correlation with Octocoral Percent Cover

All three analyses summarized in Table 14 support rejection of octocoral percent cover as a proxy for abundance. Four factors strongly support this conclusion. First, correlation coefficients are very low. Interdependent systems have correlation coefficients around 0.75 or better. The highest correlation coefficient is 0.85, but most are well below

0.50. Second, "total all Octocorallia" is never the first-ranked correlation. Some component of octocoral abundance always has higher correlation than all Octocorallia. Correlation coefficients for "total all Octocorallia" are between 0.47 and 0.61. This means that Octocorallia abundance explains approximately half of the percent cover signal. Third, medium "other octocoral" is the single most abundant of the biotic categories and typically accounts for 60% of the total Octocorallia abundance (Table 3 and 16). Yet medium "other octocoral" is never higher than the third-ranked correlation. Fourth, tall "other octocoral" contributes a maximum of 15% and tall *Gorgonia ventalina* contributes a maximum of 3% to the total Octocorallia abundance. Yet, in 14 of 15 results one of these tall biotic categories is the first-ranked correlation. Such strong correlations between a relatively minor biotic category and octocoral percent cover is perhaps the strongest reason to reject octocoral percent cover as a proxy for abundance.

The analyses summarized in Table 14 and detailed in appendices VII and VIII imply that octocoral percent cover data are biased in favor of tall individuals. This bias results from field methods employed and may not be possible to mitigate without altering the primary CRMP objective, stony-coral monitoring.

Abundance and Percent Cover Trend Correlation

Despite the poor correlation between octocoral percent cover and abundance, the two measures are undeniably related. Figure 13 presents average percent cover data with average octocoral abundance, demonstrating that their trends are similar. The direction of change was calculated for each of the three sequential year intervals for "total all Octocorallia" (Appendix II) and octocoral percent cover (Appendix V). The results are presented in Table 17 and Figure 14. For each interval, the direction of change is similar. Chi square analysis (Table 17) revealed that the percent cover and abundance change distributions are indistinguishable (α=0.01).

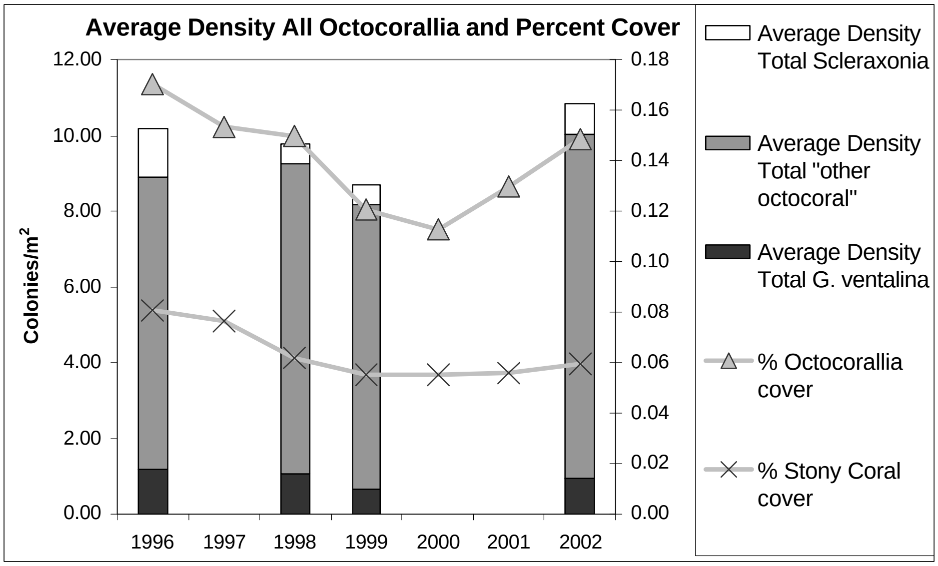

Figure 13. Average density and average percent cover for all 28 stations.

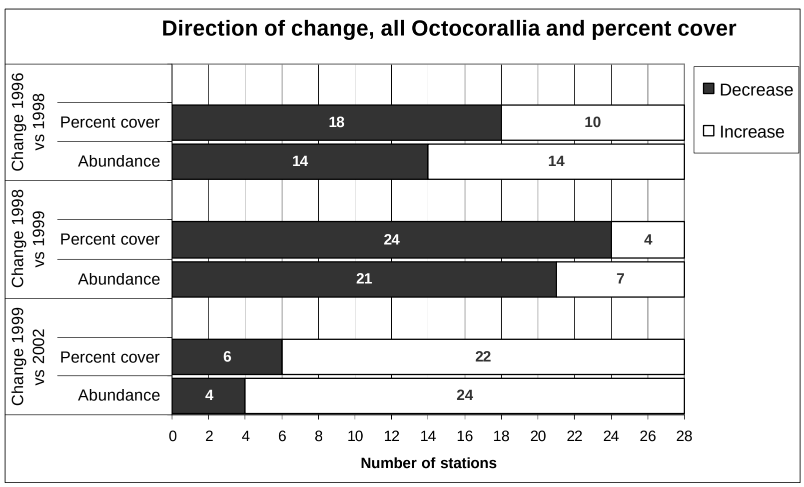

Figure 14. Direction of change, all Octocorallia and percent cover.

Table 17. Chi square analyses of distribution of change.

Chi-square test of abundance and percent cover change distributions		Increase (≥0)	Decrease (<0)	Chi-square statistic: percent cover	Chi-square statistic: abundance "expected"
Change - 1996 versus 1998	Abundance	14	14		0.115
	Percent cover	10	18	0.131	
Change - 1998 versus 1999	Abundance	7	21		0.105
	Percent cover	4	24	0.190	
Change - 1999 versus 2002	Abundance	24	4		0.357
	Percent cover	22	6	0.280	

Analyses presented in Table 17 indicate that trends in percent cover are reliable indicators of abundance trends for the 28 stations surveyed and may be applied reliably to other CRMP stations with similar average octocoral percent cover. As this survey excluded stations with less than 5% octocoral cover, trends in percent cover may not be a reliable indicator of trends in abundance at stations where octocorals are scarce.

RECOMMENDATIONS

Further applications

Data in this manuscript (Appendix II) are presented with greater resolution than similar published studies of octocorals in Florida and the northern Caribbean (Table 15). It is imperative to acquire the raw data from earlier studies to make detailed comparisons. With these datasets, a more comprehensive characterization of basin-wide Octocorallia abundance may be constructed. Further, abundance data (Appendix II), coupled with percent cover data (Appendix V), are well suited to community disturbance-recovery models.

Refining the study methods

This study demonstrated a precise and relatively rapid method to extract octocoral abundance data from video transects. This use of preexisting data reinforces the value of archived video data. If assessment of octocoral abundance from video data is to be instituted on a wider scale, a number of lessons can be learned from this survey.

The biotic categories and size classes should be refined. Spearman's ρ test for independence, BIOENV-Spearman and BIOENV-Kendall analyses (Table 14) all agreed that the tall size class is appropriate for determining correlation between abundance and percent cover. More effective and ecologically appropriate size classes shorter than 40 cm should be evaluated. Size classes should be tied to the growth rates of several key taxa. Wheaton (2003) recommended splitting “other octocoral” into *Pseudopterogorgia* spp. and “other octocoral”. *Pseudopterogorgia* are among the most opportunistic octocorals and first to colonize a disturbed area. I estimate that more than half of the octocorals counted each year were *Pseudopterogorgia* spp. Based on this estimate, the study area is either frequently disturbed or requires more time to evince undisturbed assemblages. The ecological relevance of categories counted should be weighed against repeatability and time invested in data collection. This survey counted seven biotic categories. Counting more than eight biotic categories is not realistic for real-time data collection.

Future studies using CRMP data should incorporate a smaller spatial resolution than habitat type. The smallest possible spatial resolution is station-level, but variance may prohibit meaningful analyses at this resolution. Site-level analyses show promise. Sites are composed of two to four stations, and exploratory multi-dimensional scaling of stations in this study revealed strong grouping among stations at one site. Station-level abundance (Appendix II) and Chi-square analyses (Table 13) both suggest that neighboring stations at one site are similar enough to allow analyses at the site-level. Future studies may make use of site-level resolution by counting every station at a site.

A more comprehensive *in situ* study should be undertaken for two primary reasons. First, repeated *in situ* trials on more stations would refine the density-dependent relationships seen in this study (Fig. 4). Second, repeat trials on the same stations would clarify how video-derived data and percent cover data are influenced by sea state. I recommend surveying the same stations using both video and *in situ* methods multiple times in the same year, in different weather conditions. As recommended by Hackett (2002), PointCount analyses of these video data would similarly indicate how stony coral percent cover is influenced by octocoral over story and sea state.

Any assessment method should be tested by an inter-observer calibration study.

Assessment of data collected early in my study revealed a learning curve of 10 to 18 stations. Prompted by low similarities in early analyses, I elected to throw out data from the first 18 stations examined and re-counted them. Approximately 40 minutes are required to count octocoral colonies from one station. A 12-hour learning curve was deemed too time-intensive to integrate an inter-observer calibration study into this project.

Altering the PointCount method for quantification of octocoral

Based on these study results, it is unlikely that a defensible mechanism to convert octocoral percent cover to abundance can be developed. The CRMP may consider changing PointCount methods to obtain more valuable percent cover data. Integrating aspects of this study with results from Hackett (2002), I recommend ignoring the over-story (octocoral or otherwise) whenever the under-story can be positively identified. This would help to eliminate bias in percent cover data caused by changing conditions such as current and surge between video transects.

Overall, I developed and tested a successful method to count octocoral from video transects. Using this method, I found that average densities of *Gorgonia ventalina* and Scleraxonia were consistently about one colony/m^2. Other octocoral as a group averaged 7-9 colonies/m^2. When summarized by height, short and tall averaged about 1-2 colonies/m^2, while colonies between 10 and 40cm in height consistently averaged about 6 colonies/m^2. From 1996 to 2002, I found that *G. ventalina* density declined 19% and all Octocorallia increased 6%. Neither of these changes is statistically significant (Table 11) but a 19% decline is noteworthy nonetheless. The hurricane seems to have contributed to the *G. ventalina* decline and the increase in short recruits. However, declines observed through all years are consistent with octocoral disease trends. This study entreats researchers to collect and maintain archives of standard video transects.

5. CONCLUSIONS

1) Abundance data can reliably be derived from archived video data. Methodological limitations hinder precise counts of short individuals, though density-dependent errors should be correctable using models.
2) Octocoral abundance and octocoral percent cover are not strongly correlated. Tall individuals disproportionately influence percent cover estimates.
3) Trends in octocoral percent cover are reliable indicators of the trends in octocoral abundance.
4) The octocoral assemblage was impacted by Hurricane Georges. Abundance declined most at stations near the storm center and stations in shallower water. Storm impact was related to octocoral height. Tall octocorals were removed more frequently than medium, short and encrusting forms. A dramatic increase of short individuals in 2002 indicates successful post-hurricane recruitment.
5) The octocoral assemblage is dynamic. All aspects of assemblage distribution can significantly change in six years. By 2002, octocoral abundance had essentially recovered to pre-hurricane levels.
6) Between 1996 and 2002 *Gorgonia ventalina* density decreased 19% but total Octocorallia increased 6%, mostly through recruitment from 1999 to 2002.

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APPENDICES

Appendix Ia. Attributes of *in situ* stations.

Site ID	Sitetype	Region	Site Name	Station	Area of Video Sample (m2)	Depth Min (m)	Depth Max (m)	Longitude (DD)	Latitude (DD)
112	HB	U	El Radabob	2	25.9	3	3	-80.3782	25.1201
114	HB	U	El Radabob	4	26.5	3	3	-80.3782	25.1201
322	P	U	Porter Patch	2	27.6	4	5	-80.3243	25.1032
323	P	U	Porter Patch	3	27.7	4	5	-80.3243	25.1032
384	P	L	Cliff Green	4	24.6	6	8	-81.7677	24.5036
503	S	U	Carysfort (Shallow)	3	27.0	3	4	-80.2098	25.2222
541	S	M	Alligator (Shallow)	1	26.4	4	5	-80.624	24.8457
542	S	M	Alligator (Shallow)	2	26.4	4	5	-80.624	24.8457
543	S	M	Alligator (Shallow)	3	27.0	3	4	-80.6227	24.8468
582	S	L	E Sambo S	2	26.4	1	3	-81.6659	24.4884
591	S	L	Western Sambo (Shallow)	1	27.0	3	5	-81.7176	24.4796
592	S	L	Western Sambo (Shallow)	2	28.8	3	5	-81.7176	24.4796
744	D	M	Alligator (Deep)	4	27.4	11	12	-80.6209	24.8452
792	D	L	Western Sambo (Deep)	2	24.5	12	12	-81.7171	24.478

Appendix Ib. Results of *in situ* abundance survey.

Field trial		Field trial			total	total	total	total	total	total	total	total	total
Year	Site ID	Site Name	Trial#	Label	G.ventalina - short	G.ventalina - medium	G.ventalina - tall	Other Octocorals - short	Other Octocorals - medium	Other Octocorals - tall	Station Total G. ventalina	Station Total Other Octocorals	Station Total All Octocorals
2002	112	El Radabob	in situ	112 in situ	0	0	0	5	24	6	0	35	35
2002	112	El Radabob	video 1	112 video 1	0	0	0	0	7	8	0	15	15
2002	112	El Radabob	video 2	112 video 2	0	0	0	0	7	8	0	15	15
2002	114	El Radabob	in situ	114 in situ	0	0	0	0	15	11	0	26	26
2002	114	El Radabob	video 1	114 video 1	0	0	0	0	9	5	0	14	14
2002	114	El Radabob	video 2	114 video 2	0	0	0	0	9	4	0	13	13
2002	322	Porter Patch	in situ	322 in situ	5	11	5	36	184	64	21	284	305
2002	322	Porter Patch	video 1	322 video 1	5	10	4	18	189	78	19	285	304
2002	322	Porter Patch	video 2	322 video 2	5	10	3	16	190	76	18	282	300
2002	323	Porter Patch	in situ	323 in situ	4	15	5	39	135	51	24	225	249
2002	323	Porter Patch	video 1	323 video 1	2	13	4	9	149	63	19	221	240
2002	323	Porter Patch	video 2	323 video 2	2	16	4	17	147	63	22	227	249
2002	384	Cliff Green	in situ	384 in situ	2	18	20	8	163	48	40	219	259
2002	384	Cliff Green	video 1	384 video 1	4	23	24	4	192	57	51	253	304
2002	384	Cliff Green	video 2	384 video 2	3	30	20	6	181	61	53	248	301
2002	503	Carysfort (Shallow)	in situ	503 in situ	1	41	34	40	207	15	76	262	338
2002	503	Carysfort (Shallow)	video 1	503 video 1	1	42	33	24	247	31	76	302	378
2002	503	Carysfort (Shallow)	video 2	503 video 2	0	41	38	26	239	33	79	298	377
2002	541	Alligator (Shallow)	in situ	541 in situ	46	4	0	145	245	9	50	399	449
2002	541	Alligator (Shallow)	video 1	541 video 1	7	3	0	91	161	9	10	261	271
2002	541	Alligator (Shallow)	video 2	541 video 2	6	4	0	87	166	8	10	261	271
2002	542	Alligator (Shallow)	in situ	542 in situ	44	1	1	96	186	16	46	298	344
2002	542	Alligator (Shallow)	video 1	542 video 1	6	3	1	53	149	9	10	211	221
2002	542	Alligator (Shallow)	video 2	542 video 2	6	3	1	58	143	9	10	210	220
2002	543	Alligator (Shallow)	in situ	543 in situ	60	2	0	164	208	8	62	380	442
2002	543	Alligator (Shallow)	in situ2	543 in situ2	71	3	0	224	206	8	74	438	512
2002	543	Alligator (Shallow)	video 1	543 video 1	15	0	0	75	144	9	15	228	243
2002	543	Alligator (Shallow)	video 2	543 video 2	17	2	0	68	148	7	19	223	242
2002	582	E Sambo S	in situ	582 in situ	8	27	9	3	21	8	44	32	76
2002	582	E Sambo S	video 1	582 video 1	1	13	1	3	13	0	15	16	31
2002	582	E Sambo S	video 2	582 video 2	1	12	1	3	13	0	14	16	30
2002	591	Western Sambo (Shallow)	in situ	591 in situ	1	4	0	3	31	6	5	40	45
2002	591	Western Sambo (Shallow)	video 1	591 video 1	6	9	0	6	50	6	15	62	77
2002	591	Western Sambo (Shallow)	video 2	591 video 2	6	10	0	6	54	6	16	66	82
2002	592	Western Sambo (Shallow)	in situ	592 in situ	0	2	2	1	32	3	4	36	40
2002	592	Western Sambo (Shallow)	video 1	592 video 1	2	9	2	5	45	0	13	50	63
2002	592	Western Sambo (Shallow)	video 2	592 video 2	2	9	2	7	44	0	13	51	64
2002	744	Alligator (Deep)	in situ	744 in situ	4	2	0	82	182	18	6	282	288
2002	744	Alligator (Deep)	video 1	744 video 1	0	3	0	83	143	18	3	244	247
2002	744	Alligator (Deep)	video 2	744 video 2	2	3	1	87	147	17	6	251	257
2002	792	Western Sambo (Deep)	in situ	792 in situ	0	3	1	15	83	18	4	116	120
2002	792	Western Sambo (Deep)	video 1	792 video 1	1	4	1	7	115	9	6	131	137
2002	792	Western Sambo (Deep)	video 2	792 video 2	1	3	1	8	120	13	5	141	146

Appendix II. Video-derived octocoral abundance.

Year	Site ID	Site Name	Trial#	Density G.ventalina - short	Density G.ventalina - medium	Density G.ventalina - tall	Density Other Octocorals - short	Density Other Octocorals - medium	Density Other Octocorals - tall	Density Station Total G. ventalina	Density Station Total Other Octocorals	Density Station Total Scleraxonia	Density Station Total All Octocorals
1996	141	Long Key	1	0.00	0.11	0.00	2.66	6.85	1.56	0.11	11.07	0.00	11.19
1996	141	Long Key	2	0.00	0.15	0.00	2.82	7.38	1.45	0.15	11.64	0.00	11.80
1996	141	Long Key	Average	0.00	0.13	0.00	2.74	7.12	1.50	0.13	11.36	0.00	11.49
1998	141	Long Key	1	0.00	0.08	0.00	1.86	6.47	1.07	0.08	9.40	0.00	9.47
1998	141	Long Key	2	0.00	0.08	0.00	1.75	7.08	0.84	0.08	9.67	0.00	9.74
1998	141	Long Key	Average	0.00	0.08	0.00	1.81	6.77	0.95	0.08	9.53	0.00	9.61
1999	141	Long Key	1	0.00	0.04	0.00	0.76	6.35	0.72	0.04	7.84	0.00	7.88
1999	141	Long Key	2	0.00	0.04	0.00	0.68	6.32	0.53	0.04	7.53	0.00	7.57
1999	141	Long Key	Average	0.00	0.04	0.00	0.72	6.34	0.63	0.04	7.69	0.00	7.72
2002	141	Long Key	1	0.00	0.11	0.00	4.26	7.72	0.68	0.11	12.67	0.00	12.79
2002	141	Long Key	2	0.00	0.11	0.00	4.79	7.42	0.68	0.11	12.90	0.00	13.01
2002	141	Long Key	Average	0.00	0.11	0.00	4.53	7.57	0.68	0.11	12.79	0.00	12.90
1996	142	Long Key	1	0.04	0.11	0.00	2.05	7.31	1.33	0.15	10.68	0.00	10.83
1996	142	Long Key	2	0.04	0.11	0.00	2.20	7.31	1.52	0.15	11.02	0.00	11.17
1996	142	Long Key	Average	0.04	0.11	0.00	2.12	7.31	1.42	0.15	10.85	0.00	11.00
1998	142	Long Key	1	0.15	0.15	0.04	1.36	6.36	2.01	0.34	9.73	0.00	10.08
1998	142	Long Key	2	0.19	0.15	0.04	1.40	6.29	2.05	0.38	9.73	0.00	10.11
1998	142	Long Key	Average	0.17	0.15	0.04	1.38	6.33	2.03	0.36	9.73	0.00	10.09
1999	142	Long Key	1	0.00	0.00	0.00	1.17	4.73	0.72	0.00	6.63	0.00	6.63
1999	142	Long Key	2	0.00	0.04	0.00	0.68	6.29	0.53	0.04	7.50	0.00	7.54
1999	142	Long Key	Average	0.00	0.02	0.00	0.93	5.51	0.63	0.02	7.06	0.00	7.08
2002	142	Long Key	1	0.00	0.04	0.00	5.98	6.86	0.76	0.04	13.60	0.00	13.64
2002	142	Long Key	2	0.00	0.04	0.00	6.48	6.93	0.87	0.04	14.28	0.00	14.32
2002	142	Long Key	Average	0.00	0.04	0.00	6.23	6.89	0.81	0.04	13.94	0.00	13.98
1996	152	Moser Channel	1	0.00	0.00	0.00	1.05	3.75	0.90	0.00	5.71	0.41	6.12
1996	152	Moser Channel	2	0.00	0.00	0.00	1.31	3.68	0.90	0.00	5.89	0.49	6.38
1996	152	Moser Channel	Average	0.00	0.00	0.00	1.18	3.72	0.90	0.00	5.80	0.45	6.25
1998	152	Moser Channel	1	0.00	0.00	0.00	0.94	7.28	1.20	0.00	9.42	0.15	9.57
1998	152	Moser Channel	2	0.00	0.00	0.00	1.05	6.98	1.20	0.00	9.23	0.19	9.42
1998	152	Moser Channel	Average	0.00	0.00	0.00	0.99	7.13	1.20	0.00	9.33	0.17	9.50
1999	152	Moser Channel	1	0.00	0.00	0.00	0.98	7.28	1.01	0.00	9.27	0.00	9.27
1999	152	Moser Channel	2	0.00	0.04	0.00	0.68	6.23	0.53	0.04	7.43	0.08	7.55
1999	152	Moser Channel	Average	0.00	0.02	0.00	0.83	6.76	0.77	0.02	8.35	0.04	8.41
2002	152	Moser Channel	1	0.00	0.00	0.00	0.53	8.11	0.64	0.00	9.27	0.00	9.27
2002	152	Moser Channel	2	0.00	0.00	0.00	0.53	7.92	0.75	0.00	9.20	0.00	9.20
2002	152	Moser Channel	Average	0.00	0.00	0.00	0.53	8.01	0.69	0.00	9.23	0.00	9.23
1996	154	Moser Channel	1	0.00	0.00	0.00	1.36	4.03	1.24	0.00	6.64	0.30	6.94
1996	154	Moser Channel	2	0.00	0.00	0.00	1.36	4.15	1.13	0.00	6.64	0.38	7.01
1996	154	Moser Channel	Average	0.00	0.00	0.00	1.36	4.09	1.19	0.00	6.64	0.34	6.98
1998	154	Moser Channel	1	0.00	0.00	0.00	1.24	8.26	1.43	0.00	10.94	0.19	11.12
1998	154	Moser Channel	2	0.00	0.00	0.00	1.51	8.03	1.47	0.00	11.01	0.26	11.27
1998	154	Moser Channel	Average	0.00	0.00	0.00	1.38	8.14	1.45	0.00	10.97	0.23	11.20
1999	154	Moser Channel	1	0.00	0.00	0.00	0.83	7.50	1.24	0.00	9.58	0.08	9.65
1999	154	Moser Channel	2	0.00	0.04	0.00	0.68	6.26	0.53	0.04	7.47	0.11	7.62
1999	154	Moser Channel	Average	0.00	0.02	0.00	0.75	6.88	0.89	0.02	8.52	0.09	8.63
2002	154	Moser Channel	1	0.00	0.00	0.00	0.94	6.26	1.17	0.00	8.37	0.41	8.79
2002	154	Moser Channel	2	0.00	0.00	0.00	0.87	6.07	1.17	0.00	8.11	0.38	8.48
2002	154	Moser Channel	Average	0.00	0.00	0.00	0.90	6.17	1.17	0.00	8.24	0.40	8.63

Appendix II. Video-derived octocoral abundance. (continued)

Year	Site ID	Site Name	Trial#	G.ventalina - short	G.ventalina - medium	G.ventalina - tall	Other Octocorals - short	Other Octocorals - medium	Other Octocorals - tall	Station Total G. ventalina	Station Total Other Octocorals	Station Total Scleraxonia	Station Total All Octocorals
1996	302	Turtle	1	0.04	2.88	0.83	0.34	10.64	3.67	3.75	14.66	0.61	19.02
1996	302	Turtle	2	0.15	2.73	0.80	0.38	11.93	4.55	3.67	16.86	0.64	21.17
1996	302	Turtle	Average	0.09	2.80	0.81	0.36	11.29	4.11	3.71	15.76	0.63	20.09
1998	302	Turtle	1	0.30	3.94	0.68	2.27	15.42	2.50	4.92	20.19	1.44	26.55
1998	302	Turtle	2	0.38	3.86	0.76	2.08	16.29	2.84	5.00	21.21	1.55	27.77
1998	302	Turtle	Average	0.34	3.90	0.72	2.18	15.85	2.67	4.96	20.70	1.50	27.16
1999	302	Turtle	1	0.83	3.52	0.98	2.65	14.20	2.05	5.34	18.90	0.68	24.92
1999	302	Turtle	2	0.00	0.04	0.00	0.68	6.29	0.53	0.04	7.50	0.83	8.37
1999	302	Turtle	Average	0.42	1.78	0.49	1.67	10.25	1.29	2.69	13.20	0.76	16.65
2002	302	Turtle	1	0.11	2.61	0.83	1.48	12.42	2.08	3.56	15.98	0.91	20.45
2002	302	Turtle	2	0.27	2.88	0.68	1.82	11.55	2.23	3.83	15.61	0.83	20.27
2002	302	Turtle	Average	0.19	2.75	0.76	1.65	11.99	2.16	3.69	15.80	0.87	20.36
1996	322	Porter Patch	1	0.14	0.33	0.14	0.22	5.11	2.32	0.62	7.64	1.27	9.53
1996	322	Porter Patch	2	0.14	0.40	0.11	0.29	5.33	2.50	0.65	8.12	1.27	10.04
1996	322	Porter Patch	Average	0.14	0.36	0.13	0.25	5.22	2.41	0.63	7.88	1.27	9.78
1998	322	Porter Patch	1	0.14	0.29	0.07	0.36	6.81	2.03	0.51	9.20	0.29	10.00
1998	322	Porter Patch	2	0.18	0.29	0.07	0.43	6.56	1.96	0.54	8.95	0.51	10.00
1998	322	Porter Patch	Average	0.16	0.29	0.07	0.40	6.68	1.99	0.53	9.08	0.40	10.00
1999	322	Porter Patch	1	0.14	0.51	0.04	1.16	5.65	1.74	0.69	8.55	0.65	9.89
1999	322	Porter Patch	2	0.00	0.04	0.00	0.65	6.01	0.51	0.04	7.17	0.58	7.79
1999	322	Porter Patch	Average	0.07	0.27	0.02	0.91	5.83	1.12	0.36	7.86	0.62	8.84
2002	322	Porter Patch	3	0.11	0.33	0.11	1.09	6.30	1.23	0.54	8.62	0.83	10.00
2002	322	Porter Patch	4	0.11	0.29	0.11	0.98	6.34	1.38	0.51	8.70	1.12	10.33
2002	322	Porter Patch	Average	0.11	0.31	0.11	1.03	6.32	1.30	0.53	8.66	0.98	10.16
1996	323	Porter Patch	1	0.11	0.25	0.11	0.47	4.47	2.02	0.47	6.96	0.51	7.94
1996	323	Porter Patch	2	0.11	0.29	0.11	0.54	4.58	1.88	0.51	7.00	0.54	8.04
1996	323	Porter Patch	Average	0.11	0.27	0.11	0.51	4.53	1.95	0.49	6.98	0.52	7.99
1998	323	Porter Patch	1	0.18	0.43	0.07	0.43	4.62	2.02	0.69	7.07	0.47	8.23
1998	323	Porter Patch	2	0.22	0.43	0.11	0.43	4.62	2.16	0.76	7.22	0.69	8.66
1998	323	Porter Patch	Average	0.20	0.43	0.09	0.43	4.62	2.09	0.72	7.14	0.58	8.44
1999	323	Porter Patch	1	0.14	0.47	0.11	0.79	4.69	1.70	0.72	7.18	0.40	8.30
1999	323	Porter Patch	2	0.00	0.04	0.00	0.65	5.99	0.51	0.04	7.14	0.36	7.54
1999	323	Porter Patch	Average	0.07	0.25	0.05	0.72	5.34	1.10	0.38	7.16	0.38	7.92
2002	323	Porter Patch	3	0.04	0.69	0.11	1.33	4.58	1.44	0.83	7.36	0.61	8.80
2002	323	Porter Patch	4	0.04	0.65	0.14	1.12	4.65	1.55	0.83	7.32	0.65	8.80
2002	323	Porter Patch	Average	0.04	0.67	0.13	1.23	4.62	1.50	0.83	7.34	0.63	8.80
1996	331	Admiral	1	0.00	0.80	0.53	0.03	2.06	1.99	1.33	4.08	0.56	5.98
1996	331	Admiral	2	0.00	0.93	0.50	0.03	2.19	2.03	1.43	4.25	0.56	6.24
1996	331	Admiral	Average	0.00	0.86	0.51	0.03	2.12	2.01	1.38	4.17	0.56	6.11
1998	331	Admiral	1	0.00	0.70	0.40	0.13	2.32	1.59	1.10	4.05	0.86	6.01
1998	331	Admiral	2	0.00	0.86	0.30	0.13	2.36	1.43	1.16	3.92	1.00	6.08
1998	331	Admiral	Average	0.00	0.78	0.35	0.13	2.34	1.51	1.13	3.98	0.93	6.04
1999	331	Admiral	1	0.07	0.46	0.33	0.00	1.79	1.49	0.86	3.29	0.37	4.52
1999	331	Admiral	2	0.00	0.03	0.00	0.60	5.51	0.46	0.03	6.57	0.37	6.97
1999	331	Admiral	Average	0.03	0.25	0.17	0.30	3.65	0.98	0.45	4.93	0.37	5.74
2002	331	Admiral	1	0.03	0.76	0.23	0.37	2.03	0.86	1.03	3.25	0.20	4.48
2002	331	Admiral	2	0.03	0.83	0.27	0.37	2.19	0.70	1.13	3.25	0.23	4.61
2002	331	Admiral	Average	0.03	0.80	0.25	0.37	2.11	0.78	1.08	3.25	0.22	4.55

Appendix II. Video-derived octocoral abundance. (continued)

Year	Site ID	Site Name	Trial#	G.ventalina - short	G.ventalina - medium	G.ventalina - tall	Other Octocorals - short	Other Octocorals - medium	Other Octocorals - tall	Station Total G. ventalina	Station Total Other Octocorals	Station Total Scleraxonia	Station Total All Octocorals
1996	341	W. Turtle Shoal	3	0.12	2.52	0.89	0.31	6.43	1.47	3.53	8.22	2.33	14.07
1996	341	W. Turtle Shoal	4	0.04	2.71	0.89	0.35	6.12	1.86	3.64	8.33	2.60	14.57
1996	341	W. Turtle Shoal	Average	0.08	2.62	0.89	0.33	6.28	1.67	3.59	8.28	2.46	14.32
1998	341	W. Turtle Shoal	1	0.04	1.32	1.40	0.39	5.27	2.33	2.75	7.98	0.23	10.97
1998	341	W. Turtle Shoal	2	0.04	1.28	1.16	0.39	5.04	2.36	2.48	7.79	0.31	10.58
1998	341	W. Turtle Shoal	Average	0.04	1.30	1.28	0.39	5.16	2.34	2.62	7.89	0.27	10.78
1999	341	W. Turtle Shoal	1	0.12	1.47	0.85	0.70	4.57	1.94	2.44	7.21	0.66	10.31
1999	341	W. Turtle Shoal	2	0.00	0.04	0.00	0.70	6.43	0.54	0.04	7.67	0.62	8.33
1999	341	W. Turtle Shoal	Average	0.06	0.76	0.43	0.70	5.50	1.24	1.24	7.44	0.64	9.32
2002	341	W. Turtle Shoal	1	0.16	1.32	1.16	0.85	3.99	1.47	2.64	6.32	0.70	9.65
2002	341	W. Turtle Shoal	2	0.08	1.28	1.24	0.89	4.26	2.48	2.60	7.64	0.93	11.16
2002	341	W. Turtle Shoal	Average	0.12	1.30	1.20	0.87	4.13	1.98	2.62	6.98	0.81	10.41
1996	343	W. Turtle Shoal	3	0.04	2.92	0.76	0.45	6.52	1.78	3.71	8.75	2.58	15.04
1996	343	W. Turtle Shoal	4	0.08	2.99	0.80	0.45	6.55	1.89	3.86	8.90	2.50	15.27
1996	343	W. Turtle Shoal	Average	0.06	2.95	0.78	0.45	6.53	1.84	3.79	8.83	2.54	15.15
1998	343	W. Turtle Shoal	1	0.00	1.55	0.95	0.49	5.30	2.39	2.50	8.18	0.53	11.21
1998	343	W. Turtle Shoal	2	0.00	1.55	1.02	0.64	5.30	2.50	2.58	8.45	0.53	11.55
1998	343	W. Turtle Shoal	Average	0.00	1.55	0.98	0.57	5.30	2.44	2.54	8.31	0.53	11.38
1999	343	W. Turtle Shoal	1	0.00	2.20	0.95	0.87	4.73	1.86	3.14	7.46	0.61	11.21
1999	343	W. Turtle Shoal	2	0.00	0.04	0.00	0.68	6.29	0.53	0.04	7.50	0.64	8.18
1999	343	W. Turtle Shoal	Average	0.00	1.12	0.47	0.78	5.51	1.19	1.59	7.48	0.63	9.70
2002	343	W. Turtle Shoal	1	0.15	1.33	1.44	0.76	5.23	1.55	2.92	7.54	1.33	11.78
2002	343	W. Turtle Shoal	2	0.15	1.48	1.36	0.72	5.34	1.78	2.99	7.84	1.48	12.31
2002	343	W. Turtle Shoal	Average	0.15	1.40	1.40	0.74	5.28	1.67	2.95	7.69	1.40	12.05
1996	344	W. Turtle Shoal	3	0.16	2.33	0.43	0.66	5.85	1.36	2.91	7.87	1.59	12.36
1996	344	W. Turtle Shoal	4	0.23	2.25	0.39	0.74	5.85	1.67	2.87	8.26	1.67	12.79
1996	344	W. Turtle Shoal	Average	0.19	2.29	0.41	0.70	5.85	1.51	2.89	8.06	1.63	12.58
1998	344	W. Turtle Shoal	1	0.04	1.12	0.97	0.81	4.26	2.09	2.13	7.17	0.27	9.57
1998	344	W. Turtle Shoal	2	0.00	1.16	1.01	0.74	4.15	2.09	2.17	6.98	0.27	9.42
1998	344	W. Turtle Shoal	Average	0.02	1.14	0.99	0.78	4.21	2.09	2.15	7.07	0.27	9.50
1999	344	W. Turtle Shoal	1	0.16	1.98	0.66	0.43	4.07	1.63	2.79	6.12	0.47	9.38
1999	344	W. Turtle Shoal	2	0.00	0.04	0.00	0.70	6.43	0.54	0.04	7.67	0.47	8.18
1999	344	W. Turtle Shoal	Average	0.08	1.01	0.33	0.56	5.25	1.09	1.41	6.90	0.47	8.78
2002	344	W. Turtle Shoal	1	0.12	1.43	1.28	1.09	3.14	1.20	2.83	5.43	1.05	9.30
2002	344	W. Turtle Shoal	2	0.16	1.67	1.12	0.93	3.37	1.55	2.95	5.85	1.16	9.96
2002	344	W. Turtle Shoal	Average	0.14	1.55	1.20	1.01	3.26	1.38	2.89	5.64	1.10	9.63
1996	354	Dustan Rocks	1	0.04	1.17	0.76	0.57	5.42	2.65	1.97	8.64	1.55	12.16
1996	354	Dustan Rocks	2	0.00	1.21	0.76	0.61	5.68	2.80	1.97	9.09	1.78	12.84
1996	354	Dustan Rocks	Average	0.02	1.19	0.76	0.59	5.55	2.73	1.97	8.86	1.67	12.50
1998	354	Dustan Rocks	1	0.08	1.10	0.76	0.34	6.02	2.92	1.93	9.28	0.15	11.36
1998	354	Dustan Rocks	2	0.00	1.14	0.72	0.53	5.91	3.18	1.86	9.62	0.11	11.59
1998	354	Dustan Rocks	Average	0.04	1.12	0.74	0.44	5.97	3.05	1.89	9.45	0.13	11.48
1999	354	Dustan Rocks	1	0.00	1.52	0.91	1.02	7.05	3.14	2.42	11.21	0.42	14.05
1999	354	Dustan Rocks	2	0.00	0.04	0.00	0.68	6.29	0.53	0.04	7.50	0.49	8.03
1999	354	Dustan Rocks	Average	0.00	0.78	0.45	0.85	6.67	1.84	1.23	9.36	0.45	11.04
2002	354	Dustan Rocks	1	0.11	1.02	0.53	0.34	6.48	2.95	1.67	9.77	0.87	12.31
2002	354	Dustan Rocks	2	0.11	1.14	0.53	0.53	7.05	3.03	1.78	10.61	1.06	13.45
2002	354	Dustan Rocks	Average	0.11	1.08	0.53	0.44	6.76	2.99	1.72	10.19	0.97	12.88

Appendix II. Video-derived octocoral abundance. (continued)

Year	Site ID	Site Name	Trial#	G.ventalina - short	G.ventalina - medium	G.ventalina - tall	Other Octocorals - short	Other Octocorals - medium	Other Octocorals - tall	Station Total G. ventalina	Station Total Other Octocorals	Station Total Scleraxonia	Station Total All Octocorals
1996	503	Carysfort (Shallow)	3	0.26	3.70	0.89	0.52	7.81	0.78	4.85	9.11	0.81	14.78
1996	503	Carysfort (Shallow)	4	0.30	3.63	1.04	0.48	7.44	0.96	4.96	8.89	0.81	14.67
1996	503	Carysfort (Shallow)	Average	0.28	3.67	0.96	0.50	7.63	0.87	4.91	9.00	0.81	14.72
1998	503	Carysfort (Shallow)	1	0.33	2.74	1.37	1.11	7.81	0.96	4.44	9.89	1.44	15.78
1998	503	Carysfort (Shallow)	2	0.33	2.67	1.33	1.30	7.81	1.26	4.33	10.37	1.44	16.15
1998	503	Carysfort (Shallow)	Average	0.33	2.70	1.35	1.20	7.81	1.11	4.39	10.13	1.44	15.96
1999	503	Carysfort (Shallow)	1	0.81	3.22	1.04	1.44	7.74	0.78	5.07	9.96	0.52	15.56
1999	503	Carysfort (Shallow)	2	0.00	0.04	0.00	0.67	6.15	0.52	0.04	7.33	0.48	7.85
1999	503	Carysfort (Shallow)	Average	0.41	1.63	0.52	1.06	6.94	0.65	2.56	8.65	0.50	11.70
2002	503	Carysfort (Shallow)	3	0.04	1.85	0.78	0.96	7.52	0.56	2.67	9.04	0.44	12.15
2002	503	Carysfort (Shallow)	4	0.00	2.00	0.78	1.11	7.59	0.59	2.78	9.30	0.48	12.56
2002	503	Carysfort (Shallow)	Average	0.02	1.93	0.78	1.04	7.56	0.57	2.72	9.17	0.46	12.35
1996	513	Grecian Rocks	3	0.15	0.67	0.11	0.60	6.05	0.78	0.93	7.44	0.64	9.01
1996	513	Grecian Rocks	4	0.19	0.71	0.11	0.60	6.43	0.78	1.01	7.81	0.78	9.60
1996	513	Grecian Rocks	Average	0.17	0.69	0.11	0.60	6.24	0.78	0.97	7.62	0.71	9.30
1998	513	Grecian Rocks	1	0.15	0.64	0.22	0.86	6.20	1.72	1.01	8.78	0.34	10.13
1998	513	Grecian Rocks	2	0.15	0.71	0.19	0.86	6.35	1.91	1.05	9.12	0.26	10.43
1998	513	Grecian Rocks	Average	0.15	0.67	0.21	0.86	6.28	1.81	1.03	8.95	0.30	10.28
1999	513	Grecian Rocks	1	0.11	0.82	0.15	1.20	5.19	1.35	1.08	7.74	0.07	8.89
1999	513	Grecian Rocks	2	0.00	0.04	0.00	0.67	6.20	0.52	0.04	7.40	0.07	7.51
1999	513	Grecian Rocks	Average	0.06	0.43	0.07	0.93	5.70	0.93	0.56	7.57	0.07	8.20
2002	513	Grecian Rocks	1	0.04	0.19	0.15	1.64	5.79	1.38	0.37	8.82	0.45	9.64
2002	513	Grecian Rocks	2	0.00	0.19	0.15	2.02	6.17	1.31	0.34	9.49	0.52	10.35
2002	513	Grecian Rocks	Average	0.02	0.19	0.15	1.83	5.98	1.35	0.36	9.16	0.49	10.00
1996	531	Conch (Shallow)	1	0.00	0.45	0.04	0.42	2.39	0.68	0.49	3.48	0.00	3.98
1996	531	Conch (Shallow)	2	0.04	0.45	0.08	0.45	2.58	0.64	0.57	3.67	0.00	4.24
1996	531	Conch (Shallow)	Average	0.02	0.45	0.06	0.44	2.48	0.66	0.53	3.58	0.00	4.11
1998	531	Conch (Shallow)	1	0.00	0.23	0.19	0.27	1.52	0.80	0.42	2.58	0.23	3.22
1998	531	Conch (Shallow)	2	0.00	0.23	0.19	0.23	1.55	0.80	0.42	2.58	0.27	3.26
1998	531	Conch (Shallow)	Average	0.00	0.23	0.19	0.25	1.53	0.80	0.42	2.58	0.25	3.24
1999	531	Conch (Shallow)	1	0.15	0.23	0.04	0.53	0.98	0.27	0.42	1.78	0.15	2.35
1999	531	Conch (Shallow)	2	0.00	0.04	0.00	0.68	6.29	0.53	0.04	7.50	0.11	7.65
1999	531	Conch (Shallow)	Average	0.08	0.13	0.02	0.61	3.64	0.40	0.23	4.64	0.13	5.00
2002	531	Conch (Shallow)	1	0.53	0.00	0.04	3.03	3.64	0.27	0.57	6.93	0.04	7.54
2002	531	Conch (Shallow)	2	0.68	0.00	0.04	3.22	3.60	0.27	0.72	7.08	0.04	7.84
2002	531	Conch (Shallow)	Average	0.61	0.00	0.04	3.13	3.62	0.27	0.64	7.01	0.04	7.69
1996	533	Conch (Shallow)	1	0.04	0.63	0.48	0.15	1.63	0.59	1.15	2.37	0.26	3.78
1996	533	Conch (Shallow)	2	0.04	0.74	0.41	0.11	1.56	0.67	1.19	2.33	0.19	3.70
1996	533	Conch (Shallow)	Average	0.04	0.69	0.44	0.13	1.59	0.63	1.17	2.35	0.22	3.74
1998	533	Conch (Shallow)	1	0.19	0.33	0.07	0.85	1.74	0.56	0.59	3.15	0.15	3.89
1998	533	Conch (Shallow)	2	0.19	0.33	0.07	0.93	1.67	0.59	0.59	3.19	0.07	3.85
1998	533	Conch (Shallow)	Average	0.19	0.33	0.07	0.89	1.70	0.57	0.59	3.17	0.11	3.87
1999	533	Conch (Shallow)	1	0.81	0.26	0.04	1.33	1.63	0.37	1.11	3.33	0.11	4.56
1999	533	Conch (Shallow)	2	0.00	0.04	0.00	0.67	6.15	0.52	0.04	7.33	0.11	7.48
1999	533	Conch (Shallow)	Average	0.41	0.15	0.02	1.00	3.89	0.44	0.57	5.33	0.11	6.02
2002	533	Conch (Shallow)	1	0.52	0.00	0.00	2.19	3.11	0.52	0.52	5.81	0.00	6.33
2002	533	Conch (Shallow)	2	0.44	0.00	0.00	2.37	3.11	0.48	0.44	5.96	0.00	6.41
2002	533	Conch (Shallow)	Average	0.48	0.00	0.00	2.28	3.11	0.50	0.48	5.89	0.00	6.37

Appendix II. Video-derived octocoral abundance. (continued)

Year	Site ID	Site Name	Trial#	G.ventalina - short	G.ventalina - medium	G.ventalina - tall	Other Octocorals - short	Other Octocorals - medium	Other Octocorals - tall	Station Total G. ventalina	Station Total Other Octocorals	Station Total Scleraxonia	Station Total All Octocorals
1996	541	Alligator (Shallow)	1	0.11	0.08	0.00	0.68	4.70	1.44	0.19	6.82	0.00	7.01
1996	541	Alligator (Shallow)	2	0.23	0.08	0.00	0.68	5.30	1.40	0.30	7.39	0.00	7.69
1996	541	Alligator (Shallow)	Average	0.17	0.08	0.00	0.68	5.00	1.42	0.25	7.10	0.00	7.35
1998	541	Alligator (Shallow)	1	0.42	0.11	0.00	1.59	4.43	1.44	0.53	7.46	0.00	7.99
1998	541	Alligator (Shallow)	2	0.45	0.08	0.00	1.93	4.24	1.40	0.53	7.58	0.00	8.11
1998	541	Alligator (Shallow)	Average	0.44	0.09	0.00	1.76	4.34	1.42	0.53	7.52	0.00	8.05
1999	541	Alligator (Shallow)	1	1.89	0.19	0.00	1.44	3.67	1.36	2.08	6.48	0.00	8.56
1999	541	Alligator (Shallow)	2	0.00	0.04	0.00	0.68	6.29	0.53	0.04	7.50	0.00	7.54
1999	541	Alligator (Shallow)	Average	0.95	0.11	0.00	1.06	4.98	0.95	1.06	6.99	0.00	8.05
2002	541	Alligator (Shallow)	1	0.87	0.00	0.00	5.76	6.02	0.91	0.87	12.69	0.00	13.56
2002	541	Alligator (Shallow)	2	0.87	0.00	0.00	6.25	5.95	0.98	0.87	13.18	0.00	14.05
2002	541	Alligator (Shallow)	Average	0.87	0.00	0.00	6.00	5.98	0.95	0.87	12.94	0.00	13.81
1996	554	Tennessee (Shallow)	3	0.26	0.45	0.15	1.31	9.04	1.61	0.86	11.96	0.07	12.89
1996	554	Tennessee (Shallow)	4	0.26	0.49	0.11	1.42	8.86	1.72	0.86	12.00	0.07	12.93
1996	554	Tennessee (Shallow)	Average	0.26	0.47	0.13	1.36	8.95	1.66	0.86	11.98	0.07	12.91
1998	554	Tennessee (Shallow)	1	0.00	0.49	0.11	1.16	7.74	2.09	0.60	10.99	0.00	11.58
1998	554	Tennessee (Shallow)	2	0.00	0.49	0.11	1.16	7.92	1.79	0.60	10.87	0.00	11.47
1998	554	Tennessee (Shallow)	Average	0.00	0.49	0.11	1.16	7.83	1.94	0.60	10.93	0.00	11.53
1999	554	Tennessee (Shallow)	1	0.07	0.34	0.07	1.27	6.24	1.94	0.49	9.45	0.00	9.94
1999	554	Tennessee (Shallow)	2	0.00	0.04	0.00	0.67	6.20	0.52	0.04	7.40	0.00	7.44
1999	554	Tennessee (Shallow)	Average	0.04	0.19	0.04	0.97	6.22	1.23	0.26	8.43	0.00	8.69
2002	554	Tennessee (Shallow)	1	0.45	0.26	0.07	3.29	7.17	1.35	0.78	11.81	0.00	12.59
2002	554	Tennessee (Shallow)	2	0.60	0.19	0.07	3.66	7.29	1.49	0.86	12.44	0.00	13.30
2002	554	Tennessee (Shallow)	Average	0.52	0.22	0.07	3.48	7.23	1.42	0.82	12.13	0.00	12.95
1996	562	Sombrero (Shallow)	3	0.00	0.21	0.09	0.04	0.56	0.51	0.30	1.11	0.68	2.09
1996	562	Sombrero (Shallow)	4	0.00	0.21	0.09	0.04	0.56	0.51	0.30	1.11	0.77	2.18
1996	562	Sombrero (Shallow)	Average	0.00	0.21	0.09	0.04	0.56	0.51	0.30	1.11	0.73	2.14
1998	562	Sombrero (Shallow)	1	0.00	0.13	0.00	0.17	0.94	1.20	0.13	2.31	0.17	2.61
1998	562	Sombrero (Shallow)	2	0.00	0.13	0.00	0.17	0.85	1.20	0.13	2.22	0.17	2.52
1998	562	Sombrero (Shallow)	Average	0.00	0.13	0.00	0.17	0.90	1.20	0.13	2.26	0.17	2.56
1999	562	Sombrero (Shallow)	1	0.13	0.13	0.04	0.21	1.07	1.03	0.30	2.31	0.00	2.61
1999	562	Sombrero (Shallow)	2	0.00	0.04	0.00	0.77	7.09	0.60	0.04	8.46	0.00	8.50
1999	562	Sombrero (Shallow)	Average	0.06	0.09	0.02	0.49	4.08	0.81	0.17	5.38	0.00	5.56
2002	562	Sombrero (Shallow)	1	0.38	0.30	0.04	0.26	1.97	0.81	0.73	3.03	0.94	4.70
2002	562	Sombrero (Shallow)	2	0.47	0.26	0.04	0.34	1.97	0.77	0.77	3.08	0.94	4.79
2002	562	Sombrero (Shallow)	Average	0.43	0.28	0.04	0.30	1.97	0.79	0.75	3.06	0.94	4.74
1996	563	Sombrero (Shallow)	3	0.00	0.74	0.25	0.08	2.48	1.20	0.99	3.75	0.78	5.53
1996	563	Sombrero (Shallow)	4	0.00	0.78	0.21	0.08	2.27	1.16	0.99	3.51	0.54	5.03
1996	563	Sombrero (Shallow)	Average	0.00	0.76	0.23	0.08	2.37	1.18	0.99	3.63	0.66	5.28
1998	563	Sombrero (Shallow)	1	0.00	0.62	0.50	0.25	2.64	1.73	1.11	4.62	0.00	5.73
1998	563	Sombrero (Shallow)	2	0.00	0.70	0.41	0.25	2.89	1.65	1.11	4.79	0.00	5.90
1998	563	Sombrero (Shallow)	Average	0.00	0.66	0.45	0.25	2.76	1.69	1.11	4.70	0.00	5.82
1999	563	Sombrero (Shallow)	1	0.25	0.99	0.54	0.45	2.97	1.20	1.77	4.62	0.00	6.39
1999	563	Sombrero (Shallow)	2	0.00	0.04	0.00	0.74	6.85	0.58	0.04	8.17	0.00	8.21
1999	563	Sombrero (Shallow)	Average	0.12	0.52	0.27	0.60	4.91	0.89	0.91	6.39	0.00	7.30
2002	563	Sombrero (Shallow)	1	0.25	0.58	0.58	1.28	3.55	1.44	1.40	6.27	0.50	8.17
2002	563	Sombrero (Shallow)	2	0.12	0.62	0.58	1.28	3.42	1.49	1.32	6.19	0.50	8.00
2002	563	Sombrero (Shallow)	Average	0.19	0.60	0.58	1.28	3.49	1.46	1.36	6.23	0.50	8.09

Appendix II. Video-derived octocoral abundance. (continued)

Year	Site ID	Site Name	Trial#	G.ventalina - short	G.ventalina - medium	G.ventalina - tall	Other Octocorals - short	Other Octocorals - medium	Other Octocorals - tall	Station Total G. ventalina	Station Total Other Octocorals	Station Total Scleraxonia	Station Total All Octocorals
1996	702	Carysfort (Deep)	1	0.00	0.00	0.04	0.38	7.43	0.68	0.04	8.48	2.93	11.45
1996	702	Carysfort (Deep)	2	0.00	0.00	0.04	0.56	7.77	0.56	0.04	8.90	3.12	12.05
1996	702	Carysfort (Deep)	Average	0.00	0.00	0.04	0.47	7.60	0.62	0.04	8.69	3.02	11.75
1998	702	Carysfort (Deep)	1	0.00	0.00	0.00	0.71	4.39	0.34	0.00	5.44	3.15	8.60
1998	702	Carysfort (Deep)	2	0.00	0.00	0.00	0.71	4.54	0.30	0.00	5.56	3.49	9.05
1998	702	Carysfort (Deep)	Average	0.00	0.00	0.00	0.71	4.47	0.32	0.00	5.50	3.32	8.82
1999	702	Carysfort (Deep)	1	0.00	0.08	0.04	1.76	8.22	0.75	0.11	10.74	5.37	16.22
1999	702	Carysfort (Deep)	2	0.00	0.04	0.00	0.68	6.23	0.53	0.04	7.43	5.52	12.99
1999	702	Carysfort (Deep)	Average	0.00	0.06	0.02	1.22	7.23	0.64	0.08	9.08	5.44	14.60
2002	702	Carysfort (Deep)	1	0.00	0.00	0.04	1.88	8.90	0.75	0.04	11.52	5.33	16.89
2002	702	Carysfort (Deep)	2	0.00	0.00	0.04	1.73	10.25	0.71	0.04	12.69	5.29	18.02
2002	702	Carysfort (Deep)	Average	0.00	0.00	0.04	1.80	9.57	0.73	0.04	12.11	5.31	17.45
1996	721	Molasses (Deep)	1	0.04	1.24	0.19	1.62	9.65	0.75	1.47	12.03	2.30	15.80
1996	721	Molasses (Deep)	2	0.11	1.43	0.08	1.55	9.77	0.68	1.62	11.99	2.53	16.14
1996	721	Molasses (Deep)	Average	0.08	1.34	0.13	1.58	9.71	0.72	1.55	12.01	2.41	15.97
1998	721	Molasses (Deep)	1	0.11	1.06	0.26	3.24	11.58	0.79	1.43	15.61	0.72	17.76
1998	721	Molasses (Deep)	2	0.11	1.09	0.26	3.39	11.95	0.79	1.47	16.14	0.64	18.25
1998	721	Molasses (Deep)	Average	0.11	1.07	0.26	3.32	11.76	0.79	1.45	15.87	0.68	18.01
1999	721	Molasses (Deep)	1	0.19	0.79	0.15	3.36	10.07	0.90	1.13	14.33	1.02	16.48
1999	721	Molasses (Deep)	2	0.00	0.04	0.00	0.68	6.26	0.53	0.04	7.47	0.94	8.45
1999	721	Molasses (Deep)	Average	0.09	0.41	0.08	2.02	8.16	0.72	0.58	10.90	0.98	12.46
2002	721	Molasses (Deep)	1	0.23	0.41	0.11	4.45	12.07	0.38	0.75	16.89	2.94	20.59
2002	721	Molasses (Deep)	2	0.08	0.41	0.15	4.56	12.03	0.34	0.64	16.93	2.98	20.55
2002	721	Molasses (Deep)	Average	0.15	0.41	0.13	4.51	12.05	0.36	0.70	16.91	2.96	20.57
1996	722	Molasses (Deep)	1	0.08	0.70	0.04	1.05	8.26	1.16	0.81	10.47	1.36	12.64
1996	722	Molasses (Deep)	2	0.12	0.66	0.04	1.01	8.68	1.16	0.81	10.85	1.40	13.06
1996	722	Molasses (Deep)	Average	0.10	0.68	0.04	1.03	8.47	1.16	0.81	10.66	1.38	12.85
1998	722	Molasses (Deep)	1	0.12	0.35	0.08	3.18	8.49	1.24	0.54	12.91	0.50	13.95
1998	722	Molasses (Deep)	2	0.12	0.31	0.19	3.33	8.33	1.12	0.62	12.79	0.47	13.88
1998	722	Molasses (Deep)	Average	0.12	0.33	0.14	3.26	8.41	1.18	0.58	12.85	0.48	13.91
1999	722	Molasses (Deep)	1	0.39	0.31	0.16	3.60	8.06	0.81	0.85	12.48	0.54	13.88
1999	722	Molasses (Deep)	2	0.00	0.04	0.00	0.70	6.43	0.54	0.04	7.67	0.54	8.26
1999	722	Molasses (Deep)	Average	0.19	0.17	0.08	2.15	7.25	0.68	0.45	10.08	0.54	11.07
2002	722	Molasses (Deep)	1	0.12	0.12	0.00	4.69	10.81	0.70	0.23	16.20	1.78	18.22
2002	722	Molasses (Deep)	2	0.08	0.12	0.00	4.34	11.24	0.66	0.19	16.24	1.74	18.18
2002	722	Molasses (Deep)	Average	0.10	0.12	0.00	4.52	11.03	0.68	0.21	16.22	1.76	18.20
1996	733	Conch (Deep)	1	0.00	0.03	0.00	0.35	2.01	0.56	0.03	2.92	3.99	6.94
1996	733	Conch (Deep)	2	0.00	0.03	0.00	0.28	2.29	0.45	0.03	3.02	4.13	7.19
1996	733	Conch (Deep)	Average	0.00	0.03	0.00	0.31	2.15	0.50	0.03	2.97	4.06	7.07
1998	733	Conch (Deep)	1	0.17	0.07	0.00	0.14	1.84	0.42	0.24	2.40	2.36	5.00
1998	733	Conch (Deep)	2	0.17	0.07	0.00	0.17	1.94	0.38	0.24	2.50	2.57	5.31
1998	733	Conch (Deep)	Average	0.17	0.07	0.00	0.16	1.89	0.40	0.24	2.45	2.47	5.16
1999	733	Conch (Deep)	1	0.10	0.17	0.03	0.35	3.47	0.45	0.31	4.27	2.40	6.98
1999	733	Conch (Deep)	2	0.00	0.03	0.00	0.63	5.76	0.49	0.03	6.88	2.74	9.65
1999	733	Conch (Deep)	Average	0.05	0.10	0.02	0.49	4.62	0.47	0.17	5.57	2.57	8.32
2002	733	Conch (Deep)	1	0.00	0.17	0.03	0.63	4.62	0.66	0.21	5.90	1.77	7.88
2002	733	Conch (Deep)	2	0.00	0.21	0.03	0.94	4.34	0.76	0.24	6.04	1.77	8.06
2002	733	Conch (Deep)	Average	0.00	0.19	0.03	0.78	4.48	0.71	0.23	5.97	1.77	7.97

Appendix II. Video-derived octocoral abundance. (continued)

Year	Site ID	Site Name	Trial#	G.ventalina - short	G.ventalina - medium	G.ventalina - tall	Other Octocorals - short	Other Octocorals - medium	Other Octocorals - tall	Station Total G. ventalina	Station Total Other Octocorals	Station Total Scleraxonia	Station Total All Octocorals
1996	743	Alligator (Deep)	1	0.00	0.00	0.00	0.95	8.47	1.33	0.00	10.75	0.07	10.82
1996	743	Alligator (Deep)	2	0.00	0.00	0.00	1.05	8.33	1.37	0.00	10.75	0.07	10.82
1996	743	Alligator (Deep)	Average	0.00	0.00	0.00	1.00	8.40	1.35	0.00	10.75	0.07	10.82
1998	743	Alligator (Deep)	1	0.00	0.00	0.00	1.58	7.67	1.79	0.00	11.03	0.11	11.13
1998	743	Alligator (Deep)	2	0.00	0.00	0.00	1.75	7.60	1.93	0.00	11.27	0.07	11.34
1998	743	Alligator (Deep)	Average	0.00	0.00	0.00	1.66	7.63	1.86	0.00	11.15	0.09	11.24
1999	743	Alligator (Deep)	1	0.07	0.04	0.00	1.61	7.49	1.33	0.11	10.43	0.14	10.68
1999	743	Alligator (Deep)	2	0.00	0.04	0.00	0.63	5.81	0.49	0.04	6.93	0.14	7.11
1999	743	Alligator (Deep)	Average	0.04	0.04	0.00	1.12	6.65	0.91	0.07	8.68	0.14	8.89
2002	743	Alligator (Deep)	1	0.00	0.04	0.00	3.29	5.60	1.19	0.04	10.08	0.00	10.12
2002	743	Alligator (Deep)	2	0.00	0.04	0.00	3.75	5.71	0.95	0.04	10.40	0.00	10.43
2002	743	Alligator (Deep)	Average	0.00	0.04	0.00	3.52	5.65	1.07	0.04	10.24	0.00	10.28
1996	753	Tennessee (Deep)	1	0.07	0.62	0.47	0.62	3.15	1.01	1.16	4.78	0.94	6.88
1996	753	Tennessee (Deep)	2	0.07	0.69	0.40	0.69	3.15	1.09	1.16	4.93	1.09	7.17
1996	753	Tennessee (Deep)	Average	0.07	0.65	0.43	0.65	3.15	1.05	1.16	4.86	1.01	7.03
1998	753	Tennessee (Deep)	1	0.14	0.65	0.40	0.69	3.19	0.98	1.20	4.86	0.14	6.20
1998	753	Tennessee (Deep)	2	0.11	0.69	0.36	0.76	3.30	0.76	1.16	4.82	0.18	6.16
1998	753	Tennessee (Deep)	Average	0.13	0.67	0.38	0.72	3.24	0.87	1.18	4.84	0.16	6.18
1999	753	Tennessee (Deep)	1	0.00	0.29	0.47	0.40	2.57	0.87	0.76	3.84	0.00	4.60
1999	753	Tennessee (Deep)	2	0.00	0.04	0.00	0.65	6.01	0.51	0.04	7.17	0.00	7.21
1999	753	Tennessee (Deep)	Average	0.00	0.16	0.24	0.53	4.29	0.69	0.40	5.51	0.00	5.91
2002	753	Tennessee (Deep)	1	0.04	0.51	0.22	1.99	3.62	0.58	0.76	6.20	0.04	6.99
2002	753	Tennessee (Deep)	2	0.04	0.47	0.25	1.99	3.91	0.58	0.76	6.49	0.04	7.28
2002	753	Tennessee (Deep)	Average	0.04	0.49	0.24	1.99	3.77	0.58	0.76	6.34	0.04	7.14
1996	763	Sombrero (Deep)	1	0.04	0.16	0.00	0.41	6.18	1.50	0.20	8.09	4.47	12.76
1996	763	Sombrero (Deep)	2	0.04	0.20	0.00	0.61	6.38	1.42	0.24	8.41	5.12	13.78
1996	763	Sombrero (Deep)	Average	0.04	0.18	0.00	0.51	6.28	1.46	0.22	8.25	4.80	13.27
1998	763	Sombrero (Deep)	1	0.00	0.24	0.00	0.24	5.73	0.49	0.24	6.46	0.20	6.91
1998	763	Sombrero (Deep)	2	0.00	0.24	0.00	0.16	5.69	0.53	0.24	6.38	0.16	6.79
1998	763	Sombrero (Deep)	Average	0.00	0.24	0.00	0.20	5.71	0.51	0.24	6.42	0.18	6.85
1999	763	Sombrero (Deep)	1	0.00	0.12	0.00	0.00	2.15	0.77	0.12	2.93	0.08	3.13
1999	763	Sombrero (Deep)	2	0.00	0.04	0.00	0.73	6.75	0.57	0.04	8.05	0.08	8.17
1999	763	Sombrero (Deep)	Average	0.00	0.08	0.00	0.37	4.45	0.67	0.08	5.49	0.08	5.65
2002	763	Sombrero (Deep)	1	0.00	0.04	0.00	1.67	2.60	0.53	0.04	4.80	0.49	5.33
2002	763	Sombrero (Deep)	2	0.00	0.04	0.00	2.03	2.52	0.49	0.04	5.04	0.53	5.61
2002	763	Sombrero (Deep)	Average	0.00	0.04	0.00	1.85	2.56	0.51	0.04	4.92	0.51	5.47
1996	764	Sombrero (Deep)	1	0.00	0.17	0.08	0.51	6.19	1.01	0.25	7.70	4.46	12.42
1996	764	Sombrero (Deep)	2	0.00	0.17	0.08	0.59	6.78	1.09	0.25	8.46	5.05	13.76
1996	764	Sombrero (Deep)	Average	0.00	0.17	0.08	0.55	6.48	1.05	0.25	8.08	4.76	13.09
1998	764	Sombrero (Deep)	1	0.00	0.38	0.04	0.42	5.68	0.76	0.42	6.86	0.17	7.45
1998	764	Sombrero (Deep)	2	0.00	0.38	0.04	0.59	5.35	0.76	0.42	6.69	0.08	7.20
1998	764	Sombrero (Deep)	Average	0.00	0.38	0.04	0.51	5.51	0.76	0.42	6.78	0.13	7.32
1999	764	Sombrero (Deep)	1	0.00	0.17	0.04	0.08	2.48	0.38	0.21	2.95	0.04	3.20
1999	764	Sombrero (Deep)	2	0.00	0.04	0.00	0.76	6.99	0.59	0.04	8.33	0.00	8.38
1999	764	Sombrero (Deep)	Average	0.00	0.11	0.02	0.42	4.73	0.48	0.13	5.64	0.02	5.79
2002	764	Sombrero (Deep)	1	0.08	0.00	0.00	1.89	3.32	0.51	0.08	5.72	0.42	6.23
2002	764	Sombrero (Deep)	2	0.08	0.00	0.00	2.19	3.07	0.42	0.08	5.68	0.38	6.14
2002	764	Sombrero (Deep)	Average	0.08	0.00	0.00	2.04	3.20	0.46	0.08	5.70	0.40	6.19

Appendix III. Abridged results of the Bray-Curtis similarity matrix, no transformation, not standardized.

Bray-Curtis similarity coefficients. No standardization, no transformation							
1996 comparison	Bray-Curtis similarity coefficient	1998 comparison	Bray-Curtis similarity coefficient	1999 comparison	Bray-Curtis similarity coefficient	2002 comparison	Bray-Curtis similarity coefficient
141 96video1 vs 141 96video2	96.358	141 98video1 vs 141 98video2	95.050	141 99video1 vs 141 99video2	98.030	141 02video1 vs 141 02video2	96.755
142 96video1 vs 142 96video2	98.451	142 98video1 vs 142 98video2	99.062	142 99video1 vs 142 99video2	96.317	142 02video1 vs 142 02video2	97.561
152 96video1 vs 152 96video2	96.697	152 98video1 vs 152 98video2	97.628	152 99video1 vs 152 99video2	94.757	152 02video1 vs 152 02video2	98.252
154 96video1 vs 154 96video2	97.838	154 98video1 vs 154 98video2	97.306	154 99video1 vs 154 99video2	99.022	154 02video1 vs 154 02video2	98.253
302 96video1 vs 302 96video2	93.685	302 98video1 vs 302 98video2	96.792	302 99video1 vs 302 99video2	97.664	302 02video1 vs 302 02video2	95.070
322 96video1 vs 322 96video2	97.037	322 98video1 vs 322 98video2	96.739	322 99video1 vs 322 99video2	95.620	322 02video3 vs 322 02video4	96.970
323 96video1 vs 323 96video2	97.517	323 98video1 vs 323 98video2	97.436	323 99video1 vs 323 99video2	97.845	323 02video3 vs 323 02video4	97.131
331 96video1 vs 331 96video2	97.283	331 98video1 vs 331 98video2	95.055	331 99video1 vs 331 99video2	98.182	331 02video1 vs 331 02video2	94.891
341 96video3 vs 341 96video4	95.535	341 98video1 vs 341 98video2	97.122	341 99video1 vs 341 99video2	98.148	341 02video1 vs 341 02video2	91.620
343 96video3 vs 343 96video4	98.750	343 98video1 vs 343 98video2	98.502	343 99video1 vs 343 99video2	97.487	343 02video1 vs 343 02video2	96.855
344 96video3 vs 344 96video4	97.381	344 98video1 vs 344 98video2	98.367	344 99video1 vs 344 99video2	94.781	344 02video1 vs 344 02video2	93.360
354 96video1 vs 354 96video2	96.970	354 98video1 vs 354 98video2	96.700	354 99video1 vs 354 99video2	95.833	354 02video1 vs 354 02video2	95.588
503 96video3 vs 503 96video4	97.107	503 98video1 vs 503 98video2	98.144	503 99video1 vs 503 99video2	96.074	503 02video3 vs 503 02video4	98.051
513 96video3 vs 513 96video4	96.787	513 98video1 vs 513 98video2	97.455	513 99video1 vs 513 99video2	98.545	513 02video1 vs 513 02video2	95.327
531 96video1 vs 531 96video2	95.853	531 98video1 vs 531 98video2	98.246	531 99video1 vs 531 99video2	95.238	531 02video1 vs 531 02video2	97.537
533 96video1 vs 533 96video2	94.059	533 98video1 vs 533 98video2	96.651	533 99video1 vs 533 99video2	98.387	533 02video1 vs 533 02video2	97.674
541 96video1 vs 541 96video2	94.845	541 98video1 vs 541 98video2	96.000	541 99video1 vs 541 99video2	99.123	541 02video1 vs 541 02video2	97.668
554 96video3 vs 554 96video4	98.119	554 98video1 vs 554 98video2	97.893	554 99video1 vs 554 99video2	98.155	554 02video1 vs 554 02video2	96.681
562 96video3 vs 562 96video4	98.000	562 98video1 vs 562 98video2	98.333	562 99video1 vs 562 99video2	92.800	562 02video1 vs 562 02video2	97.297
563 96video3 vs 563 96video4	94.531	563 98video1 vs 563 98video2	95.745	563 99video1 vs 563 99video2	97.452	563 02video1 vs 563 02video2	97.959
702 96video1 vs 702 96video2	96.486	702 98video1 vs 702 98video2	97.021	702 99video1 vs 702 99video2	97.829	702 02video1 vs 702 02video2	95.484
721 96video1 vs 721 96video2	97.285	721 98video1 vs 721 98video2	98.220	721 99video1 vs 721 99video2	95.195	721 02video1 vs 721 02video2	98.992
722 96video1 vs 722 96video2	97.738	722 98video1 vs 722 98video2	97.772	722 99video1 vs 722 99video2	98.202	722 02video1 vs 722 02video2	97.551
733 96video1 vs 733 96video2	95.823	733 98video1 vs 733 98video2	96.296	733 99video1 vs 733 99video2	95.844	733 02video1 vs 733 02video2	95.425
743 96video1 vs 743 96video2	98.706	743 98video1 vs 743 98video2	98.131	743 99video1 vs 743 99video2	97.271	743 02video1 vs 743 02video2	96.082
753 96video1 vs 753 96video2	96.907	753 98video1 vs 753 98video2	95.601	753 99video1 vs 753 99video2	94.253	753 02video1 vs 753 02video2	97.462
763 96video1 vs 763 96video2	95.559	763 98video1 vs 763 98video2	98.516	763 99video1 vs 763 99video2	99.355	763 02video1 vs 763 02video2	95.167
764 96video1 vs 764 96video2	94.855	764 98video1 vs 764 98video2	95.977	764 99video1 vs 764 99video2	94.805	764 02video1 vs 764 02video2	94.558

Appendix IVa. Descriptive statistics by habitat type, 1996.

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
1996	Mean	0.09	1.07	0.39	0.29	5.79	2.62	0.75	1.55	8.70	0.37	6.86	3.01	10.99
Upper Patch Stations	Standard Error	0.03	0.59	0.17	0.10	1.95	0.51	0.18	0.75	2.48	0.12	2.47	0.65	3.12
	Median	0.10	0.61	0.32	0.31	4.87	2.21	0.59	1.01	7.43	0.43	5.19	2.53	8.89
	Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.06	1.18	0.34	0.20	3.90	1.01	0.35	1.49	4.97	0.25	4.94	1.30	6.25
	Sample Variance	0.00	1.40	0.11	0.04	15.19	1.03	0.12	2.22	24.66	0.06	24.39	1.68	39.06
	Kurtosis	2.26	2.93	-2.46	0.33	2.34	3.11	3.71	2.50	2.48	2.07	3.17	3.49	2.91
	Skewness	-1.28	1.73	0.63	-0.51	1.29	1.77	1.92	1.62	1.38	-1.17	1.71	1.82	1.66
	Range	0.14	2.53	0.71	0.47	9.16	2.16	0.75	3.23	11.59	0.58	11.10	2.87	13.99
	Minimum	0.00	0.27	0.11	0.03	2.12	1.95	0.52	0.49	4.17	0.03	2.99	2.06	6.11
	Maximum	0.14	2.80	0.81	0.51	11.29	4.11	1.27	3.71	15.76	0.61	14.09	4.92	20.09
	Sum	0.35	4.30	1.56	1.15	23.16	10.48	2.98	6.21	34.79	1.50	27.46	12.04	43.98
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1996	Confidence Level(95.0%)	0.10	1.88	0.54	0.32	6.20	1.61	0.56	2.37	7.90	0.39	7.86	2.06	9.94
1996	Mean	0.13	1.37	0.39	0.42	4.49	0.74	0.44	1.89	5.64	0.54	5.86	1.13	7.97
Upper Shallow Stations	Standard Error	0.06	0.77	0.21	0.10	1.45	0.06	0.19	1.01	1.59	0.15	2.08	0.25	2.58
	Median	0.10	0.69	0.28	0.47	4.36	0.72	0.47	1.07	5.60	0.61	4.93	0.99	6.71
	Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.12	1.53	0.42	0.20	2.91	0.11	0.39	2.03	3.18	0.29	4.17	0.49	5.17
	Sample Variance	0.01	2.35	0.17	0.04	8.45	0.01	0.15	4.11	10.09	0.08	17.36	0.24	26.72
	Kurtosis	-2.26	3.90	0.29	2.20	-4.47	-2.92	-4.13	3.68	-4.41	-1.70	-1.20	2.39	-1.25
	Skewness	0.64	1.97	1.14	-1.36	0.11	0.41	-0.21	1.90	0.03	-0.77	0.84	1.49	0.86
	Range	0.26	3.21	0.91	0.47	6.04	0.24	0.81	4.38	6.65	0.61	9.02	1.11	10.98
	Minimum	0.02	0.45	0.06	0.13	1.59	0.63	0.00	0.53	2.35	0.17	2.28	0.72	3.74
	Maximum	0.28	3.67	0.96	0.60	7.63	0.87	0.81	4.91	9.00	0.78	11.30	1.83	14.72
	Sum	0.50	5.50	1.58	1.66	17.94	2.95	1.75	7.58	22.55	2.17	23.44	4.52	31.88
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1996	Confidence Level(95.0%)	0.19	2.44	0.66	0.32	4.63	0.18	0.62	3.22	5.06	0.46	6.63	0.78	8.23
1996	Mean	0.04	0.51	0.05	0.85	6.98	0.75	2.72	0.61	8.58	0.89	7.50	0.80	11.91
Upper Deep Stations	Standard Error	0.03	0.32	0.03	0.29	1.67	0.14	0.56	0.36	1.99	0.31	1.90	0.15	1.84
	Median	0.04	0.36	0.04	0.75	8.04	0.67	2.72	0.43	9.67	0.80	8.37	0.75	12.30
	Mode	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.05	0.63	0.06	0.58	3.33	0.29	1.12	0.72	3.98	0.62	3.81	0.30	3.69
	Sample Variance	0.00	0.40	0.00	0.33	11.12	0.08	1.26	0.53	15.86	0.39	14.51	0.09	13.62
	Kurtosis	-5.12	-1.29	2.57	-1.68	2.80	2.38	0.11	-1.55	1.73	-2.41	1.71	0.21	1.29
	Skewness	0.15	0.85	1.36	0.67	-1.60	1.47	0.00	0.80	-1.35	0.55	-1.21	0.82	-0.61
	Range	0.10	1.34	0.13	1.27	7.56	0.66	2.69	1.51	9.04	1.35	8.86	0.70	8.90
	Minimum	0.00	0.00	0.00	0.31	2.15	0.50	1.38	0.03	2.97	0.31	2.19	0.50	7.07
	Maximum	0.10	1.34	0.13	1.58	9.71	1.16	4.06	1.55	12.01	1.66	11.05	1.20	15.97
	Sum	0.17	2.05	0.21	3.39	27.93	3.00	10.87	2.43	34.33	3.56	29.98	3.21	47.63
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1996	Confidence Level(95.0%)	0.08	1.01	0.09	0.92	5.31	0.46	1.79	1.15	6.34	0.99	6.06	0.48	5.87

Appendix IVa. Descriptive statistics by habitat type, 1996 (continued)

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
1996	Mean	0.01	0.06	0.00	1.85	5.56	1.25	0.20	0.07	8.66	1.86	5.62	1.25	8.93
Middle Hardbottom Stations	Standard Error	0.01	0.04	0.00	0.36	0.96	0.14	0.12	0.04	1.42	0.36	0.99	0.14	1.35
	Median	0.00	0.06	0.00	1.74	5.60	1.30	0.17	0.07	8.74	1.76	5.67	1.30	8.99
	Mode	0.00	0.00	0.00	#N/A	#N/A	#N/A	0.00	0.00	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.02	0.07	0.00	0.72	1.92	0.27	0.23	0.08	2.85	0.72	1.99	0.27	2.70
	Sample Variance	0.00	0.01	0.00	0.52	3.68	0.07	0.05	0.01	8.12	0.53	3.96	0.07	7.29
	Kurtosis	4.00	-5.63	#DIV/0!	-2.44	-5.76	-0.91	-4.89	-5.75	-5.42	-2.84	-5.78	-0.91	-5.48
	Skewness	2.00	0.06	#DIV/0!	0.55	-0.02	-0.80	0.19	0.04	-0.05	0.48	-0.02	-0.80	-0.03
	Range	0.04	0.13	0.00	1.56	3.59	0.60	0.45	0.15	5.56	1.56	3.71	0.60	5.24
	Minimum	0.00	0.00	0.00	1.18	3.72	0.90	0.00	0.00	5.80	1.18	3.72	0.90	6.25
	Maximum	0.04	0.13	0.00	2.74	7.31	1.50	0.45	0.15	11.36	2.74	7.42	1.50	11.49
	Sum	0.04	0.25	0.00	7.40	22.23	5.01	0.79	0.28	34.65	7.44	22.48	5.01	35.72
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1996	Confidence Level(95.0%)	0.03	0.11	0.00	1.15	3.05	0.43	0.37	0.13	4.53	1.15	3.17	0.43	4.30
1996	Mean	0.09	2.26	0.71	0.52	6.05	1.94	2.07	3.06	8.51	0.60	8.32	2.64	13.64
Middle Patch Stations	Standard Error	0.04	0.38	0.10	0.08	0.22	0.27	0.25	0.41	0.20	0.10	0.59	0.32	0.66
	Median	0.07	2.45	0.77	0.52	6.07	1.75	2.06	3.24	8.55	0.56	8.52	2.59	13.45
	Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.08	0.76	0.21	0.16	0.44	0.54	0.49	0.82	0.40	0.21	1.19	0.64	1.31
	Sample Variance	0.01	0.58	0.04	0.03	0.19	0.30	0.24	0.67	0.16	0.04	1.41	0.41	1.73
	Kurtosis	2.33	1.75	2.80	-1.53	-2.46	2.85	-5.85	-0.59	-4.59	1.42	0.23	1.62	-4.09
	Skewness	1.38	-1.27	-1.51	-0.11	-0.11	1.65	0.02	-0.91	-0.23	1.13	-0.84	0.53	0.33
	Range	0.17	1.76	0.48	0.37	0.98	1.22	0.91	1.82	0.80	0.48	2.75	1.57	2.65
	Minimum	0.02	1.19	0.41	0.33	5.55	1.51	1.63	1.97	8.06	0.41	6.74	1.92	12.50
	Maximum	0.19	2.95	0.89	0.70	6.53	2.73	2.54	3.79	8.86	0.89	9.49	3.48	15.15
	Sum	0.35	9.05	2.83	2.07	24.22	7.74	8.29	12.23	34.03	2.42	33.27	10.58	54.55
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1996	Confidence Level(95.0%)	0.12	1.21	0.33	0.25	0.70	0.87	0.78	1.31	0.64	0.33	1.89	1.02	2.09
1996	Mean	0.11	0.38	0.11	0.54	4.22	1.19	0.37	0.60	5.96	0.65	4.60	1.30	6.92
Middle Shallow Stations	Standard Error	0.07	0.15	0.05	0.31	1.82	0.25	0.19	0.19	2.35	0.37	1.83	0.25	2.27
	Median	0.09	0.34	0.11	0.38	3.69	1.30	0.37	0.58	5.37	0.47	4.11	1.41	6.31
	Mode	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.13	0.30	0.09	0.62	3.64	0.50	0.38	0.38	4.71	0.75	3.66	0.50	4.53
	Sample Variance	0.02	0.09	0.01	0.39	13.27	0.25	0.15	0.15	22.15	0.56	13.42	0.25	20.55
	Kurtosis	-3.70	-1.19	0.41	-0.86	-0.39	1.22	-5.66	-5.33	-0.61	-1.37	0.55	2.33	0.86
	Skewness	0.41	0.58	0.16	0.93	0.70	-1.09	-0.01	0.08	0.60	0.83	0.71	-1.20	0.73
	Range	0.26	0.69	0.23	1.32	8.39	1.15	0.73	0.74	10.87	1.58	8.65	1.20	10.77
	Minimum	0.00	0.08	0.00	0.04	0.56	0.51	0.00	0.25	1.11	0.04	0.77	0.60	2.14
	Maximum	0.26	0.76	0.23	1.36	8.95	1.66	0.73	0.99	11.98	1.63	9.42	1.79	12.91
	Sum	0.43	1.52	0.44	2.17	16.88	4.77	1.46	2.39	23.82	2.60	18.40	5.22	27.68
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1996	Confidence Level(95.0%)	0.21	0.48	0.15	0.99	5.80	0.79	0.61	0.61	7.49	1.19	5.83	0.80	7.21

Appendix IVa. Descriptive statistics by habitat type, 1996 (continued)

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
1996	Mean	0.03	0.25	0.13	0.68	6.08	1.23	2.66	0.41	7.98	0.70	6.33	1.36	11.05
Middle Deep Stations	Standard Error	0.02	0.14	0.10	0.11	1.09	0.10	1.24	0.26	1.21	0.11	0.95	0.08	1.45
	Median	0.02	0.18	0.04	0.60	6.38	1.20	2.89	0.24	8.17	0.64	6.56	1.41	11.95
	Mode	0.00	#N/A	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.04	0.28	0.21	0.22	2.17	0.21	2.47	0.51	2.42	0.21	1.90	0.16	2.91
	Sample Variance	0.00	0.08	0.04	0.05	4.72	0.04	6.12	0.26	5.84	0.05	3.60	0.03	8.44
	Kurtosis	-2.32	2.72	3.19	2.41	1.83	-4.55	-5.28	3.21	1.59	0.56	1.73	0.88	0.71
	Skewness	0.66	1.45	1.79	1.59	-0.81	0.25	-0.12	1.70	-0.45	1.22	-0.70	-1.26	-1.24
	Range	0.07	0.65	0.43	0.49	5.25	0.41	4.73	1.16	5.89	0.45	4.60	0.35	6.24
	Minimum	0.00	0.00	0.00	0.51	3.15	1.05	0.07	0.00	4.86	0.55	3.80	1.14	7.03
	Maximum	0.07	0.65	0.43	1.00	8.40	1.46	4.80	1.16	10.75	1.00	8.40	1.49	13.27
	Sum	0.11	1.00	0.52	2.71	24.32	4.91	10.64	1.64	31.94	2.82	25.32	5.43	44.21
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1996	Confidence Level(95.0%)	0.06	0.45	0.33	0.35	3.46	0.33	3.94	0.82	3.85	0.34	3.02	0.25	4.62
1996	Mean	0.07	0.85	0.26	0.73	5.60	1.39	1.31	1.17	7.72	0.80	6.44	1.64	10.20
1996 All Stations	Standard Error	0.02	0.20	0.06	0.12	0.50	0.15	0.27	0.26	0.63	0.12	0.60	0.18	0.80
	Median	0.04	0.46	0.11	0.53	6.05	1.27	0.72	0.72	8.07	0.61	6.70	1.42	10.91
	Mode	0.00	0.00	0.00	#N/A	#N/A	1.42	0.00	0.00	#N/A	#N/A	#N/A	1.42	#N/A
	Standard Deviation	0.08	1.04	0.32	0.63	2.67	0.78	1.42	1.37	3.35	0.64	3.18	0.96	4.24
	Sample Variance	0.01	1.08	0.10	0.40	7.11	0.60	2.03	1.87	11.24	0.40	10.10	0.93	18.00
	Kurtosis	0.71	1.22	-0.13	2.96	-0.54	4.56	0.91	1.15	0.06	2.26	-0.22	3.94	-0.34
	Skewness	1.22	1.51	1.14	1.65	0.00	1.76	1.32	1.44	0.05	1.43	0.32	1.71	0.09
	Range	0.28	3.67	0.96	2.71	10.73	3.61	4.80	4.91	14.65	2.71	13.32	4.42	17.96
	Minimum	0.00	0.00	0.00	0.03	0.56	0.50	0.00	0.00	1.11	0.03	0.77	0.50	2.14
	Maximum	0.28	3.67	0.96	2.74	11.29	4.11	4.80	4.91	15.76	2.74	14.09	4.92	20.09
	Sum	1.95	23.67	7.14	20.55	156.68	38.87	36.78	32.76	216.10	22.51	180.35	46.01	285.65
	Count	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
1996	Confidence Level(95.0%)	0.03	0.40	0.12	0.24	1.03	0.30	0.55	0.53	1.30	0.25	1.23	0.37	1.65

Appendix IVb. Descriptive statistics by habitat type, 1998.

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
1998	Mean	0.18	1.35	0.31	0.79	7.37	2.07	0.85	1.83	10.23	0.96	8.72	2.37	12.91
Upper Patch Stations	Standard Error	0.07	0.86	0.15	0.47	2.96	0.24	0.24	1.05	3.65	0.53	3.76	0.35	4.82
	Median	0.18	0.61	0.22	0.42	5.65	2.04	0.75	0.93	8.11	0.60	6.01	2.12	9.22
	Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.14	1.71	0.30	0.94	5.92	0.48	0.48	2.10	7.29	1.06	7.52	0.69	9.64
	Sample Variance	0.02	2.93	0.09	0.88	35.10	0.23	0.23	4.41	53.17	1.13	56.54	0.48	92.88
	Kurtosis	1.21	3.70	0.12	3.64	2.38	1.33	-0.04	3.70	2.59	3.29	3.16	3.32	3.47
	Skewness	-0.21	1.92	1.13	1.87	1.48	0.30	0.93	1.92	1.51	1.73	1.74	1.77	1.83
	Range	0.34	3.61	0.65	2.05	13.51	1.16	1.10	4.44	16.72	2.39	16.63	1.53	21.12
	Minimum	0.00	0.29	0.07	0.13	2.34	1.51	0.40	0.53	3.98	0.13	3.12	1.86	6.04
	Maximum	0.34	3.90	0.72	2.18	15.85	2.67	1.50	4.96	20.70	2.52	19.75	3.39	27.16
	Sum	0.70	5.40	1.23	3.14	29.50	8.27	3.40	7.34	40.90	3.84	34.90	9.50	51.64
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1998	Confidence Level(95.0%)	0.22	2.73	0.48	1.49	9.43	0.76	0.77	3.34	11.60	1.69	11.96	1.10	15.34
1998	Mean	0.17	0.98	0.46	0.80	4.33	1.07	0.53	1.61	6.21	0.97	5.32	1.53	8.34
Upper Shallow Stations	Standard Error	0.07	0.58	0.30	0.20	1.60	0.27	0.31	0.94	1.94	0.27	2.10	0.43	3.00
	Median	0.17	0.50	0.20	0.87	3.99	0.95	0.27	0.81	6.06	1.04	4.49	1.50	7.07
	Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.14	1.16	0.60	0.40	3.20	0.54	0.62	1.87	3.89	0.53	4.21	0.85	6.00
	Sample Variance	0.02	1.35	0.36	0.16	10.22	0.29	0.38	3.51	15.11	0.29	17.71	0.73	35.95
	Kurtosis	1.16	3.43	3.82	2.12	-4.86	0.89	3.70	3.61	-5.43	1.81	-2.71	-4.01	-1.97
	Skewness	-0.01	1.85	1.94	-1.06	0.19	1.09	1.90	1.89	0.06	-0.81	0.58	0.10	0.71
	Range	0.33	2.48	1.28	0.96	6.28	1.24	1.33	3.97	7.55	1.29	8.76	1.81	12.72
	Minimum	0.00	0.23	0.07	0.25	1.53	0.57	0.11	0.42	2.58	0.25	1.76	0.65	3.24
	Maximum	0.33	2.70	1.35	1.20	7.81	1.81	1.44	4.39	10.13	1.54	10.52	2.46	15.96
	Sum	0.67	3.94	1.82	3.20	17.33	4.29	2.10	6.43	24.82	3.87	21.27	6.11	33.35
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1998	Confidence Level(95.0%)	0.22	1.85	0.96	0.64	5.09	0.86	0.98	2.98	6.19	0.85	6.70	1.36	9.54
1998	Mean	0.10	0.37	0.10	1.86	6.63	0.67	1.74	0.57	9.17	1.96	7.00	0.77	11.47
Upper Deep Stations	Standard Error	0.04	0.25	0.06	0.83	2.17	0.20	0.69	0.32	3.12	0.84	2.40	0.25	2.82
	Median	0.11	0.20	0.07	1.98	6.44	0.60	1.57	0.41	9.17	2.04	6.60	0.73	11.37
	Mode	#N/A	#N/A	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.07	0.49	0.13	1.66	4.35	0.40	1.38	0.63	6.25	1.67	4.79	0.49	5.64
	Sample Variance	0.01	0.24	0.02	2.76	18.89	0.16	1.91	0.40	39.05	2.79	22.98	0.24	31.86
	Kurtosis	2.17	2.19	-1.53	-5.44	-2.00	-1.64	-4.09	1.33	-3.82	-5.73	-1.77	-4.51	-2.01
	Skewness	-1.09	1.54	0.81	-0.10	0.19	0.73	0.30	1.22	0.00	-0.04	0.36	0.22	0.08
	Range	0.17	1.07	0.26	3.16	9.87	0.86	2.84	1.45	13.43	3.10	10.88	1.00	12.85
	Minimum	0.00	0.00	0.00	0.16	1.89	0.32	0.48	0.00	2.45	0.33	1.96	0.32	5.16
	Maximum	0.17	1.07	0.26	3.32	11.76	1.18	3.32	1.45	15.87	3.43	12.84	1.32	18.01
	Sum	0.40	1.47	0.40	7.44	26.53	2.69	6.95	2.28	36.67	7.85	28.01	3.09	45.90
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1998	Confidence Level(95.0%)	0.12	0.78	0.20	2.65	6.92	0.63	2.20	1.01	9.94	2.66	7.63	0.78	8.98

Appendix IVb. Descriptive statistics by habitat type, 1998. (continued)

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
1998	Mean	0.04	0.06	0.01	1.39	7.09	1.41	0.10	0.11	9.89	1.43	7.15	1.42	10.10
Middle Hardbottom Stations	Standard Error	0.04	0.04	0.01	0.17	0.39	0.23	0.06	0.09	0.37	0.17	0.36	0.24	0.39
	Median	0.00	0.04	0.00	1.38	6.95	1.33	0.08	0.04	9.63	1.46	6.99	1.33	9.85
	Mode	0.00	0.00	0.00	#N/A	#N/A	#N/A	0.00	0.00	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.09	0.07	0.02	0.33	0.77	0.46	0.12	0.17	0.74	0.34	0.71	0.48	0.78
	Sample Variance	0.01	0.01	0.00	0.11	0.60	0.21	0.01	0.03	0.55	0.12	0.51	0.23	0.60
	Kurtosis	4.00	-1.33	4.00	1.52	1.13	0.74	-4.83	3.03	3.04	0.41	1.69	0.92	1.56
	Skewness	2.00	0.85	2.00	0.20	0.97	0.91	0.21	1.75	1.70	-0.50	1.18	0.98	1.41
	Range	0.17	0.15	0.04	0.81	1.82	1.08	0.23	0.36	1.64	0.81	1.67	1.11	1.70
	Minimum	0.00	0.00	0.00	0.99	6.33	0.95	0.00	0.00	9.33	0.99	6.48	0.95	9.50
	Maximum	0.17	0.15	0.04	1.81	8.14	2.03	0.23	0.36	10.97	1.81	8.14	2.06	11.20
	Sum	0.17	0.23	0.04	5.56	28.38	5.63	0.40	0.44	39.57	5.73	28.60	5.67	40.40
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1998	Confidence Level(95.0%)	0.14	0.12	0.03	0.53	1.23	0.73	0.19	0.27	1.18	0.54	1.14	0.76	1.24
1998	Mean	0.02	1.28	1.00	0.54	5.16	2.48	0.30	2.30	8.18	0.57	6.44	3.48	10.78
Middle Patch Stations	Standard Error	0.01	0.10	0.11	0.09	0.36	0.20	0.08	0.17	0.50	0.08	0.38	0.15	0.46
	Median	0.03	1.22	0.99	0.50	5.23	2.39	0.27	2.34	8.10	0.52	6.65	3.53	11.08
	Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	0.27	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.02	0.20	0.22	0.17	0.73	0.41	0.17	0.34	0.99	0.16	0.77	0.30	0.91
	Sample Variance	0.00	0.04	0.05	0.03	0.53	0.16	0.03	0.11	0.98	0.03	0.59	0.09	0.83
	Kurtosis	-1.19	0.49	1.55	0.01	1.49	2.09	2.11	-3.12	0.74	1.36	1.70	0.06	1.42
	Skewness	-0.87	1.18	0.30	1.01	-0.58	1.20	1.04	-0.43	0.45	1.30	-1.37	-0.75	-1.39
	Range	0.04	0.44	0.54	0.39	1.76	0.96	0.40	0.72	2.38	0.37	1.73	0.71	1.98
	Minimum	0.00	1.12	0.74	0.39	4.21	2.09	0.13	1.89	7.07	0.43	5.35	3.08	9.50
	Maximum	0.04	1.55	1.28	0.78	5.97	3.05	0.53	2.62	9.45	0.79	7.08	3.79	11.48
	Sum	0.10	5.11	3.99	2.17	20.63	9.93	1.21	9.20	32.73	2.26	25.74	13.92	43.13
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1998	Confidence Level(95.0%)	0.03	0.32	0.35	0.28	1.16	0.65	0.26	0.54	1.58	0.26	1.22	0.48	1.45
1998	Mean	0.11	0.34	0.14	0.83	3.96	1.56	0.04	0.59	6.35	0.94	4.30	1.70	6.99
Middle Shallow Stations	Standard Error	0.11	0.14	0.11	0.38	1.47	0.16	0.04	0.20	1.87	0.47	1.52	0.23	1.89
	Median	0.00	0.31	0.06	0.70	3.55	1.56	0.00	0.56	6.11	0.70	3.93	1.74	6.93
	Mode	0.00	#N/A	0.00	#N/A	#N/A	#N/A	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.22	0.28	0.21	0.76	2.94	0.32	0.09	0.40	3.73	0.95	3.03	0.47	3.77
	Sample Variance	0.05	0.08	0.05	0.58	8.64	0.11	0.01	0.16	13.92	0.90	9.21	0.22	14.23
	Kurtosis	4.00	-4.05	2.65	-3.09	0.54	-1.57	4.00	1.46	-0.98	-0.89	1.26	-4.72	-0.14
	Skewness	2.00	0.32	1.67	0.50	0.73	0.10	2.00	0.42	0.31	0.92	0.69	-0.16	0.08
	Range	0.44	0.57	0.45	1.59	6.93	0.75	0.17	0.99	8.67	2.03	7.29	0.95	8.96
	Minimum	0.00	0.09	0.00	0.17	0.90	1.20	0.00	0.13	2.26	0.17	1.03	1.20	2.56
	Maximum	0.44	0.66	0.45	1.76	7.83	1.94	0.17	1.11	10.93	2.20	8.31	2.15	11.53
	Sum	0.44	1.37	0.57	3.34	15.83	6.25	0.17	2.37	25.42	3.77	17.20	6.82	27.96
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1998	Confidence Level(95.0%)	0.35	0.44	0.34	1.21	4.68	0.52	0.14	0.64	5.94	1.51	4.83	0.74	6.00

Appendix IVb. Descriptive statistics by habitat type, 1998. (continued)

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
1998	Mean	0.03	0.32	0.11	0.77	5.53	1.00	0.14	0.46	7.30	0.81	5.85	1.10	7.90
Middle Deep Stations	Standard Error	0.03	0.14	0.09	0.32	0.90	0.30	0.02	0.25	1.35	0.31	0.76	0.29	1.14
	Median	0.00	0.31	0.02	0.61	5.61	0.81	0.14	0.33	6.60	0.68	5.92	1.02	7.09
	Mode	0.00	#N/A	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.06	0.28	0.18	0.63	1.80	0.59	0.04	0.51	2.70	0.63	1.52	0.59	2.28
	Sample Variance	0.00	0.08	0.03	0.40	3.23	0.35	0.00	0.26	7.32	0.40	2.31	0.34	5.19
	Kurtosis	4.00	0.42	3.75	2.07	1.49	2.91	-1.52	2.07	2.58	0.90	1.54	-0.74	3.22
	Skewness	2.00	0.24	1.93	1.33	-0.29	1.60	-0.49	1.32	1.40	1.03	-0.30	0.63	1.74
	Range	0.13	0.67	0.38	1.46	4.39	1.35	0.10	1.18	6.32	1.46	3.72	1.35	5.06
	Minimum	0.00	0.00	0.00	0.20	3.24	0.51	0.09	0.00	4.84	0.20	3.91	0.51	6.18
	Maximum	0.13	0.67	0.38	1.66	7.63	1.86	0.18	1.18	11.15	1.66	7.63	1.86	11.24
	Sum	0.13	1.29	0.42	3.10	22.10	3.99	0.56	1.84	29.19	3.22	23.39	4.41	31.59
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1998	Confidence Level(95.0%)	0.10	0.44	0.29	1.00	2.86	0.94	0.07	0.81	4.30	1.00	2.42	0.93	3.62
1998	Mean	0.09	0.67	0.30	1.00	5.72	1.47	0.53	1.07	8.19	1.09	6.40	1.77	9.78
1998 All Stations	Standard Error	0.02	0.17	0.08	0.16	0.60	0.14	0.15	0.24	0.78	0.17	0.71	0.19	0.93
	Median	0.03	0.36	0.10	0.75	5.61	1.44	0.24	0.59	8.10	0.82	6.47	1.65	9.55
	Mode	0.00	0.00	0.00	#N/A	#N/A	#N/A	0.00	0.00	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.12	0.88	0.41	0.86	3.19	0.72	0.78	1.27	4.10	0.90	3.74	0.99	4.92
	Sample Variance	0.01	0.77	0.17	0.74	10.18	0.52	0.61	1.60	16.84	0.82	14.02	0.99	24.20
	Kurtosis	1.26	6.74	1.00	1.86	2.69	-0.70	6.22	3.35	2.07	1.30	5.16	-0.49	4.89
	Skewness	1.35	2.43	1.46	1.44	1.14	0.28	2.47	1.87	0.99	1.32	1.69	0.58	1.66
	Range	0.44	3.90	1.35	3.19	14.95	2.73	3.32	4.96	18.44	3.30	18.73	3.47	24.59
	Minimum	0.00	0.00	0.00	0.13	0.90	0.32	0.00	0.00	2.26	0.13	1.03	0.32	2.56
	Maximum	0.44	3.90	1.35	3.32	15.85	3.05	3.32	4.96	20.70	3.43	19.75	3.79	27.16
	Sum	2.60	18.82	8.47	27.95	160.29	41.06	14.78	29.89	229.30	30.55	179.11	49.52	273.97
	Count	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
1998	Confidence Level(95.0%)	0.05	0.34	0.16	0.33	1.24	0.28	0.30	0.49	1.59	0.35	1.45	0.39	1.91

Appendix IVc. Descriptive statistics by habitat type, 1999.

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
1999	Mean	0.15	0.64	0.18	0.90	6.27	1.12	0.53	0.97	8.29	1.05	6.91	1.31	9.79
Upper Patch Stations	Standard Error	0.09	0.38	0.11	0.29	1.41	0.06	0.10	0.57	1.75	0.37	1.77	0.16	2.38
	Median	0.07	0.26	0.11	0.81	5.59	1.11	0.50	0.41	7.51	0.89	5.85	1.15	8.38
	Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.18	0.76	0.22	0.57	2.81	0.13	0.19	1.15	3.51	0.74	3.54	0.32	4.75
	Sample Variance	0.03	0.58	0.05	0.33	7.91	0.02	0.04	1.32	12.29	0.55	12.54	0.10	22.60
	Kurtosis	3.81	4.00	2.17	1.42	2.40	1.49	-3.41	3.98	2.20	2.06	2.87	3.99	2.78
	Skewness	1.94	2.00	1.53	0.83	1.33	0.51	0.45	1.99	1.23	1.19	1.57	2.00	1.55
	Range	0.38	1.53	0.47	1.37	6.59	0.31	0.39	2.33	8.27	1.75	8.13	0.64	10.90
	Minimum	0.03	0.25	0.02	0.30	3.65	0.98	0.37	0.36	4.93	0.33	3.90	1.14	5.74
	Maximum	0.42	1.78	0.49	1.67	10.25	1.29	0.76	2.69	13.20	2.08	12.03	1.78	16.65
	Sum	0.59	2.55	0.73	3.59	25.07	4.49	2.12	3.88	33.15	4.19	27.62	5.22	39.15
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1999	Confidence Level(95.0%)	0.29	1.21	0.34	0.91	4.47	0.20	0.30	1.83	5.58	1.18	5.63	0.50	7.56
1999	Mean	0.24	0.59	0.16	0.90	5.04	0.61	0.20	0.98	6.55	1.14	5.63	0.76	7.73
Upper Shallow Stations	Standard Error	0.10	0.35	0.12	0.10	0.78	0.12	0.10	0.53	0.94	0.18	1.11	0.19	1.48
	Median	0.24	0.29	0.05	0.97	4.79	0.55	0.12	0.57	6.45	1.20	5.08	0.74	7.11
	Mode	0.41	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.20	0.71	0.24	0.20	1.57	0.24	0.20	1.06	1.88	0.37	2.23	0.38	2.97
	Sample Variance	0.04	0.50	0.06	0.04	2.45	0.06	0.04	1.13	3.52	0.14	4.97	0.14	8.80
	Kurtosis	-5.95	3.19	3.75	2.82	-2.99	-0.24	3.72	3.60	-3.83	-2.73	-0.85	-5.09	-0.01
	Skewness	-0.01	1.79	1.93	-1.65	0.50	1.01	1.91	1.86	0.16	-0.55	0.92	0.13	0.96
	Range	0.35	1.50	0.50	0.45	3.31	0.54	0.43	2.33	4.01	0.78	4.81	0.75	6.70
	Minimum	0.06	0.13	0.02	0.61	3.64	0.40	0.07	0.23	4.64	0.68	3.77	0.42	5.00
	Maximum	0.41	1.63	0.52	1.06	6.94	0.93	0.50	2.56	8.65	1.46	8.57	1.17	11.70
	Sum	0.95	2.34	0.63	3.60	20.17	2.42	0.82	3.92	26.19	4.54	22.51	3.06	30.92
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1999	Confidence Level(95.0%)	0.31	1.13	0.39	0.32	2.49	0.39	0.32	1.69	2.99	0.59	3.55	0.60	4.72
1999	Mean	0.09	0.19	0.05	1.47	6.81	0.63	2.38	0.32	8.91	1.55	7.00	0.67	11.61
Upper Deep Stations	Standard Error	0.04	0.08	0.02	0.39	0.76	0.05	1.11	0.12	1.17	0.42	0.81	0.07	1.32
	Median	0.07	0.14	0.05	1.62	7.24	0.66	1.77	0.31	9.58	1.67	7.35	0.71	11.76
	Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.08	0.16	0.03	0.77	1.53	0.11	2.22	0.24	2.34	0.83	1.63	0.14	2.63
	Sample Variance	0.01	0.03	0.00	0.60	2.33	0.01	4.92	0.06	5.49	0.69	2.65	0.02	6.94
	Kurtosis	0.68	2.17	-5.97	-1.91	2.80	2.40	0.69	-3.62	2.10	-2.65	2.31	0.39	0.23
	Skewness	0.77	1.48	0.00	-0.69	-1.49	-1.50	1.20	0.14	-1.43	-0.48	-1.21	-1.10	-0.31
	Range	0.19	0.36	0.06	1.67	3.55	0.25	4.90	0.51	5.32	1.81	3.86	0.31	6.29
	Minimum	0.00	0.06	0.02	0.49	4.62	0.47	0.54	0.08	5.57	0.54	4.72	0.49	8.32
	Maximum	0.19	0.41	0.08	2.15	8.16	0.72	5.44	0.58	10.90	2.34	8.58	0.79	14.60
	Sum	0.34	0.75	0.19	5.87	27.26	2.50	9.54	1.28	35.63	6.21	28.01	2.69	46.45
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1999	Confidence Level(95.0%)	0.13	0.25	0.05	1.23	2.43	0.17	3.53	0.38	3.73	1.32	2.59	0.22	4.19

Appendix IVc. Descriptive statistics by habitat type, 1999. (continued)

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
1999	Mean	0.00	0.02	0.00	0.81	6.37	0.73	0.03	0.02	7.91	0.81	6.39	0.73	7.96
Middle Hardbottom Stations	Standard Error	0.00	0.00	0.00	0.05	0.31	0.06	0.02	0.00	0.33	0.05	0.31	0.06	0.35
	Median	0.00	0.02	0.00	0.79	6.55	0.70	0.02	0.02	8.02	0.79	6.57	0.70	8.07
	Mode	0.00	#N/A	0.00	#N/A	#N/A	#N/A	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.00	0.01	0.00	0.09	0.62	0.13	0.04	0.01	0.67	0.09	0.62	0.13	0.70
	Sample Variance	0.00	0.00	0.00	0.01	0.38	0.02	0.00	0.00	0.44	0.01	0.38	0.02	0.49
	Kurtosis	#DIV/0!	4.00	#DIV/0!	-0.42	0.95	-2.16	0.47	4.00	-1.92	-0.42	1.18	-2.16	-1.94
	Skewness	#DIV/0!	2.00	#DIV/0!	0.87	-1.25	0.69	1.20	2.00	-0.64	0.87	-1.30	0.69	-0.58
	Range	0.00	0.02	0.00	0.21	1.37	0.26	0.09	0.02	1.46	0.21	1.37	0.26	1.55
	Minimum	0.00	0.02	0.00	0.72	5.51	0.63	0.00	0.02	7.06	0.72	5.53	0.63	7.08
	Maximum	0.00	0.04	0.00	0.93	6.88	0.89	0.09	0.04	8.52	0.93	6.90	0.89	8.63
	Sum	0.00	0.09	0.00	3.23	25.49	2.91	0.13	0.09	31.62	3.23	25.58	2.91	31.85
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1999	Confidence Level(95.0%)	0.00	0.02	0.00	0.14	0.99	0.20	0.07	0.02	1.06	0.14	0.98	0.20	1.12
1999	Mean	0.03	0.91	0.42	0.72	5.73	1.34	0.55	1.37	7.79	0.76	6.65	1.76	9.71
Middle Patch Stations	Standard Error	0.02	0.09	0.03	0.06	0.32	0.17	0.05	0.09	0.54	0.04	0.28	0.19	0.48
	Median	0.03	0.89	0.44	0.74	5.51	1.22	0.55	1.33	7.46	0.77	6.44	1.67	9.51
	Mode	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	6.26	#N/A	#N/A
	Standard Deviation	0.04	0.18	0.06	0.12	0.63	0.34	0.10	0.17	1.07	0.09	0.56	0.37	0.96
	Sample Variance	0.00	0.03	0.00	0.02	0.40	0.11	0.01	0.03	1.15	0.01	0.31	0.14	0.93
	Kurtosis	-4.86	-4.12	2.19	-0.06	3.39	3.35	-5.84	-1.35	3.05	1.49	1.81	2.59	1.60
	Skewness	0.20	0.31	-1.48	-0.61	1.78	1.78	0.01	0.84	1.62	-0.67	1.48	1.37	1.11
	Range	0.08	0.36	0.14	0.29	1.41	0.75	0.18	0.36	2.46	0.21	1.18	0.88	2.26
	Minimum	0.00	0.76	0.33	0.56	5.25	1.09	0.45	1.23	6.90	0.64	6.26	1.41	8.78
	Maximum	0.08	1.12	0.47	0.85	6.67	1.84	0.64	1.59	9.36	0.85	7.44	2.29	11.04
	Sum	0.14	3.66	1.68	2.89	22.93	5.36	2.18	5.48	31.18	3.02	26.59	7.04	38.84
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1999	Confidence Level(95.0%)	0.06	0.28	0.10	0.20	1.01	0.54	0.16	0.27	1.71	0.14	0.89	0.59	1.53
1999	Mean	0.29	0.23	0.08	0.78	5.05	0.97	0.00	0.60	6.80	1.07	5.27	1.05	7.40
Middle Shallow Stations	Standard Error	0.22	0.10	0.06	0.14	0.44	0.09	0.00	0.22	0.64	0.33	0.46	0.10	0.68
	Median	0.09	0.15	0.03	0.78	4.95	0.92	0.00	0.58	6.69	0.87	5.26	1.05	7.68
	Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.44	0.20	0.13	0.28	0.88	0.18	0.00	0.45	1.27	0.65	0.93	0.20	1.35
	Sample Variance	0.19	0.04	0.02	0.08	0.78	0.03	0.00	0.20	1.62	0.42	0.86	0.04	1.83
	Kurtosis	3.86	3.01	3.71	-4.80	1.73	2.41	#DIV/0!	-5.24	0.60	2.32	0.88	-3.02	0.90
	Skewness	1.96	1.74	1.91	-0.04	0.69	1.47	#DIV/0!	0.06	0.46	1.53	0.09	0.01	-1.03
	Range	0.91	0.43	0.27	0.57	2.14	0.42	0.00	0.89	3.04	1.45	2.24	0.44	3.13
	Minimum	0.04	0.09	0.00	0.49	4.08	0.81	0.00	0.17	5.38	0.56	4.17	0.83	5.56
	Maximum	0.95	0.52	0.27	1.06	6.22	1.23	0.00	1.06	8.43	2.01	6.41	1.27	8.69
	Sum	1.17	0.90	0.33	3.12	20.19	3.88	0.00	2.40	27.19	4.29	21.10	4.21	29.60
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1999	Confidence Level(95.0%)	0.70	0.32	0.20	0.44	1.40	0.29	0.00	0.71	2.02	1.03	1.47	0.31	2.15

Appendix IVc. Descriptive statistics by habitat type, 1999. (continued)

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
1999	Mean	0.01	0.10	0.06	0.61	5.03	0.69	0.06	0.17	6.33	0.62	5.13	0.75	6.56
Middle Deep Stations	Standard Error	0.01	0.03	0.06	0.17	0.55	0.09	0.03	0.08	0.79	0.18	0.53	0.10	0.78
	Median	0.00	0.09	0.01	0.47	4.59	0.68	0.05	0.10	5.57	0.47	4.69	0.79	5.85
	Mode	0.00	#N/A	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.02	0.05	0.11	0.35	1.10	0.17	0.06	0.15	1.57	0.37	1.05	0.20	1.56
	Sample Variance	0.00	0.00	0.01	0.12	1.20	0.03	0.00	0.02	2.47	0.13	1.11	0.04	2.43
	Kurtosis	4.00	0.59	3.84	3.25	3.43	1.50	-1.80	3.47	3.96	3.32	3.47	-2.90	3.91
	Skewness	2.00	0.30	1.96	1.79	1.84	0.30	0.60	1.86	1.99	1.81	1.86	-0.55	1.97
	Range	0.04	0.13	0.24	0.75	2.36	0.43	0.14	0.33	3.20	0.79	2.23	0.42	3.24
	Minimum	0.00	0.04	0.00	0.37	4.29	0.48	0.00	0.07	5.49	0.37	4.46	0.51	5.65
	Maximum	0.04	0.16	0.24	1.12	6.65	0.91	0.14	0.40	8.68	1.16	6.69	0.92	8.89
	Sum	0.04	0.38	0.26	2.43	20.13	2.75	0.24	0.68	25.32	2.47	20.52	3.01	26.24
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
1999	Confidence Level(95.0%)	0.03	0.08	0.18	0.55	1.74	0.28	0.10	0.25	2.50	0.58	1.67	0.32	2.48
1999	Mean	0.12	0.38	0.14	0.88	5.76	0.87	0.54	0.63	7.51	1.00	6.14	1.00	8.68
1999 All Stations	Standard Error	0.04	0.09	0.03	0.08	0.28	0.06	0.21	0.14	0.37	0.10	0.33	0.08	0.52
	Median	0.05	0.17	0.03	0.80	5.51	0.85	0.14	0.39	7.46	0.81	6.19	0.92	8.36
	Mode	0.00	#N/A	0.00	#N/A	5.51	#N/A	0.00	#N/A	#N/A	#N/A	6.26	#N/A	#N/A
	Standard Deviation	0.20	0.48	0.18	0.45	1.48	0.32	1.09	0.72	1.96	0.55	1.76	0.45	2.76
	Sample Variance	0.04	0.23	0.03	0.20	2.21	0.10	1.19	0.52	3.83	0.30	3.08	0.20	7.62
	Kurtosis	9.89	2.68	-0.25	2.35	1.64	1.59	16.08	2.41	1.25	0.67	3.43	1.22	1.60
	Skewness	2.95	1.82	1.17	1.49	0.94	0.96	3.82	1.66	0.87	1.22	1.34	1.08	1.17
	Range	0.95	1.76	0.52	1.85	6.61	1.44	5.44	2.67	8.56	2.01	8.26	1.88	11.65
	Minimum	0.00	0.02	0.00	0.30	3.64	0.40	0.00	0.02	4.64	0.33	3.77	0.42	5.00
	Maximum	0.95	1.78	0.52	2.15	10.25	1.84	5.44	2.69	13.20	2.34	12.03	2.29	16.65
	Sum	3.22	10.68	3.82	24.74	161.24	24.31	15.03	17.72	210.29	27.96	171.92	28.13	243.04
	Count	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
1999	Confidence Level(95.0%)	0.08	0.19	0.07	0.17	0.58	0.12	0.42	0.28	0.76	0.21	0.68	0.17	1.07

Appendix IVd. Descriptive statistics by habitat type, 2002.

	Habitat	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
2002	Upper Patch Stations	Mean	0.09	1.13	0.31	1.07	6.26	1.44	0.67	1.53	8.76	1.16	7.39	1.75	10.97
		Standard Error	0.04	0.55	0.15	0.27	2.10	0.28	0.17	0.73	2.61	0.30	2.57	0.41	3.35
		Median	0.07	0.73	0.19	1.13	5.47	1.40	0.75	0.95	8.00	1.20	5.96	1.52	9.48
		Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
		Standard Deviation	0.07	1.10	0.30	0.53	4.19	0.57	0.34	1.46	5.22	0.59	5.13	0.82	6.70
		Sample Variance	0.01	1.20	0.09	0.29	17.59	0.32	0.11	2.13	27.28	0.35	26.36	0.67	44.92
		Kurtosis	-0.91	3.38	3.08	1.13	1.39	1.01	0.30	3.54	1.60	1.39	2.51	2.51	2.20
		Skewness	0.92	1.78	1.76	-0.65	1.01	0.35	-1.04	1.86	0.83	-0.42	1.46	1.46	1.22
		Range	0.16	2.44	0.65	1.28	9.88	1.38	0.76	3.17	12.54	1.44	11.83	1.89	15.81
		Minimum	0.03	0.31	0.11	0.37	2.11	0.78	0.22	0.53	3.25	0.40	2.91	1.03	4.55
		Maximum	0.19	2.75	0.76	1.65	11.99	2.16	0.98	3.69	15.80	1.84	14.73	2.92	20.36
		Sum	0.37	4.52	1.24	4.27	25.04	5.74	2.70	6.13	35.05	4.64	29.56	6.98	43.87
		Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
2002		Confidence Level(95.0%)	0.12	1.75	0.48	0.85	6.67	0.91	0.54	2.32	8.31	0.94	8.17	1.30	10.66
2002	Upper Shallow Stations	Mean	0.28	0.53	0.24	2.07	5.07	0.67	0.25	1.05	7.80	2.35	5.59	0.91	9.10
		Standard Error	0.15	0.47	0.18	0.44	1.04	0.23	0.13	0.56	0.82	0.58	1.46	0.30	1.32
		Median	0.25	0.09	0.09	2.05	4.80	0.54	0.25	0.56	8.08	2.30	4.89	0.93	8.84
		Mode	#N/A	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
		Standard Deviation	0.31	0.94	0.36	0.87	2.08	0.47	0.26	1.12	1.63	1.15	2.92	0.60	2.63
		Sample Variance	0.09	0.88	0.13	0.76	4.32	0.22	0.07	1.26	2.66	1.33	8.50	0.36	6.94
		Kurtosis	-5.20	3.81	3.35	0.25	-3.11	2.76	-5.86	3.78	-3.79	-1.25	-0.51	-5.19	-1.60
		Skewness	0.14	1.95	1.82	0.08	0.42	1.52	-0.01	1.93	-0.39	0.18	0.97	-0.04	0.43
		Range	0.59	1.93	0.78	2.09	4.44	1.08	0.49	2.37	3.28	2.68	6.37	1.19	5.98
		Minimum	0.02	0.00	0.00	1.04	3.11	0.27	0.00	0.36	5.89	1.06	3.11	0.30	6.37
		Maximum	0.61	1.93	0.78	3.13	7.56	1.35	0.49	2.72	9.17	3.73	9.48	1.49	12.35
		Sum	1.12	2.11	0.97	8.27	20.26	2.68	0.99	4.20	31.22	9.40	22.38	3.65	36.41
		Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
2002		Confidence Level(95.0%)	0.49	1.49	0.58	1.39	3.31	0.75	0.42	1.78	2.60	1.84	4.64	0.95	4.19
2002	Upper Deep Stations	Mean	0.06	0.18	0.05	2.90	9.28	0.62	2.95	0.29	12.80	2.96	9.46	0.67	16.05
		Standard Error	0.04	0.09	0.03	0.95	1.68	0.09	0.84	0.14	2.51	0.99	1.70	0.06	2.77
		Median	0.05	0.15	0.04	3.15	10.30	0.70	2.37	0.22	14.16	3.21	10.36	0.71	17.83
		Mode	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
		Standard Deviation	0.07	0.17	0.06	1.90	3.36	0.18	1.67	0.28	5.02	1.97	3.41	0.13	5.55
		Sample Variance	0.01	0.03	0.00	3.63	11.28	0.03	2.79	0.08	25.24	3.90	11.60	0.02	30.77
		Kurtosis	-3.57	1.09	2.69	-4.62	2.21	3.68	1.45	2.67	0.10	-4.71	1.76	2.00	3.06
		Skewness	0.43	0.84	1.43	-0.24	-1.48	-1.91	1.40	1.43	-1.10	-0.23	-1.32	-1.49	-1.65
		Range	0.15	0.41	0.13	3.73	7.57	0.37	3.55	0.66	10.94	3.88	7.79	0.28	12.60
		Minimum	0.00	0.00	0.00	0.78	4.48	0.36	1.76	0.04	5.97	0.78	4.67	0.49	7.97
		Maximum	0.15	0.41	0.13	4.52	12.05	0.73	5.31	0.70	16.91	4.66	12.46	0.77	20.57
		Sum	0.25	0.72	0.20	11.60	37.13	2.48	11.81	1.17	51.21	11.85	37.85	2.68	64.19
		Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
2002		Confidence Level(95.0%)	0.12	0.28	0.09	3.03	5.34	0.28	2.66	0.45	7.99	3.14	5.42	0.20	8.83

Appendix IVd. Descriptive statistics by habitat type, 2002. (continued)

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
2002	Mean	0.00	0.04	0.00	3.05	7.16	0.84	0.10	0.04	11.05	3.05	7.20	0.84	11.19
Middle Hardbottom Stations	Standard Error	0.00	0.03	0.00	1.39	0.40	0.11	0.10	0.03	1.37	1.39	0.41	0.11	1.32
	Median	0.00	0.02	0.00	2.72	7.23	0.75	0.00	0.02	11.01	2.72	7.31	0.75	11.07
	Mode	0.00	0.00	0.00	#N/A	#N/A	#N/A	0.00	0.00	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.00	0.05	0.00	2.79	0.81	0.23	0.20	0.05	2.74	2.79	0.83	0.23	2.65
	Sample Variance	0.00	0.00	0.00	7.76	0.65	0.05	0.04	0.00	7.52	7.76	0.68	0.05	7.01
	Kurtosis	#DIV/0!	1.52	#DIV/0!	-4.14	-1.42	2.49	4.00	1.52	-4.53	-4.14	-1.66	2.49	-4.95
	Skewness	#DIV/0!	1.42	#DIV/0!	0.30	-0.40	1.63	2.00	1.42	0.04	0.30	-0.56	1.63	0.10
	Range	0.00	0.11	0.00	5.71	1.85	0.48	0.40	0.11	5.70	5.71	1.85	0.48	5.34
	Minimum	0.00	0.00	0.00	0.53	6.17	0.68	0.00	0.00	8.24	0.53	6.17	0.68	8.63
	Maximum	0.00	0.11	0.00	6.23	8.01	1.17	0.40	0.11	13.94	6.23	8.01	1.17	13.98
	Sum	0.00	0.15	0.00	12.19	28.65	3.36	0.40	0.15	44.20	12.19	28.80	3.36	44.75
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
2002	Confidence Level(95.0%)	0.00	0.09	0.00	4.43	1.29	0.36	0.32	0.09	4.36	4.43	1.31	0.36	4.21
2002	Mean	0.13	1.33	1.08	0.76	4.86	2.00	1.07	2.55	7.62	0.89	6.19	3.09	11.24
Middle Patch Stations	Standard Error	0.01	0.10	0.19	0.12	0.76	0.35	0.12	0.28	0.95	0.13	0.68	0.20	0.74
	Median	0.13	1.35	1.20	0.81	4.71	1.82	1.04	2.75	7.33	0.94	6.06	3.12	11.23
	Mode	#N/A	#N/A	1.20	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.02	0.20	0.38	0.24	1.52	0.70	0.25	0.57	1.91	0.25	1.35	0.39	1.48
	Sample Variance	0.00	0.04	0.15	0.06	2.30	0.50	0.06	0.32	3.65	0.06	1.82	0.15	2.20
	Kurtosis	-2.35	0.37	3.05	0.69	-0.89	1.80	0.48	2.55	1.28	1.43	-1.97	1.28	-3.35
	Skewness	0.62	-0.48	-1.62	-0.88	0.47	1.31	0.76	-1.63	0.84	-1.00	0.41	-0.54	0.03
	Range	0.04	0.47	0.87	0.57	3.51	1.62	0.59	1.23	4.55	0.59	3.03	0.95	3.25
	Minimum	0.11	1.08	0.53	0.44	3.26	1.38	0.81	1.72	5.64	0.55	4.81	2.58	9.63
	Maximum	0.15	1.55	1.40	1.01	6.76	2.99	1.40	2.95	10.19	1.14	7.84	3.52	12.88
	Sum	0.52	5.33	4.33	3.05	19.43	8.01	4.29	10.18	30.50	3.57	24.76	12.35	44.96
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
2002	Confidence Level(95.0%)	0.03	0.31	0.61	0.39	2.41	1.12	0.40	0.90	3.04	0.40	2.15	0.62	2.36
2002	Mean	0.50	0.28	0.17	2.76	4.67	1.16	0.36	0.95	8.59	3.27	4.94	1.33	9.90
Middle Shallow Stations	Standard Error	0.14	0.12	0.14	1.27	1.19	0.17	0.23	0.14	2.37	1.39	1.13	0.28	2.13
	Median	0.48	0.25	0.06	2.38	4.74	1.18	0.25	0.85	9.18	2.73	5.03	1.22	10.52
	Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.28	0.25	0.27	2.54	2.38	0.34	0.45	0.28	4.75	2.78	2.27	0.56	4.26
	Sample Variance	0.08	0.06	0.07	6.43	5.67	0.11	0.20	0.08	22.53	7.75	5.14	0.31	18.15
	Kurtosis	1.12	1.46	3.75	-1.22	-2.97	-4.88	-1.75	3.39	-3.77	-1.18	-1.56	-1.62	-3.01
	Skewness	0.53	0.57	1.92	0.66	-0.11	-0.17	0.77	1.80	-0.35	0.78	-0.19	0.73	-0.47
	Range	0.69	0.60	0.58	5.70	5.27	0.67	0.94	0.61	9.88	6.15	5.21	1.21	9.06
	Minimum	0.19	0.00	0.00	0.30	1.97	0.79	0.00	0.75	3.06	0.73	2.24	0.83	4.74
	Maximum	0.87	0.60	0.58	6.00	7.23	1.46	0.94	1.36	12.94	6.88	7.46	2.04	13.81
	Sum	2.01	1.10	0.70	11.06	18.67	4.62	1.44	3.80	34.35	13.06	19.77	5.32	39.58
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
2002	Confidence Level(95.0%)	0.45	0.39	0.43	4.03	3.79	0.54	0.72	0.44	7.55	4.43	3.61	0.88	6.78

Appendix IVd. Descriptive statistics by habitat type, 2002. (continued)

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
2002	Mean	0.03	0.14	0.06	2.35	3.80	0.65	0.24	0.23	6.80	2.38	3.94	0.71	7.27
Middle Deep Stations	Standard Error	0.02	0.12	0.06	0.39	0.67	0.14	0.13	0.18	1.18	0.38	0.68	0.14	1.06
	Median	0.02	0.04	0.00	2.02	3.48	0.54	0.22	0.06	6.02	2.08	3.73	0.66	6.66
	Mode	0.00	#N/A	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.04	0.23	0.12	0.78	1.33	0.28	0.26	0.35	2.37	0.77	1.35	0.28	2.12
	Sample Variance	0.00	0.05	0.01	0.61	1.78	0.08	0.07	0.13	5.60	0.59	1.83	0.08	4.49
	Kurtosis	-0.08	3.89	4.00	3.80	1.66	3.40	-5.03	3.92	2.89	3.59	-0.69	-2.33	2.00
	Skewness	1.09	1.96	2.00	1.93	1.22	1.83	0.14	1.98	1.64	1.87	0.71	0.62	1.41
	Range	0.08	0.49	0.24	1.67	3.09	0.60	0.51	0.73	5.32	1.67	3.09	0.60	4.81
	Minimum	0.00	0.00	0.00	1.85	2.56	0.46	0.00	0.04	4.92	1.85	2.60	0.46	5.47
	Maximum	0.08	0.49	0.24	3.52	5.65	1.07	0.51	0.76	10.24	3.52	5.69	1.07	10.28
	Sum	0.12	0.56	0.24	9.40	15.18	2.62	0.94	0.92	27.20	9.52	15.75	2.85	29.07
	Count	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
2002	Confidence Level(95.0%)	0.06	0.37	0.19	1.25	2.12	0.44	0.41	0.56	3.77	1.22	2.16	0.45	3.37
2002	Mean	0.16	0.52	0.27	2.14	5.87	1.05	0.81	0.95	9.06	2.29	6.39	1.33	10.82
2002 All Stations	Standard Error	0.04	0.13	0.08	0.32	0.53	0.12	0.21	0.20	0.72	0.34	0.57	0.17	0.83
	Median	0.09	0.21	0.06	1.72	5.82	0.80	0.49	0.67	8.45	1.82	6.08	0.99	10.08
	Mode	0.00	0.00	0.00	#N/A	#N/A	#N/A	0.00	0.00	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.22	0.70	0.42	1.70	2.82	0.62	1.12	1.07	3.81	1.79	3.03	0.92	4.39
	Sample Variance	0.05	0.49	0.18	2.89	7.94	0.38	1.27	1.14	14.50	3.19	9.16	0.85	19.25
	Kurtosis	3.25	2.81	1.59	0.29	0.01	2.23	9.34	0.63	-0.50	0.46	1.01	0.32	0.07
	Skewness	1.90	1.74	1.65	1.11	0.76	1.36	2.76	1.30	0.54	1.15	1.00	1.20	0.77
	Range	0.87	2.75	1.40	5.93	10.08	2.73	5.31	3.69	13.86	6.48	12.49	3.22	16.02
	Minimum	0.00	0.00	0.00	0.30	1.97	0.27	0.00	0.00	3.06	0.40	2.24	0.30	4.55
	Maximum	0.87	2.75	1.40	6.23	12.05	2.99	5.31	3.69	16.91	6.88	14.73	3.52	20.57
	Sum	4.38	14.50	7.68	59.85	164.35	29.52	22.55	26.56	253.72	64.24	178.85	37.20	302.83
	Count	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00
2002	Confidence Level(95.0%)	0.09	0.27	0.16	0.66	1.09	0.24	0.44	0.41	1.48	0.69	1.17	0.36	1.70

Appendix IVe. Descriptive statistics by habitat type, All Years.

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
All Years	Mean	0.13	1.05	0.30	0.76	6.42	1.81	0.70	1.47	8.99	0.89	7.47	2.11	11.17
Upper Patch Stations	Standard Error	0.03	0.28	0.07	0.16	0.98	0.21	0.09	0.36	1.23	0.18	1.24	0.25	1.61
	Median	0.10	0.55	0.15	0.47	5.28	1.73	0.62	0.78	7.60	0.62	5.59	1.96	8.82
	Mode	0.00	#N/A	#N/A	#N/A	4.62	#N/A	#N/A	0.53	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.12	1.14	0.27	0.63	3.94	0.82	0.34	1.46	4.90	0.72	4.96	1.01	6.42
	Sample Variance	0.01	1.29	0.08	0.40	15.52	0.67	0.12	2.12	24.06	0.52	24.57	1.03	41.23
	Kurtosis	1.61	1.46	-0.70	0.11	0.72	3.04	0.75	0.89	0.75	0.46	1.14	2.92	1.23
	Skewness	1.36	1.58	0.91	1.02	1.14	1.43	0.97	1.45	1.15	1.11	1.41	1.51	1.41
	Range	0.42	3.65	0.80	2.14	13.74	3.33	1.28	4.60	17.45	2.49	16.85	3.90	22.61
	Minimum	0.00	0.25	0.02	0.03	2.11	0.78	0.22	0.36	3.25	0.03	2.91	1.03	4.55
	Maximum	0.42	3.90	0.81	2.18	15.85	4.11	1.50	4.96	20.70	2.52	19.75	4.92	27.16
	Sum	2.01	16.78	4.77	12.16	102.76	28.97	11.20	23.55	143.89	14.17	119.54	33.74	178.64
	Count	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
All Years	Confidence Level(95.0%)	0.06	0.61	0.15	0.34	2.10	0.44	0.18	0.78	2.61	0.38	2.64	0.54	3.42
All Years	Mean	0.20	0.87	0.31	1.05	4.73	0.77	0.35	1.38	6.55	1.25	5.60	1.08	8.28
Upper Shallow Stations	Standard Error	0.05	0.27	0.10	0.19	0.57	0.10	0.10	0.37	0.66	0.23	0.78	0.15	1.00
	Median	0.16	0.44	0.13	0.91	4.79	0.66	0.23	0.62	7.29	1.03	5.08	1.00	7.95
	Mode	0.41	0.00	#N/A	#N/A	#N/A	0.57	0.00	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Standard Deviation	0.19	1.07	0.40	0.78	2.28	0.39	0.38	1.47	2.64	0.92	3.12	0.62	4.00
	Sample Variance	0.04	1.14	0.16	0.61	5.20	0.15	0.15	2.16	6.95	0.85	9.75	0.38	15.97
	Kurtosis	-0.62	2.16	1.91	2.47	-1.56	2.40	3.37	1.60	-1.37	2.70	-1.01	0.12	-0.76
	Skewness	0.75	1.68	1.61	1.53	-0.09	1.43	1.71	1.64	-0.37	1.54	0.51	0.84	0.48
	Range	0.61	3.67	1.35	3.00	6.28	1.55	1.44	4.68	7.78	3.56	9.53	2.16	12.72
	Minimum	0.00	0.00	0.00	0.13	1.53	0.27	0.00	0.23	2.35	0.17	1.76	0.30	3.24
	Maximum	0.61	3.67	1.35	3.13	7.81	1.81	1.44	4.91	10.13	3.73	11.30	2.46	15.96
	Sum	3.24	13.89	4.99	16.73	75.71	12.35	5.65	22.12	104.78	19.97	89.59	17.34	132.56
	Count	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
All Years	Confidence Level(95.0%)	0.10	0.57	0.21	0.42	1.22	0.21	0.20	0.78	1.40	0.49	1.66	0.33	2.13
All Years	Mean	0.07	0.31	0.06	1.77	7.43	0.67	2.45	0.45	9.87	1.84	7.74	0.73	12.76
Upper Deep Stations	Standard Error	0.02	0.10	0.02	0.36	0.79	0.06	0.39	0.12	1.12	0.37	0.85	0.07	1.13
	Median	0.08	0.15	0.04	1.40	7.88	0.68	2.44	0.23	10.37	1.44	8.09	0.71	12.66
	Mode	0.00	0.00	0.00	#N/A	#N/A	0.72	#N/A	0.04	#N/A	#N/A	#N/A	0.66	#N/A
	Standard Deviation	0.07	0.40	0.07	1.43	3.16	0.24	1.55	0.48	4.50	1.47	3.38	0.28	4.53
	Sample Variance	0.00	0.16	0.01	2.06	9.96	0.06	2.40	0.23	20.24	2.16	11.44	0.08	20.51
	Kurtosis	-1.15	2.18	2.87	-0.35	-0.74	0.82	-0.26	1.10	-0.85	-0.41	-0.82	0.17	-0.98
	Skewness	0.29	1.68	1.62	0.87	-0.34	0.82	0.63	1.35	-0.07	0.87	-0.26	0.71	0.03
	Range	0.19	1.34	0.26	4.36	10.16	0.86	4.96	1.55	14.46	4.34	10.88	1.00	15.41
	Minimum	0.00	0.00	0.00	0.16	1.89	0.32	0.48	0.00	2.45	0.31	1.96	0.32	5.16
	Maximum	0.19	1.34	0.26	4.52	12.05	1.18	5.44	1.55	16.91	4.66	12.84	1.32	20.57
	Sum	1.16	5.00	1.00	28.32	118.85	10.68	39.17	7.16	157.84	29.48	123.85	11.68	204.17
	Count	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
All Years	Confidence Level(95.0%)	0.04	0.21	0.04	0.76	1.68	0.13	0.83	0.26	2.40	0.78	1.80	0.15	2.41

Appendix IVe. Descriptive statistics by habitat type, All Years. (continued)

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
All Years	Mean	0.01	0.05	0.00	1.77	6.55	1.06	0.11	0.06	9.38	1.79	6.59	1.06	9.54
Middle Hardbottom Stations	Standard Error	0.01	0.01	0.00	0.39	0.31	0.10	0.04	0.02	0.55	0.39	0.31	0.10	0.54
	Median	0.00	0.02	0.00	1.27	6.83	0.93	0.00	0.02	9.28	1.27	6.87	0.93	9.37
	Mode	0.00	0.00	0.00	#N/A	#N/A	#N/A	0.00	0.00	#N/A	#N/A	#N/A	#N/A	8.63
	Standard Deviation	0.04	0.05	0.01	1.55	1.23	0.39	0.16	0.09	2.20	1.55	1.25	0.40	2.16
	Sample Variance	0.00	0.00	0.00	2.40	1.51	0.15	0.03	0.01	4.86	2.40	1.55	0.16	4.65
	Kurtosis	14.16	-0.67	16.00	4.24	1.28	0.78	0.17	6.49	-0.10	4.19	1.30	1.04	-0.25
	Skewness	3.72	0.95	4.00	2.11	-1.20	1.01	1.27	2.38	0.45	2.09	-1.25	1.08	0.48
	Range	0.17	0.15	0.04	5.71	4.43	1.40	0.45	0.36	8.14	5.71	4.43	1.44	7.73
	Minimum	0.00	0.00	0.00	0.53	3.72	0.63	0.00	0.00	5.80	0.53	3.72	0.63	6.25
	Maximum	0.17	0.15	0.04	6.23	8.14	2.03	0.45	0.36	13.94	6.23	8.14	2.06	13.98
	Sum	0.21	0.72	0.04	28.38	104.74	16.91	1.71	0.97	150.04	28.59	105.46	16.95	152.72
	Count	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
All Years	Confidence Level(95.0%)	0.02	0.03	0.01	0.83	0.66	0.21	0.08	0.05	1.17	0.82	0.66	0.21	1.15
All Years	Mean	0.07	1.45	0.80	0.64	5.45	1.94	1.00	2.32	8.03	0.70	6.90	2.74	11.34
Middle Patch Stations	Standard Error	0.01	0.16	0.09	0.05	0.24	0.16	0.19	0.20	0.29	0.05	0.31	0.19	0.46
	Median	0.06	1.25	0.77	0.64	5.51	1.84	0.73	2.34	7.97	0.70	6.71	2.84	11.21
	Mode	0.00	1.30	1.20	0.70	#N/A	1.84	0.27	2.89	#N/A	#N/A	6.26	#N/A	#N/A
	Standard Deviation	0.06	0.63	0.35	0.20	0.96	0.62	0.75	0.79	1.15	0.22	1.25	0.77	1.83
	Sample Variance	0.00	0.40	0.12	0.04	0.92	0.39	0.56	0.63	1.31	0.05	1.57	0.60	3.34
	Kurtosis	-0.44	1.24	-1.25	-0.88	0.50	-0.80	0.06	-0.80	0.12	-0.65	0.10	-1.18	-0.25
	Skewness	0.65	1.41	0.26	0.14	-0.76	0.48	0.99	0.29	-0.05	0.38	0.45	-0.38	0.59
	Range	0.19	2.20	1.07	0.68	3.51	1.96	2.41	2.56	4.55	0.74	4.68	2.37	6.37
	Minimum	0.00	0.76	0.33	0.33	3.26	1.09	0.13	1.23	5.64	0.41	4.81	1.41	8.78
	Maximum	0.19	2.95	1.40	1.01	6.76	3.05	2.54	3.79	10.19	1.14	9.49	3.79	15.15
	Sum	1.10	23.15	12.84	10.18	87.21	31.04	15.97	37.09	128.43	11.27	110.36	43.88	181.48
	Count	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
All Years	Confidence Level(95.0%)	0.03	0.34	0.19	0.10	0.51	0.33	0.40	0.42	0.61	0.11	0.67	0.41	0.97
All Years	Mean	0.25	0.31	0.13	1.23	4.47	1.22	0.19	0.69	6.92	1.48	4.78	1.35	7.80
Middle Shallow Stations	Standard Error	0.08	0.06	0.04	0.38	0.61	0.10	0.08	0.09	0.91	0.44	0.61	0.12	0.89
	Median	0.15	0.22	0.06	0.83	4.62	1.21	0.00	0.78	6.69	0.93	4.75	1.34	7.70
	Mode	0.00	#N/A	0.00	#N/A	#N/A	1.42	0.00	#N/A	#N/A	#N/A	#N/A	1.42	8.05
	Standard Deviation	0.31	0.24	0.17	1.53	2.42	0.39	0.32	0.38	3.62	1.76	2.42	0.47	3.54
	Sample Variance	0.10	0.06	0.03	2.34	5.86	0.15	0.10	0.14	13.12	3.08	5.87	0.22	12.55
	Kurtosis	0.78	-1.01	2.31	6.30	-0.61	-0.55	0.70	-1.09	-0.85	5.74	-0.27	-0.80	-0.65
	Skewness	1.30	0.60	1.71	2.40	0.11	0.04	1.46	-0.05	0.24	2.27	0.15	0.34	0.26
	Range	0.95	0.76	0.58	5.96	8.39	1.43	0.94	1.23	11.82	6.83	8.65	1.55	11.67
	Minimum	0.00	0.00	0.00	0.04	0.56	0.51	0.00	0.13	1.11	0.04	0.77	0.60	2.14
	Maximum	0.95	0.76	0.58	6.00	8.95	1.94	0.94	1.36	12.94	6.88	9.42	2.15	13.81
	Sum	4.05	4.89	2.03	19.69	71.57	19.52	3.07	10.97	110.78	23.74	76.46	21.56	124.82
	Count	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
All Years	Confidence Level(95.0%)	0.16	0.13	0.09	0.82	1.29	0.21	0.17	0.20	1.93	0.94	1.29	0.25	1.89

Appendix IVe. Descriptive statistics by habitat type, All Years. (continued)

	Descriptive Statistics	*G.ventalina* - short	*G.ventalina* - medium	*G.ventalina* - tall	"other octocoral" - short	"other octocoral" - medium	"other octocoral" - tall	Total Scleraxonia	Total *G. ventalina*	Total "other octocoral"	Total Short	Total Medium	Total Tall	Station Total All Octocorals
All Years	Mean	0.02	0.20	0.09	1.10	5.11	0.89	0.77	0.32	7.10	1.13	5.31	0.98	8.19
Middle Deep Stations	Standard Error	0.01	0.06	0.04	0.22	0.43	0.10	0.40	0.10	0.54	0.22	0.41	0.10	0.67
	Median	0.00	0.13	0.00	0.69	5.12	0.81	0.13	0.17	6.38	0.79	5.26	0.92	7.08
	Mode	0.00	0.00	0.00	#N/A	#N/A	0.51	0.00	0.00	#N/A	#N/A	#N/A	0.51	#N/A
	Standard Deviation	0.04	0.23	0.15	0.89	1.72	0.40	1.58	0.39	2.16	0.89	1.62	0.42	2.69
	Sample Variance	0.00	0.05	0.02	0.79	2.95	0.16	2.51	0.15	4.65	0.80	2.64	0.17	7.25
	Kurtosis	1.89	0.23	1.13	2.23	-0.77	0.71	4.47	1.33	-0.71	2.04	-0.64	-0.52	-0.70
	Skewness	1.59	1.18	1.55	1.49	0.29	1.04	2.39	1.53	0.79	1.44	0.20	0.50	0.85
	Range	0.13	0.67	0.43	3.32	5.84	1.39	4.80	1.18	6.32	3.32	5.80	1.39	7.80
	Minimum	0.00	0.00	0.00	0.20	2.56	0.46	0.00	0.00	4.84	0.20	2.60	0.46	5.47
	Maximum	0.13	0.67	0.43	3.52	8.40	1.86	4.80	1.18	11.15	3.52	8.40	1.86	13.27
	Sum	0.40	3.25	1.43	17.64	81.73	14.28	12.38	5.07	113.65	18.03	84.98	15.71	131.11
	Count	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
All Years	Confidence Level(95.0%)	0.02	0.12	0.08	0.47	0.91	0.21	0.84	0.21	1.15	0.48	0.87	0.22	1.44
All Years	Mean	0.11	0.60	0.24	1.19	5.74	1.19	0.80	0.95	8.12	1.30	6.34	1.44	9.87
All Stations	Standard Error	0.02	0.08	0.03	0.11	0.24	0.06	0.11	0.11	0.32	0.12	0.28	0.08	0.39
	Median	0.04	0.27	0.08	0.84	5.68	1.06	0.43	0.55	7.87	0.89	6.26	1.18	9.31
	Mode	0.00	0.00	0.00	0.44	4.62	1.42	0.00	0.00	#N/A	0.85	6.26	1.42	8.05
	Standard Deviation	0.17	0.81	0.35	1.16	2.59	0.67	1.16	1.14	3.41	1.22	2.98	0.90	4.17
	Sample Variance	0.03	0.65	0.12	1.34	6.68	0.45	1.34	1.29	11.65	1.49	8.86	0.81	17.41
	Kurtosis	8.74	4.45	2.15	5.90	1.61	2.68	5.61	2.57	1.30	5.96	3.35	1.67	2.13
	Skewness	2.69	2.10	1.70	2.28	0.76	1.38	2.35	1.73	0.77	2.25	1.21	1.33	1.06
	Range	0.95	3.90	1.40	6.20	15.30	3.84	5.44	4.96	19.59	6.84	18.98	4.62	25.02
	Minimum	0.00	0.00	0.00	0.03	0.56	0.27	0.00	0.00	1.11	0.03	0.77	0.30	2.14
	Maximum	0.95	3.90	1.40	6.23	15.85	4.11	5.44	4.96	20.70	6.88	19.75	4.92	27.16
	Sum	12.16	67.67	27.11	133.09	642.56	133.76	89.15	106.94	909.41	145.25	710.23	160.86	1105.49
	Count	112.00	112.00	112.00	112.00	112.00	112.00	112.00	112.00	112.00	112.00	112.00	112.00	112.00
All Years	Confidence Level(95.0%)	0.03	0.15	0.06	0.22	0.48	0.13	0.22	0.21	0.64	0.23	0.56	0.17	0.78

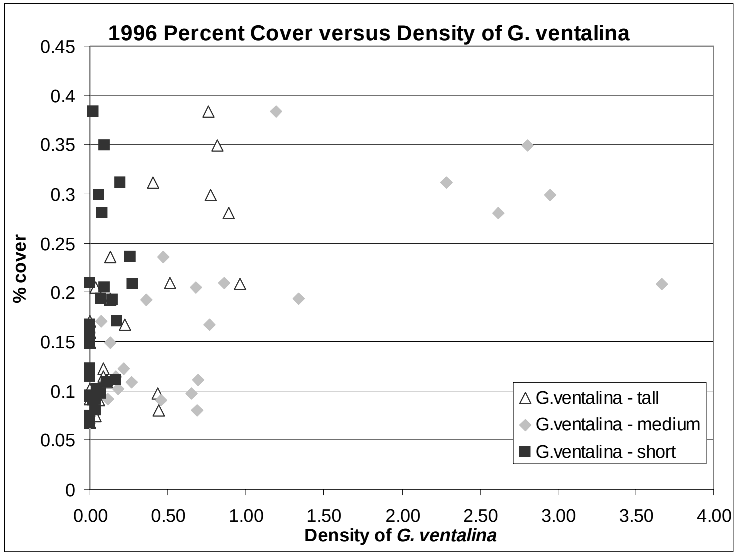
Appendix V. Coral Reef Monitoring Project (CRMP) percent cover data.

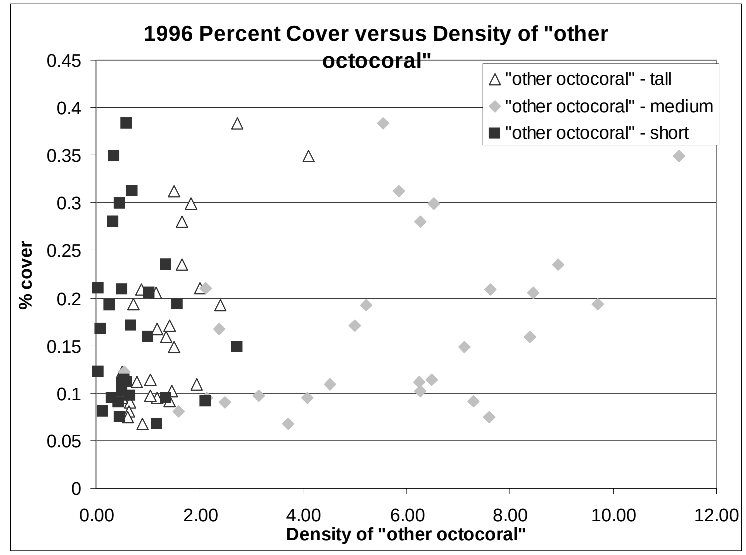
Year	Site ID	Site Name	Octocorallia percent cover	Stony coral percent cover	Macroalgae percent cover	Seagrass percent cover	Porifera percent cover	Zoanthidea percent cover	Substrate percent cover
1996	141	Long Key	14.8%	3.0%	18.4%	0.0%	0.3%	0.0%	63.5%
1998	141	Long Key	11.5%	3.8%	9.0%	0.1%	0.5%	0.0%	75.1%
1999	141	Long Key	7.9%	2.6%	16.0%	0.1%	1.8%	0.0%	71.5%
2002	141	Long Key	10.1%	2.5%	4.1%	0.0%	0.6%	0.0%	82.6%
1996	142	Long Key	9.1%	9.8%	36.4%	0.0%	0.1%	0.0%	44.6%
1998	142	Long Key	10.6%	5.6%	8.9%	0.1%	0.9%	0.0%	73.9%
1999	142	Long Key	5.1%	7.9%	17.8%	0.0%	0.5%	0.0%	68.7%
2002	142	Long Key	9.2%	6.0%	7.6%	0.0%	0.6%	0.0%	76.6%
1996	152	Moser Channel	6.8%	0.9%	73.1%	0.0%	0.6%	0.0%	18.6%
1998	152	Moser Channel	12.3%	0.3%	10.7%	0.0%	0.9%	0.0%	75.7%
1999	152	Moser Channel	11.0%	0.9%	28.2%	0.0%	0.7%	0.0%	59.2%
2002	152	Moser Channel	7.9%	1.1%	6.6%	0.0%	1.4%	0.0%	83.0%
1996	154	Moser Channel	9.5%	1.3%	70.1%	0.0%	0.6%	0.0%	18.5%
1998	154	Moser Channel	11.1%	1.2%	6.5%	0.0%	0.8%	0.0%	80.5%
1999	154	Moser Channel	8.9%	1.7%	11.5%	0.0%	1.3%	0.0%	76.6%
2002	154	Moser Channel	10.3%	0.8%	4.3%	0.0%	1.2%	0.0%	83.3%
1996	302	Turtle	34.9%	6.8%	22.0%	0.0%	1.8%	0.9%	33.6%
1998	302	Turtle	27.6%	5.1%	17.7%	0.0%	2.5%	0.6%	46.5%
1999	302	Turtle	28.6%	3.1%	9.9%	0.0%	1.4%	1.2%	55.8%
2002	302	Turtle	35.0%	5.8%	27.4%	0.0%	2.7%	0.7%	28.5%
1996	322	Porter Patch	19.3%	5.4%	9.0%	0.1%	4.4%	0.2%	61.7%
1998	322	Porter Patch	16.7%	5.7%	42.5%	0.0%	1.9%	0.5%	32.7%
1999	322	Porter Patch	16.2%	4.9%	18.4%	0.0%	2.3%	0.2%	58.0%
2002	322	Porter Patch	19.9%	5.4%	19.3%	0.3%	2.9%	0.6%	51.7%
1996	323	Porter Patch	10.9%	1.8%	11.3%	0.1%	5.3%	0.8%	69.9%
1998	323	Porter Patch	14.3%	1.2%	36.9%	0.1%	2.9%	0.6%	44.1%
1999	323	Porter Patch	14.3%	0.9%	19.1%	0.3%	2.6%	0.8%	62.0%
2002	323	Porter Patch	16.4%	2.1%	19.4%	1.0%	4.0%	0.6%	56.4%
1996	331	Admiral	21.0%	35.3%	6.2%	0.3%	0.0%	0.0%	37.1%
1998	331	Admiral	17.2%	32.4%	10.9%	0.0%	0.3%	0.0%	39.2%
1999	331	Admiral	17.9%	29.0%	2.2%	0.0%	0.3%	0.0%	50.6%
2002	331	Admiral	16.2%	22.7%	2.3%	0.0%	0.1%	0.0%	58.7%
1996	341	W. Turtle Shoal	28.0%	11.3%	0.1%	0.0%	7.3%	3.1%	50.1%
1998	341	W. Turtle Shoal	27.2%	10.8%	4.1%	0.0%	6.1%	2.8%	49.0%
1999	341	W. Turtle Shoal	21.6%	7.4%	5.7%	0.0%	4.9%	3.8%	56.5%
2002	341	W. Turtle Shoal	20.9%	10.9%	0.5%	0.0%	7.6%	3.8%	56.4%
1996	343	W. Turtle Shoal	29.9%	18.5%	3.2%	0.0%	5.9%	2.7%	39.8%
1998	343	W. Turtle Shoal	27.5%	12.6%	1.1%	0.0%	4.8%	3.1%	50.9%
1999	343	W. Turtle Shoal	26.6%	10.8%	0.5%	0.0%	8.7%	4.0%	49.5%
2002	343	W. Turtle Shoal	32.7%	13.3%	2.1%	0.0%	12.7%	4.7%	34.4%
1996	344	W. Turtle Shoal	31.2%	21.1%	0.2%	0.0%	5.0%	3.9%	38.6%
1998	344	W. Turtle Shoal	25.5%	22.2%	2.0%	0.0%	6.3%	3.1%	40.8%
1999	344	W. Turtle Shoal	23.9%	21.3%	5.2%	0.0%	4.2%	4.3%	41.2%
2002	344	W. Turtle Shoal	23.9%	25.3%	0.8%	0.0%	9.4%	4.0%	36.6%
1996	354	Dustan Rocks	38.3%	20.2%	3.8%	0.0%	2.1%	1.6%	33.9%
1998	354	Dustan Rocks	23.7%	20.0%	31.5%	0.0%	1.1%	0.2%	23.5%
1999	354	Dustan Rocks	25.2%	21.0%	10.8%	0.0%	2.0%	0.3%	40.7%
2002	354	Dustan Rocks	38.9%	22.0%	2.3%	0.0%	2.6%	1.0%	33.2%
1996	503	Carysfort (Shallow)	20.9%	5.2%	15.8%	0.0%	0.7%	2.5%	54.9%
1998	503	Carysfort (Shallow)	21.2%	5.2%	9.3%	0.0%	0.1%	2.6%	61.7%
1999	503	Carysfort (Shallow)	15.5%	3.3%	1.7%	0.0%	0.0%	1.6%	77.9%
2002	503	Carysfort (Shallow)	21.9%	5.2%	2.8%	0.0%	0.2%	3.2%	66.7%
1996	513	Grecian Rocks	11.1%	12.3%	7.7%	0.0%	5.2%	1.1%	62.6%
1998	513	Grecian Rocks	13.3%	8.0%	38.6%	0.0%	3.7%	1.0%	35.3%
1999	513	Grecian Rocks	12.7%	7.0%	17.6%	0.0%	2.0%	1.2%	59.4%
2002	513	Grecian Rocks	11.8%	6.6%	13.5%	0.0%	3.4%	1.6%	63.1%

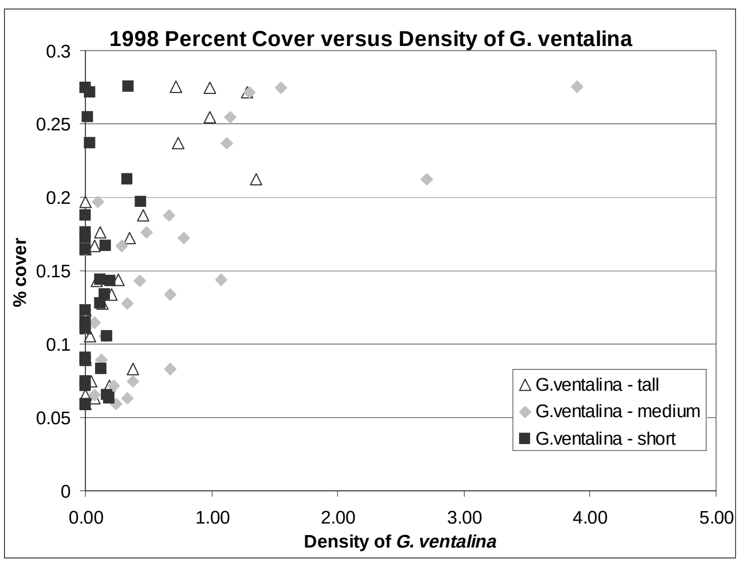
Appendix V. Coral Reef Monitoring Project (CRMP) percent cover data. (continued)

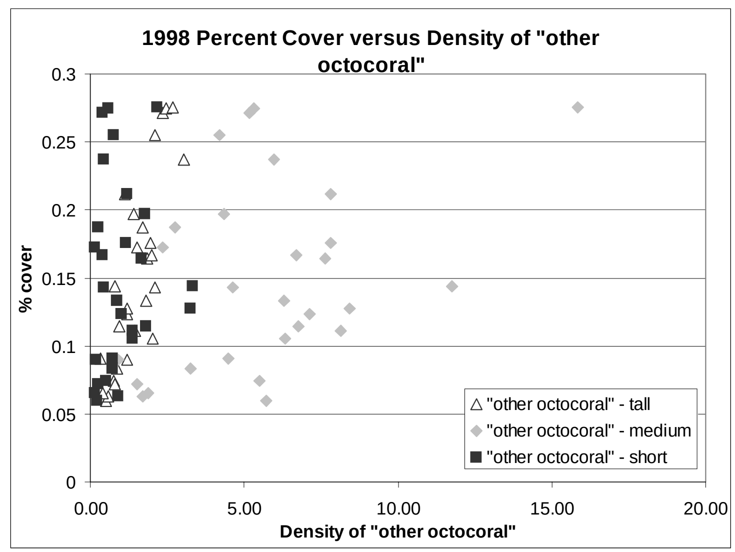
Year	Site ID	Site Name	Octocorallia percent cover	Stony coral percent cover	Macroalgae percent cover	Seagrass percent cover	Porifera percent cover	Zoanthidea percent cover	Substrate percent cover
1996	531	Conch (Shallow)	9.0%	2.3%	2.3%	0.0%	1.5%	0.1%	84.7%
1998	531	Conch (Shallow)	7.2%	1.2%	29.6%	0.0%	0.2%	0.7%	61.0%
1999	531	Conch (Shallow)	3.7%	1.3%	0.5%	0.0%	0.7%	0.6%	93.1%
2002	531	Conch (Shallow)	6.1%	0.8%	10.7%	0.0%	0.3%	0.8%	81.3%
1996	533	Conch (Shallow)	8.1%	2.1%	23.5%	0.0%	6.4%	2.0%	57.9%
1998	533	Conch (Shallow)	6.3%	0.8%	33.0%	0.0%	0.6%	2.7%	56.6%
1999	533	Conch (Shallow)	4.4%	1.1%	32.3%	0.0%	0.4%	2.2%	59.6%
2002	533	Conch (Shallow)	4.3%	5.7%	13.6%	0.0%	0.3%	1.0%	75.1%
1996	541	Alligator (Shallow)	17.0%	1.2%	29.5%	0.1%	0.2%	0.4%	51.6%
1998	541	Alligator (Shallow)	19.7%	0.8%	19.7%	0.0%	0.6%	0.6%	58.6%
1999	541	Alligator (Shallow)	11.3%	0.3%	44.1%	0.0%	0.6%	0.6%	43.0%
2002	541	Alligator (Shallow)	12.2%	0.5%	10.4%	0.0%	0.8%	1.4%	74.7%
1996	554	Tennessee (Shallow)	23.6%	4.3%	5.1%	0.1%	3.1%	0.9%	63.0%
1998	554	Tennessee (Shallow)	17.6%	3.8%	29.9%	0.1%	3.4%	0.8%	44.3%
1999	554	Tennessee (Shallow)	11.9%	2.5%	3.7%	0.0%	1.3%	1.0%	79.7%
2002	554	Tennessee (Shallow)	13.4%	2.9%	1.7%	0.0%	2.2%	1.5%	78.3%
1996	562	Sombrero (Shallow)	12.2%	12.8%	4.7%	0.0%	0.6%	11.2%	58.6%
1998	562	Sombrero (Shallow)	9.0%	2.5%	35.2%	0.0%	1.7%	20.0%	31.7%
1999	562	Sombrero (Shallow)	6.5%	2.2%	6.7%	0.0%	3.9%	22.5%	58.2%
2002	562	Sombrero (Shallow)	10.3%	1.0%	0.1%	0.0%	2.8%	25.4%	60.3%
1996	563	Sombrero (Shallow)	16.7%	6.6%	2.9%	0.0%	1.4%	11.3%	61.0%
1998	563	Sombrero (Shallow)	18.7%	3.5%	6.1%	0.0%	0.7%	13.3%	57.7%
1999	563	Sombrero (Shallow)	12.4%	3.0%	1.8%	0.0%	2.6%	10.5%	69.8%
2002	563	Sombrero (Shallow)	20.7%	3.8%	3.0%	0.0%	2.6%	14.0%	56.0%
1996	702	Carysfort (Deep)	7.4%	14.7%	22.0%	0.0%	3.8%	0.0%	52.1%
1998	702	Carysfort (Deep)	9.1%	5.7%	20.6%	0.0%	0.5%	0.0%	64.1%
1999	702	Carysfort (Deep)	6.8%	5.2%	9.0%	0.0%	1.1%	1.1%	76.8%
2002	702	Carysfort (Deep)	16.2%	5.6%	7.9%	0.0%	3.4%	0.0%	66.8%
1996	721	Molasses (Deep)	19.4%	4.0%	9.8%	0.0%	6.6%	0.2%	60.0%
1998	721	Molasses (Deep)	14.4%	1.5%	22.8%	0.0%	3.8%	0.1%	57.4%
1999	721	Molasses (Deep)	11.8%	3.0%	0.5%	0.0%	10.1%	0.3%	74.4%
2002	721	Molasses (Deep)	12.8%	2.2%	0.4%	0.0%	7.6%	0.4%	76.7%
1996	722	Molasses (Deep)	20.5%	1.9%	11.6%	0.0%	10.7%	0.0%	55.3%
1998	722	Molasses (Deep)	12.7%	2.4%	28.6%	0.0%	7.2%	0.1%	49.0%
1999	722	Molasses (Deep)	9.2%	1.7%	1.0%	0.0%	6.6%	0.0%	81.4%
2002	722	Molasses (Deep)	12.7%	1.3%	11.8%	0.0%	9.0%	0.0%	65.3%
1996	733	Conch (Deep)	9.5%	6.0%	9.5%	0.0%	4.4%	0.0%	70.4%
1998	733	Conch (Deep)	6.6%	3.5%	34.6%	0.0%	8.3%	0.0%	47.0%
1999	733	Conch (Deep)	5.7%	2.4%	7.7%	0.0%	3.4%	0.0%	80.8%
2002	733	Conch (Deep)	9.9%	2.4%	3.0%	0.0%	4.2%	0.0%	80.5%
1996	743	Alligator (Deep)	15.9%	1.7%	1.6%	0.0%	1.9%	0.0%	78.8%
1998	743	Alligator (Deep)	16.4%	0.8%	23.1%	0.0%	1.0%	0.0%	58.6%
1999	743	Alligator (Deep)	9.6%	0.7%	2.2%	0.0%	1.4%	0.0%	86.1%
2002	743	Alligator (Deep)	8.5%	1.1%	0.9%	0.0%	1.5%	0.0%	88.0%
1996	753	Tennessee (Deep)	9.8%	7.2%	5.6%	0.0%	11.8%	0.0%	65.6%
1998	753	Tennessee (Deep)	8.3%	5.5%	49.5%	0.0%	7.4%	0.0%	29.3%
1999	753	Tennessee (Deep)	4.1%	4.5%	29.9%	0.0%	2.5%	0.0%	59.0%
2002	753	Tennessee (Deep)	8.0%	4.2%	5.0%	0.0%	9.7%	0.0%	73.1%
1996	763	Sombrero (Deep)	10.2%	4.2%	7.9%	0.1%	3.5%	2.4%	71.8%
1998	763	Sombrero (Deep)	5.9%	3.9%	45.6%	0.0%	1.8%	0.1%	42.7%
1999	763	Sombrero (Deep)	1.9%	3.0%	17.0%	0.0%	1.4%	0.1%	76.7%
2002	763	Sombrero (Deep)	2.4%	2.6%	2.8%	0.0%	2.1%	0.0%	90.1%
1996	764	Sombrero (Deep)	11.4%	3.3%	7.3%	0.0%	4.2%	0.1%	73.6%
1998	764	Sombrero (Deep)	7.4%	3.8%	62.4%	0.0%	2.6%	0.0%	23.7%
1999	764	Sombrero (Deep)	2.4%	2.7%	33.3%	0.0%	2.0%	0.0%	59.6%
2002	764	Sombrero (Deep)	3.0%	1.8%	1.0%	0.0%	2.7%	0.0%	91.4%

Appendix VI. Octocoral percent cover versus video-derived octocoral density

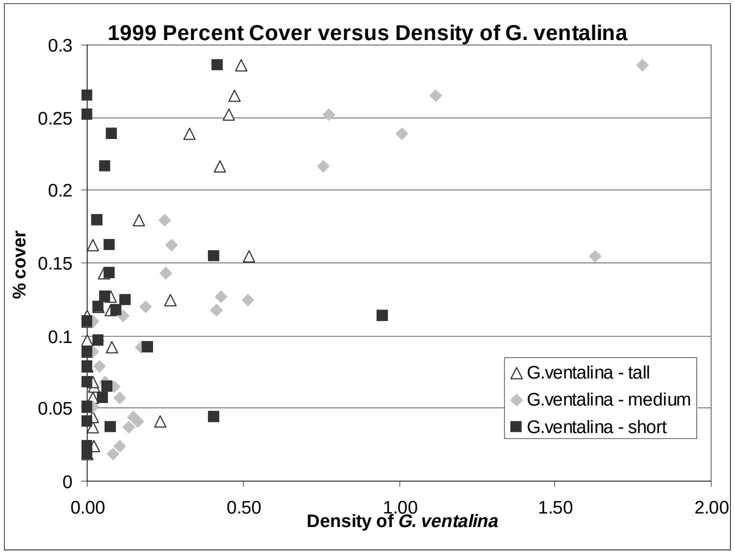


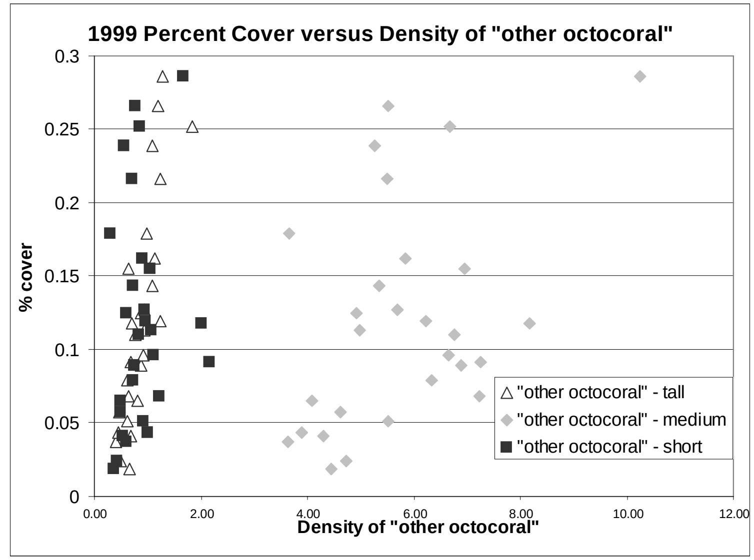


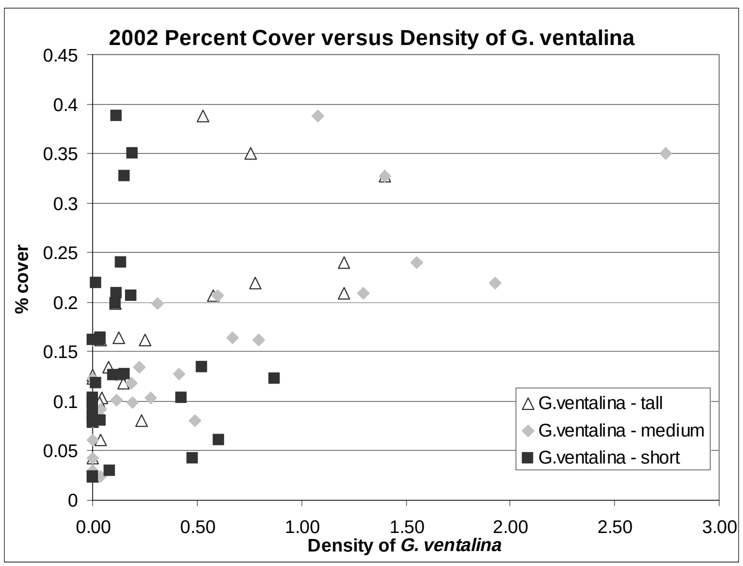


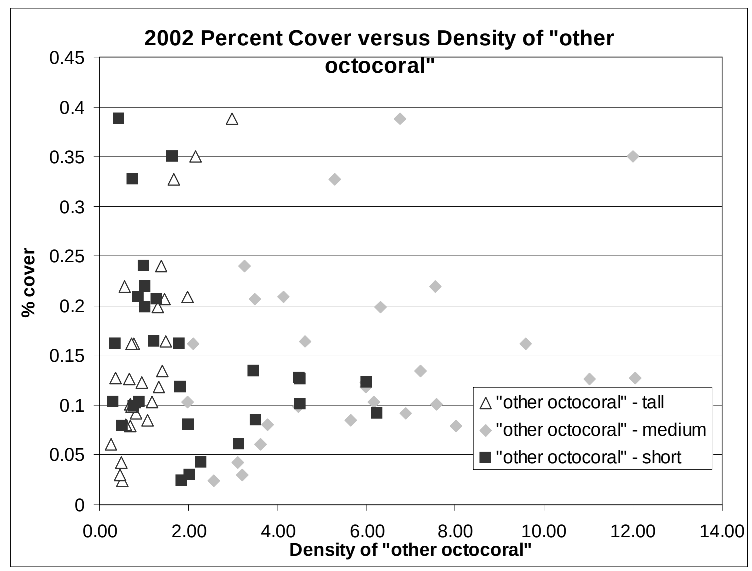


Appendix VI. Octocoral percent cover versus video-derived octocoral density. (continued)









Appendix VII. Results Spearman-*rho* test for independence.

Year	Biotic Category versus Percent Cover n=28 pairs	normal-z	*p*-value	*rho*	trimmed *rho*, trim=.2	trimmed *rho*, 95% confidence upper	trimmed *rho*, 95% confidence lower
1996	*G.ventalina* - medium	3.724	**0.000**	0.717	0.747	0.876	0.519
1996	"other octocoral" - tall	3.378	**0.001**	0.650	0.721	0.862	0.476
1996	*G.ventalina* - tall	3.296	**0.001**	0.635	0.716	0.859	0.467
1996	Total All Octocorallia	2.996	**0.003**	0.577	0.753	0.879	0.528
1996	*G.ventalina* - short	2.389	**0.017**	0.460	0.689	0.845	0.425
1996	"other octocoral" - medium	2.021	**0.043**	0.389	0.501	0.736	0.157
1996	Scleraxonia	1.106	0.269	0.213	0.684	0.842	0.418
1996	"other octocoral" - short	-0.363	0.717	-0.070	0.208	0.539	-0.179
1998	"other octocoral" - tall	4.100	**0.000**	0.789	0.799	0.903	0.606
1998	*G.ventalina* - tall	3.342	**0.001**	0.643	0.809	0.908	0.624
1998	*G.ventalina* - medium	3.284	**0.001**	0.632	0.717	0.860	0.469
1998	Total All Octocorallia	3.150	**0.002**	0.606	0.460	0.711	0.105
1998	"other octocoral" - medium	1.662	0.096	0.320	0.187	0.524	-0.200
1998	"other octocoral" - short	1.122	0.262	0.216	0.387	0.664	0.017
1998	*G.ventalina* - short	0.931	0.352	0.179	0.131	0.481	-0.255
1998	Scleraxonia	0.705	0.481	0.136	0.352	0.641	-0.025
1999	"other octocoral" - tall	4.401	**0.000**	0.847	0.852	0.930	0.702
1999	*G.ventalina* - medium	3.949	**0.000**	0.760	0.771	0.889	0.559
1999	*G.ventalina* - tall	3.355	**0.001**	0.646	0.753	0.879	0.528
1999	Total All Octocorallia	3.144	**0.002**	0.605	0.749	0.877	0.521
1999	Scleraxonia	2.185	**0.029**	0.421	0.698	0.850	0.439
1999	"other octocoral" - medium	2.034	**0.042**	0.392	0.421	0.686	0.057
1999	*G.ventalina* - short	1.474	0.140	0.284	0.548	0.765	0.220
1999	"other octocoral" - short	1.241	0.214	0.239	0.534	0.756	0.201
2002	*G.ventalina* - tall	4.109	**0.000**	0.791	0.774	0.890	0.563
2002	*G.ventalina* - medium	4.097	**0.000**	0.789	0.791	0.899	0.593
2002	"other octocoral" - tall	3.733	**0.000**	0.719	0.699	0.850	0.440
2002	Scleraxonia	2.713	**0.007**	0.522	0.687	0.844	0.421
2002	Total All Octocorallia	2.427	**0.015**	0.467	0.486	0.727	0.138
2002	"other octocoral" - medium	1.517	0.129	0.292	0.272	0.585	-0.113
2002	*G.ventalina* - short	1.495	0.135	0.288	0.697	0.849	0.438
2002	"other octocoral" - short	-2.115	**0.035**	-0.407	-0.389	-0.019	-0.666
All Years	"other octocoral" - tall n=112	7.832	**0.000**	0.743	0.815	0.869	0.742
All Years	*G.ventalina* - medium n=112	7.564	**0.000**	0.718	0.772	0.838	0.685
All Years	*G.ventalina* - tall n=112	7.193	**0.000**	0.683	0.756	0.826	0.664
All Years	Total All Octocorallia	5.864	**0.000**	0.557	0.601	0.708	0.468
All Years	Scleraxonia n=112	3.563	**0.000**	0.338	0.699	0.783	0.590
All Years	"other octocoral" - medium n=112	3.502	**0.001**	0.332	0.225	0.394	0.042
All Years	*G.ventalina* - short n=112	2.699	**0.007**	0.256	0.493	0.622	0.339
All Years	"other octocoral" - short n=112	-0.417	0.677	-0.040	0.243	0.410	0.060

Appendix VIIIa. BIOENV-Spearman

APPENDIX VIIa

BIOENV for all years.
Spearman Method

BIOENV
Biota and/or Environment
matching

Worksheet

File: C:\Files\Matt Lybolt\USF_thesis_primerall_density.pri
Sample selection: All
Variable selection: 1-7

Similarity Matrix

File: Sheet1
Data type: Similarities
Sample selection: All

Parameters

Rank correlation method: Spearman
Maximum number of variables: 7

Similarity Matrix Parameters for sample data worksheet:
Analyse between: Samples
Similarity measure: Bray Curtis
Standardise: No
Transform: None

Variables

1 G.ventalina - short
2 G.ventalina - medium
3 G.ventalina - tall
4 “other octocoral” - short
5 “other octocoral” - medium
6 “other octocoral” - tall
7 Scleraxonia

Number of variables: 1

No. Vars	Corr.	Selections
1	0.401	6
1	0.219	2
1	0.136	3
1	0.055	5
1	0.028	1
1	0.006	7
1	-0.041	4

Number of variables: 2

No. Vars	Corr.	Selections
2	0.528	2,6
2	0.490	3,6
2	0.391	1,6
2	0.320	6,7
2	0.229	2,3
2	0.226	4,6
2	0.211	2,4
2	0.200	1,2
2	0.160	5,6
2	0.153	2,7
2	0.151	2,5
2	0.137	1,3
2	0.120	3,4
2	0.111	3,5
2	0.066	3,7
2	0.063	5,7
2	0.055	1,5
2	0.041	4,5
2	0.026	4,7
2	0.025	1,7
2	-0.036	1,4

Number of variables: 3

No. Vars	Corr.	Selections
3	0.534	2,3,6
3	0.515	1,2,6
3	0.477	1,3,6
3	0.397	2,6,7
3	0.370	3,6,7
3	0.358	2,4,6
3	0.309	1,6,7
3	0.301	3,4,6
3	0.257	2-4
3	0.237	2,5,6
3	0.225	1,4,6
3	0.212	1-3
3	0.207	1,2,4
3	0.203	4,6,7
3	0.201	3,5,6
3	0.187	2,3,5
3	0.169	2,3,7
3	0.166	2,4,7
3	0.158	1,5,6
3	0.154	5-7
3	0.149	1,2,5
3	0.147	1,2,7
3	0.140	2,5,7
3	0.131	4-6
3	0.124	2,4,5
3	0.118	1,3,4
3	0.109	1,3,5
3	0.109	3,4,7
3	0.106	3,5,7
3	0.086	3-5
3	0.076	1,3,7
3	0.062	1,5,7
3	0.050	4,5,7
3	0.040	1,4,5
3	0.026	1,4,7

Number of variables: 4

No. Vars	Corr.	Selections
4	0.525	1-3,6
4	0.413	2,3,6,7
4	0.388	1,2,6,7
4	0.386	2-4,6
4	0.360	1,3,6,7
4	0.355	1,2,4,6
4	0.299	1,3,4,6
4	0.296	2,4,6,7
4	0.264	2,3,5,6
4	0.255	3,4,6,7
4	0.254	1-4
4	0.235	1,2,5,6
4	0.220	2,5-7
4	0.202	2,4-6
4	0.202	2-4,7
4	0.202	1,4,6,7
4	0.199	1,3,5,6
4	0.190	3,5-7
4	0.185	1-3,5
4	0.172	2,3,5,7
4	0.169	3-6
4	0.164	1,2,4,7
4	0.163	1-3,7
4	0.157	2-5
4	0.153	1,5-7
4	0.139	1,2,5,7
4	0.132	4-7
4	0.130	1,4-6
4	0.122	1,2,4,5
4	0.121	2,4,5,7
4	0.108	1,3,4,7
4	0.105	1,3,5,7
4	0.088	3-5,7
4	0.085	1,3-5
4	0.049	1,4,5,7

Number of variables: 5

No. Vars	Corr.	Selections
5	0.406	1-3,6,7
5	0.383	1-4,6
5	0.322	2-4,6,7
5	0.293	1,2,4,6,7
5	0.262	1-3,5,6
5	0.253	1,3,4,6,7
5	0.247	2,3,5-7
5	0.230	2-6
5	0.219	1,2,5-7
5	0.201	1,2,4-6
5	0.200	1-4,7
5	0.195	2,4-7
5	0.189	1,3,5-7
5	0.172	1-3,5,7
5	0.167	1,3-6
5	0.165	3-7
5	0.156	1-5
5	0.152	2-5,7
5	0.131	1,4-7
5	0.120	1,2,4,5,7
5	0.087	1,3-5,7

Number of variables: 6

No. Vars	Corr.	Selections
6	0.320	1-4,6,7
6	0.246	1-3,5-7
6	0.228	1-6
6	0.221	2-7
6	0.193	1,2,4-7
6	0.164	1,3-7
6	0.150	1-5,7

Number of variables: 7

No. Vars	Corr.	Selections
7	0.219	All

Best results

No. Vars	Corr.	Selections
3	0.534	2,3,6
2	0.528	2,6
4	0.525	1-3,6
3	0.515	1,2,6
2	0.490	3,6
3	0.477	1,3,6
4	0.413	2,3,6,7
5	0.406	1-3,6,7
1	0.401	6
3	0.397	2,6,7

Appendix VIIIa. BIOENV-Spearman (continued)

BIOENV for 1996.
Spearman Method

BIOENV
Biota and/or Environment matching

Worksheet

File: C:\Files\Matt Lybolt\USF_thesis_primerall_density.pri
Sample selection: 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,73,77,81,85,89,93,97,101,105,109
Variable selection: 1-7

Similarity Matrix

File: Sheet1
Data type: Similarities
Sample selection: 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,73,77,81,85,89,93,97,101,105,109

Parameters

Rank correlation method: Spearman
Maximum number of variables: 7

Similarity Matrix Parameters for sample data worksheet:
Analyse between: Samples
Similarity measure: Bray Curtis
Standardise: No
Transform: None

Variables

1 G.ventalina - short
2 G.ventalina - medium
3 G.ventalina - tall
4 “other octocoral” - short
5 “other octocoral” - medium
6 “other octocoral” - tall
7 Scleraxonia

Number of variables: 1

No. Vars	Corr.	Selections
1	0.262	6
1	0.226	2
1	0.033	3
1	0.014	5
1	-0.020	1
1	-0.072	7
1	-0.117	4

Number of variables: 2

No. Vars	Corr.	Selections
2	0.462	2,6
2	0.333	3,6
2	0.277	1,6
2	0.236	2,4
2	0.227	1,2
2	0.207	2,3
2	0.167	4,6
2	0.139	6,7
2	0.111	2,5
2	0.076	5,6
2	0.075	1,3
2	0.044	3,4
2	0.044	3,5
2	0.035	2,7
2	0.015	1,5
2	0.000	4,5
2	0.000	5,7
2	-0.059	3,7
2	-0.067	1,7
2	-0.084	4,7
2	-0.098	1,4

Number of variables: 3

No. Vars	Corr.	Selections
3	0.464	1,2,6
3	0.456	2,3,6
3	0.366	2,4,6
3	0.344	1,3,6
3	0.247	2-4
3	0.234	1,2,4
3	0.232	3,4,6
3	0.232	2,6,7
3	0.207	1-3
3	0.178	1,4,6
3	0.164	2,5,6
3	0.155	3,6,7
3	0.146	1,6,7
3	0.134	2,3,5
3	0.111	1,2,5
3	0.102	3,5,6
3	0.088	2,4,5
3	0.078	2,5,7
3	0.076	1,5,6
3	0.069	4,6,7
3	0.060	4-6
3	0.056	1,3,4
3	0.052	5-7
3	0.046	1,3,5
3	0.045	2,4,7
3	0.041	2,3,7
3	0.039	1,2,7
3	0.022	3-5
3	0.021	3,5,7
3	0.001	1,4,5
3	0.001	1,5,7
3	-0.012	4,5,7
3	-0.047	3,4,7
3	-0.050	1,3,7
3	-0.080	1,4,7

Number of variables: 4

No. Vars	Corr.	Selections
4	0.458	1-3,6
4	0.368	2-4,6
4	0.365	1,2,4,6
4	0.246	1-4
4	0.238	1,3,4,6
4	0.236	2,3,6,7
4	0.236	1,2,6,7
4	0.179	2,3,5,6
4	0.179	2,4,6,7
4	0.165	1,2,5,6
4	0.158	1,3,6,7
4	0.146	2,4-6
4	0.133	1-3,5
4	0.126	2,5-7
4	0.112	2-5
4	0.102	1,3,5,6
4	0.098	3,4,6,7
4	0.094	2,3,5,7
4	0.088	1,2,4,5
4	0.079	3-6
4	0.079	1,2,5,7
4	0.071	3,5-7
4	0.070	1,4,6,7
4	0.061	1,4-6
4	0.061	2,4,5,7
4	0.058	2-4,7
4	0.053	1,5-7
4	0.048	1-3,7
4	0.047	1,2,4,7
4	0.034	4-7
4	0.023	1,3-5
4	0.021	1,3,5,7
4	0.005	3-5,7
4	-0.011	1,4,5,7
4	-0.044	1,3,4,7

Number of variables: 5

No. Vars	Corr.	Selections
5	0.368	1-4,6
5	0.240	1-3,6,7
5	0.188	2-4,6,7
5	0.180	1,2,4,6,7
5	0.179	1-3,5,6
5	0.160	2-6
5	0.146	1,2,4-6
5	0.143	2,3,5-7
5	0.127	1,2,5-7
5	0.112	1-5
5	0.107	2,4-7
5	0.099	1,3,4,6,7
5	0.094	1-3,5,7
5	0.081	1,3-6
5	0.079	2-5,7
5	0.073	1,3,5-7
5	0.062	1,2,4,5,7
5	0.059	1-4,7
5	0.054	3-7
5	0.037	1,4-7
5	0.005	1,3-5,7

Number of variables: 6

No. Vars	Corr.	Selections
6	0.189	1-4,6,7
6	0.161	1-6
6	0.144	1-3,5-7
6	0.123	2-7
6	0.107	1,2,4-7
6	0.079	1-5,7
6	0.056	1,3-7

Number of variables: 7

No. Vars	Corr.	Selections
7	0.122	All

Best results

No. Vars	Corr.	Selections
3	0.464	1,2,6
2	0.462	2,6
4	0.458	1-3,6
3	0.456	2,3,6
5	0.368	1-4,6
4	0.368	2-4,6
3	0.366	2,4,6
4	0.365	1,2,4,6
3	0.344	1,3,6
2	0.333	3,6

Appendix VIIIa. BIOENV-Spearman (continued)

BIOENV for 1998.
Spearman Method

BIOENV
Biota and/or Environment matching

Worksheet

File: C:\Files\Matt Lybolt\USF_thesis_primerall_density.pri
Sample selection: 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78,82,86,90,94,98,102,106,110
Variable selection: 1-7

Similarity Matrix

File: Sheet1
Data type: Similarities
Sample selection: 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78,82,86,90,94,98,102,106,110

Parameters

Rank correlation method: Spearman
Maximum number of variables: 7

Similarity Matrix Parameters for sample data worksheet:
Analyse between: Samples
Similarity measure: Bray Curtis
Standardise: No
Transform: None

Variables

1 G.ventalina - short
2 G.ventalina - medium
3 G.ventalina - tall
4 “other octocoral” - short
5 “other octocoral” - medium
6 “other octocoral” - tall
7 Scleraxonia

Number of variables: 1

No. Vars	Corr.	Selections
1	0.530	6
1	0.157	5
1	0.107	3
1	0.076	2
1	0.015	4
1	-0.002	1
1	-0.073	7

Number of variables: 2

No. Vars	Corr.	Selections
2	0.621	3,6
2	0.564	2,6
2	0.534	1,6
2	0.460	6,7
2	0.449	4,6
2	0.279	5,6
2	0.268	3,4
2	0.258	2,4
2	0.219	3,5
2	0.216	2,5
2	0.159	5,7
2	0.156	1,5
2	0.135	4,5
2	0.099	3,7
2	0.095	2,3
2	0.094	1,3
2	0.085	1,2
2	0.079	2,7
2	0.018	1,4
2	0.015	4,7
2	-0.076	1,7

Number of variables: 3

No. Vars	Corr.	Selections
3	0.617	1,3,6
3	0.583	2,3,6
3	0.557	1,2,6
3	0.535	3,4,6
3	0.524	3,6,7
3	0.514	2,4,6
3	0.474	2,6,7
3	0.458	1,6,7
3	0.443	1,4,6
3	0.376	4,6,7
3	0.334	2-4
3	0.327	3,5,6
3	0.322	2,5,6
3	0.277	1,5,6
3	0.267	5-7
3	0.263	1,3,4
3	0.259	2,3,5
3	0.259	4-6
3	0.253	1,2,4
3	0.216	1,3,5
3	0.214	1,2,5
3	0.209	3,5,7
3	0.208	2,5,7
3	0.198	2,4,5
3	0.194	3,4,7
3	0.193	3-5
3	0.184	2,4,7
3	0.157	1,5,7
3	0.138	4,5,7
3	0.135	1,4,5
3	0.124	2,3,7
3	0.106	1-3
3	0.095	1,3,7
3	0.076	1,2,7
3	0.011	1,4,7

Number of variables: 4

No. Vars	Corr.	Selections
4	0.578	1-3,6
4	0.553	2-4,6
4	0.531	1,3,4,6
4	0.520	1,3,6,7
4	0.507	1,2,4,6
4	0.500	2,3,6,7
4	0.471	1,2,6,7
4	0.448	3,4,6,7
4	0.420	2,4,6,7
4	0.371	1,4,6,7
4	0.356	2,3,5,6
4	0.332	1-4
4	0.321	1,3,5,6
4	0.320	1,2,5,6
4	0.304	3,5-7
4	0.304	2,4-6
4	0.302	3-6
4	0.301	2,5-7
4	0.265	1,5-7
4	0.264	2-4,7
4	0.257	1-3,5
4	0.257	1,4-6
4	0.247	4-7
4	0.245	2,3,5,7
4	0.240	2-5
4	0.205	1,2,5,7
4	0.205	1,3,5,7
4	0.195	1,2,4,5
4	0.192	1,3-5
4	0.187	1,3,4,7
4	0.187	2,4,5,7
4	0.186	3-5,7
4	0.183	1,2,4,7
4	0.138	1,4,5,7
4	0.126	1-3,7

Number of variables: 5

No. Vars	Corr.	Selections
5	0.548	1-4,6
5	0.500	1-3,6,7
5	0.463	2-4,6,7
5	0.445	1,3,4,6,7
5	0.418	1,2,4,6,7
5	0.352	1-3,5,6
5	0.334	2,3,5-7
5	0.333	2-6
5	0.301	1,3,5-7
5	0.301	1,2,4-6
5	0.299	1,3-6
5	0.297	1,2,5-7
5	0.285	3-7
5	0.283	2,4-7
5	0.262	1-4,7
5	0.246	1,4-7
5	0.244	1-3,5,7
5	0.238	1-5
5	0.226	2-5,7
5	0.187	1,2,4,5,7
5	0.184	1,3-5,7

Number of variables: 6

No. Vars	Corr.	Selections
6	0.460	1-4,6,7
6	0.332	1-6
6	0.331	1-3,5-7
6	0.314	2-7
6	0.282	1,3-7
6	0.280	1,2,4-7
6	0.224	1-5,7

Number of variables: 7

No. Vars	Corr.	Selections
7	0.312	All

Best results

No. Vars	Corr.	Selections
2	0.621	3,6
3	0.617	1,3,6
3	0.583	2,3,6
4	0.578	1-3,6
2	0.564	2,6
3	0.557	1,2,6
4	0.553	2-4,6
5	0.548	1-4,6
3	0.535	3,4,6
2	0.534	1,6

BIOENV for 1999.
Spearman Method

BIOENV
Biota and/or Environment matching

Worksheet

File: C:\Files\Matt Lybolt\USF_thesis_primerall_density.pri
Sample selection: 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71,75,79,83,87,91,95,99,103,107,111
Variable selection: 1-7

Similarity Matrix

File: Sheet1
Data type: Similarities
Sample selection: 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71,75,79,83,87,91,95,99,103,107,111

Parameters

Rank correlation method: Spearman
Maximum number of variables: 7

Similarity Matrix Parameters for sample data worksheet:
Analyse between: Samples
Similarity measure: Bray Curtis
Standardise: No
Transform: None

Variables

1 G.ventalina - short
2 G.ventalina - medium
3 G.ventalina - tall
4 "other octocoral" - short
5 "other octocoral" - medium
6 "other octocoral" - tall
7 Scleraxonia

Number of variables: 1

No. Vars	Corr.	Selections
1	0.514	6
1	0.318	2
1	0.208	5
1	0.201	1
1	0.121	4
1	0.102	3
1	0.010	7

Number of variables: 2

No. Vars	Corr.	Selections
2	0.591	3,6
2	0.584	2,6
2	0.426	4,6
2	0.424	1,6
2	0.404	6,7
2	0.389	2,4
2	0.319	5,6
2	0.308	2,3
2	0.301	2,5
2	0.292	3,4
2	0.269	1,2
2	0.260	3,5
2	0.244	4,7
2	0.211	5,7
2	0.197	4,5
2	0.193	2,7
2	0.192	1,5
2	0.178	1,3
2	0.130	1,7
2	0.085	1,4
2	0.037	3,7

Number of variables: 3

No. Vars	Corr.	Selections
3	0.584	2,3,6
3	0.555	2,4,6
3	0.526	1,2,6
3	0.509	3,4,6
3	0.497	1,3,6
3	0.429	2,6,7
3	0.429	3,6,7
3	0.427	2-4
3	0.392	2,5,6
3	0.377	4,6,7
3	0.367	1,4,6
3	0.362	3,5,6
3	0.356	1,6,7
3	0.347	1,2,4
3	0.337	2,4,7
3	0.333	2,3,5
3	0.302	1,5,6
3	0.299	3,4,7
3	0.298	4-6
3	0.296	5-7
3	0.285	2,4,5
3	0.282	1,2,5
3	0.275	2,5,7
3	0.267	1-3
3	0.246	3,5,7
3	0.243	3-5
3	0.240	1,3,4
3	0.239	1,3,5
3	0.209	1,4,7
3	0.199	4,5,7
3	0.195	1,5,7
3	0.183	2,3,7
3	0.182	1,2,7
3	0.179	1,4,5
3	0.103	1,3,7

Number of variables: 4

No. Vars	Corr.	Selections
4	0.565	2-4,6
4	0.533	1-3,6
4	0.515	1,2,4,6
4	0.454	1,3,4,6
4	0.430	2,3,6,7
4	0.428	2,4,6,7
4	0.419	2,3,5,6
4	0.409	3,4,6,7
4	0.401	1,2,6,7
4	0.398	1-4
4	0.385	1,3,6,7
4	0.372	2,4-6
4	0.371	1,2,5,6
4	0.354	2-4,7
4	0.352	2,5-7
4	0.340	1,3,5,6
4	0.337	3-6
4	0.336	1,4,6,7
4	0.327	3,5-7
4	0.316	1,2,4,7
4	0.313	2-5
4	0.311	1-3,5
4	0.301	2,3,5,7
4	0.283	1,5-7
4	0.279	1,4-6
4	0.279	4-7
4	0.270	1,3,4,7
4	0.264	2,4,5,7
4	0.263	1,2,4,5
4	0.261	1,2,5,7
4	0.234	3-5,7
4	0.230	1,3,5,7
4	0.224	1,3-5
4	0.185	1,4,5,7
4	0.176	1-3,7

Number of variables: 5

No. Vars	Corr.	Selections
5	0.534	1-4,6
5	0.437	2-4,6,7
5	0.409	1-3,6,7
5	0.408	1,2,4,6,7
5	0.397	2-6
5	0.397	1-3,5,6
5	0.377	1,3,4,6,7
5	0.372	2,3,5-7
5	0.353	1,2,4-6
5	0.340	1-4,7
5	0.338	1,2,5-7
5	0.334	2,4-7
5	0.318	1,3-6
5	0.311	1,3,5-7
5	0.306	3-7
5	0.293	1-5
5	0.289	2-5,7
5	0.283	1-3,5,7
5	0.266	1,4-7
5	0.248	1,2,4,5,7
5	0.218	1,3-5,7

Number of variables: 6

No. Vars	Corr.	Selections
6	0.421	1-4,6,7
6	0.380	1-6
6	0.359	1-3,5-7
6	0.356	2-7
6	0.323	1,2,4-7
6	0.295	1,3-7
6	0.273	1-5,7

Number of variables: 7

No. Vars	Corr.	Selections
7	0.344	All

Best results

No. Vars	Corr.	Selections
2	0.591	3,6
2	0.584	2,6
3	0.584	2,3,6
4	0.565	2-4,6
3	0.555	2,4,6
5	0.534	1-4,6
4	0.533	1-3,6
3	0.526	1,2,6
4	0.515	1,2,4,6
1	0.514	6

BIOENV for 2002.
Spearman Method

BIOENV
Biota and/or Environment matching

Worksheet

File: C:\Files\Matt Lybolt\USF_thesis_primerall_density.pri
Sample selection: 4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76,80,84,88,92,96,100,104,108,112
Variable selection: 1-7

Similarity Matrix

File: Sheet1
Data type: Similarities
Sample selection: 4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76,80,84,88,92,96,100,104,108,112

Parameters

Rank correlation method: Spearman
Maximum number of variables: 7

Similarity Matrix Parameters for sample data worksheet:
Analyse between: Samples
Similarity measure: Bray Curtis
Standardise: No
Transform: None

Variables

1 G.ventalina - short
2 G.ventalina - medium
3 G.ventalina - tall
4 “other octocoral” - short
5 “other octocoral” - medium
6 “other octocoral” - tall
7 Scleraxonia

Number of variables: 1

No. Vars	Corr.	Selections
1	0.415	6
1	0.294	2
1	0.256	3
1	0.077	5
1	0.012	4
1	-0.016	1
1	-0.034	7

Number of variables: 2

No. Vars	Corr.	Selections
2	0.567	2,6
2	0.530	3,6
2	0.379	1,6
2	0.323	2,3
2	0.277	6,7
2	0.211	2,5
2	0.197	5,6
2	0.189	1,2
2	0.176	2,4
2	0.167	4,6
2	0.166	3,5
2	0.143	2,7
2	0.136	1,3
2	0.111	3,4
2	0.101	4,5
2	0.085	1,5
2	0.084	5,7
2	0.037	3,7
2	0.016	1,4
2	0.008	4,7
2	-0.061	1,7

Number of variables: 3

No. Vars	Corr.	Selections
3	0.577	2,3,6
3	0.542	1,2,6
3	0.506	1,3,6
3	0.420	2,6,7
3	0.369	3,6,7
3	0.302	2,5,6
3	0.292	2,4,6
3	0.272	2,3,5
3	0.266	3,5,6
3	0.243	3,4,6
3	0.240	1-3
3	0.236	1,6,7
3	0.222	2-4
3	0.216	1,2,5
3	0.199	1,5,6
3	0.197	2,4,5
3	0.197	2,5,7
3	0.186	4-6
3	0.176	5-7
3	0.171	1,3,5
3	0.170	1,2,4
3	0.164	2,3,7
3	0.162	3-5
3	0.162	1,4,6
3	0.155	3,5,7
3	0.138	2,4,7
3	0.123	4,6,7
3	0.106	1,3,4
3	0.103	1,4,5
3	0.103	1,2,7
3	0.094	4,5,7
3	0.086	1,5,7
3	0.077	3,4,7
3	0.008	1,4,7
3	0.004	1,3,7

Number of variables: 4

No. Vars	Corr.	Selections
4	0.561	1-3,6
4	0.454	2,3,6,7
4	0.387	1,2,6,7
4	0.352	2,3,5,6
4	0.332	1,3,6,7
4	0.330	2-4,6
4	0.305	1,2,5,6
4	0.287	1,2,4,6
4	0.278	2,5-7
4	0.276	1-3,5
4	0.271	2,4-6
4	0.269	1,3,5,6
4	0.252	2,3,5,7
4	0.247	2-5
4	0.243	3-6
4	0.240	3,5-7
4	0.240	1,3,4,6
4	0.237	2,4,6,7
4	0.214	1-4
4	0.200	1,2,4,5
4	0.197	1,2,5,7
4	0.189	3,4,6,7
4	0.187	1,4-6
4	0.184	2,4,5,7
4	0.182	1,5-7
4	0.179	2-4,7
4	0.170	4-7
4	0.165	1,3-5
4	0.156	1,3,5,7
4	0.151	3-5,7
4	0.134	1,2,4,7
4	0.130	1-3,7
4	0.118	1,4,6,7
4	0.095	1,4,5,7
4	0.075	1,3,4,7

Number of variables: 5

No. Vars	Corr.	Selections
5	0.425	1-3,6,7
5	0.354	1-3,5,6
5	0.325	1-4,6
5	0.325	2,3,5-7
5	0.314	2-6
5	0.279	1,2,5-7
5	0.277	2-4,6,7
5	0.272	1,2,4-6
5	0.254	1-3,5,7
5	0.252	2,4-7
5	0.249	1-5
5	0.243	1,3,5-7
5	0.242	1,3-6
5	0.231	1,2,4,6,7
5	0.230	2-5,7
5	0.220	3-7
5	0.186	1,2,4,5,7
5	0.184	1,3,4,6,7
5	0.174	1-4,7
5	0.170	1,4-7
5	0.152	1,3-5,7

Number of variables: 6

No. Vars	Corr.	Selections
6	0.325	1-3,5-7
6	0.312	1-6
6	0.292	2-7
6	0.271	1-4,6,7
6	0.252	1,2,4-7
6	0.232	1-5,7
6	0.221	1,3-7

Number of variables: 7

No. Vars	Corr.	Selections
7	0.290	All

Best results

No. Vars	Corr.	Selections
3	0.577	2,3,6
2	0.567	2,6
4	0.561	1-3,6
3	0.542	1,2,6
2	0.530	3,6
3	0.506	1,3,6
4	0.454	2,3,6,7
5	0.425	1-3,6,7
3	0.420	2,6,7
1	0.415	6

Appendix VIIIa. BIOENV-Spearman (continued)

BIOENV Summary of best ten results.
Spearman Method

Variables
1 G.ventalina - short
2 G.ventalina - med
3 G.ventalina - tall
4 “other octocoral” short
5 “other octocoral” med
6 “other octocoral” - tall
7 Scleraxonia

BIOENV for All Years.
Best results
Spearman Method

No. Vars	Corr.	Selections
3	0.534	2,3,6
2	0.528	2,6
4	0.525	1-3,6
3	0.515	1,2,6
2	0.490	3,6
3	0.477	1,3,6
4	0.413	2,3,6,7
5	0.406	1-3,6,7
1	0.401	6
4	0.397	2,6,7

BIOENV for 1996.
Best results
Spearman Method

No. Vars	Corr.	Selections
3	0.464	1,2,6
2	0.462	2,6
4	0.458	1-3,6
3	0.456	2,3,6
5	0.368	1-4,6
4	0.368	2-4,6
3	0.366	2,4,6
4	0.365	1,2,4,6
3	0.344	1,3,6
3	0.333	3,6

BIOENV for 1998.
Best results
Spearman Method

No. Vars	Corr.	Selections
2	0.621	3,6
3	0.617	1,3,6
3	0.583	2,3,6
4	0.578	1-3,6
2	0.564	2,6
3	0.557	1,2,6
4	0.553	2-4,6
5	0.548	1-4,6
3	0.535	3,4,6
2	0.534	1,6

BIOENV for 1999.
Best results
Spearman Method

No. Vars	Corr.	Selections
2	0.591	3,6
2	0.584	2,6
3	0.584	2,3,6
4	0.565	2-4,6
3	0.555	2,4,6
5	0.534	1-4,6
4	0.533	1-3,6
3	0.526	1,2,6
4	0.515	1,2,4,6
1	0.514	6

BIOENV for 2002.
Best results
Spearman Method

No. Vars	Corr.	Selections
3	0.577	2,3,6
2	0.567	2,6
4	0.561	1-3,6
3	0.542	1,2,6
2	0.530	3,6
3	0.506	1,3,6
4	0.454	2,3,6,7
5	0.425	1-3,6,7
3	0.420	2,6,7
1	0.415	6

Appendix VIIIa. BIOENV-Spearman (continued)

BIOENV Single Variable
Correlation With Percent Cover
Results.
Spearman Method

Variables
1 G.ventalina - short
2 G.ventalina - med
3 G.ventalina - tall
4 “other octocoral” short
5 “other octocoral” med
6 “other octocoral” - tall
7 Scleraxonia

BIOENV for 2002.
Single Variable Results
Spearman Method

No. Vars	Corr.	Selections
1	0.415	6
1	0.294	2
1	0.256	3
1	0.077	5
1	0.012	4
1	-0.016	1
1	-0.034	7

BIOENV for All Years.
Single Variable Results Spearman
Method

No. Vars	Corr.	Selections
1	0.401	6
1	0.219	2
1	0.136	3
1	0.055	5
1	0.028	1
1	0.006	7
1	-0.041	4

BIOENV for 1996.
Single Variable Results Spearman
Method

No. Vars	Corr.	Selections
1	0.262	6
1	0.226	2
1	0.033	3
1	0.014	5
1	-0.020	1
1	-0.072	7
1	-0.117	4

BIOENV for 1998.
Single Variable Results Spearman
Method

No. Vars	Corr.	Selections
1	0.530	6
1	0.157	5
1	0.107	3
1	0.076	2
1	0.015	4
1	-0.002	1
1	-0.073	7

BIOENV for 1999.
Single Variable Results
Spearman Method

No. Vars	Corr.	Selections
1	0.514	6
1	0.318	2
1	0.208	5
1	0.201	1
1	0.121	4
1	0.102	3
1	0.010	7

Appendix VIIIa. BIOENV-Spearman (continued)

BIOENV
Biota and/or Environment matching

Worksheet

File: C:\Files\Matt Lybolt\USF_thesis_primerall_density.pri
Parameters

Rank correlation method: Spearman
Maximum number of variables: 8

Similarity Matrix Parameters for sample data worksheet:
Analyse between: Samples
Similarity measure: Bray Curtis
Standardise: No
Transform: None

Variables

1 G.ventalina - short
2 G.ventalina - medium
3 G.ventalina - tall
4 “other octocoral” - short
5 “other octocoral” - medium
6 “other octocoral” - tall
7 Scleraxonia
8 Total All Octocorals

Number of variables: 1

1996 Spearman method

No. Vars	Corr.	Selections
1	0.262	6
1	0.226	2
1	0.128	8
1	0.033	3
1	0.014	5
1	-0.020	1
1	-0.072	7
1	-0.117	4

1998 Spearman method

No. Vars	Corr.	Selections
1	0.530	6
1	0.244	8
1	0.157	5
1	0.107	3
1	0.076	2
1	0.015	4
1	-0.002	1
1	-0.073	7

1999 Spearman method

No. Vars	Corr.	Selections
1	0.514	6
1	0.334	8
1	0.318	2
1	0.208	5
1	0.201	1
1	0.121	4
1	0.102	3
1	0.010	7

2002 Spearman method

No. Vars	Corr.	Selections
1	0.415	6
1	0.294	2
1	0.256	3
1	0.135	8
1	0.077	5
1	0.012	4
1	-0.016	1
1	-0.034	7

All Years Spearman method

No. Vars	Corr.	Selections
1	0.401	6
1	0.219	2
1	0.180	8
1	0.136	3
1	0.055	5
1	0.028	1
1	0.006	7
1	-0.041	4

Appendix VIIIb. BIOENV-Kendall

APPENDIX VIIIb

BIOENV for All Years.
Kendall Method

BIOENV
Biota and/or Environment
matching

Worksheet

File: C:\Files\Matt Lybolt\USF_thesis_primerall_density.pri
Sample selection: All

Variable selection: 1-7

Similarity Matrix

File: Sheet1
Data type: Similarities
Sample selection: All

Parameters

Rank correlation method: Kendall
Maximum number of variables: 7

Similarity Matrix Parameters for sample data worksheet:
Analyse between: Samples
Similarity measure: Bray Curtis
Standardise: No
Transform: None

Variables

1 G.ventalina - short
2 G.ventalina - medium
3 G.ventalina - tall
4 “other octocoral” - short
5 “other octocoral” - medium
6 “other octocoral” - tall
7 Scleraxonia

Number of variables: 1

No. Vars	Corr.	Selections
1	0.272	6
1	0.152	2
1	0.102	3
1	0.037	5
1	0.020	1
1	0.005	7
1	-0.027	4

Number of variables: 2

No. Vars	Corr.	Selections
2	0.366	2,6
2	0.338	3,6
2	0.265	1,6
2	0.221	6,7
2	0.158	2,3
2	0.151	4,6
2	0.141	2,4
2	0.137	1,2
2	0.107	5,6
2	0.104	2,7
2	0.102	2,5
2	0.099	1,3
2	0.080	3,4
2	0.075	3,5
2	0.046	3,7
2	0.042	5,7
2	0.037	1,5
2	0.027	4,5
2	0.017	1,7
2	0.017	4,7
2	-0.024	1,4

Number of variables: 3

No. Vars	Corr.	Selections
3	0.371	2,3,6
3	0.356	1,2,6
3	0.328	1,3,6
3	0.274	2,6,7
3	0.256	3,6,7
3	0.243	2,4,6
3	0.213	1,6,7
3	0.203	3,4,6
3	0.172	2-4
3	0.161	2,5,6
3	0.150	1,4,6
3	0.145	1-3
3	0.138	1,2,4
3	0.137	4,6,7
3	0.136	3,5,6
3	0.126	2,3,5
3	0.114	2,3,7
3	0.111	2,4,7
3	0.106	1,5,6
3	0.104	5-7
3	0.100	1,2,5
3	0.099	1,2,7
3	0.094	2,5,7
3	0.088	4-6
3	0.083	2,4,5
3	0.078	1,3,4
3	0.074	1,3,5
3	0.073	3,4,7
3	0.071	3,5,7
3	0.058	3-5
3	0.053	1,3,7
3	0.042	1,5,7
3	0.033	4,5,7
3	0.027	1,4,5
3	0.017	1,4,7

Number of variables: 4

No. Vars	Corr.	Selections
4	0.364	1-3,6
4	0.285	2,3,6,7
4	0.267	1,2,6,7
4	0.263	2-4,6
4	0.249	1,3,6,7
4	0.241	1,2,4,6
4	0.202	1,3,4,6
4	0.201	2,4,6,7
4	0.180	2,3,5,6
4	0.173	3,4,6,7
4	0.170	1-4
4	0.159	1,2,5,6
4	0.150	2,5-7
4	0.137	2,4-6
4	0.136	1,4,6,7
4	0.136	2-4,7
4	0.134	1,3,5,6
4	0.128	3,5-7
4	0.125	1-3,5
4	0.116	2,3,5,7
4	0.113	3-6
4	0.110	1-3,7
4	0.110	1,2,4,7
4	0.106	2-5
4	0.103	1,5-7
4	0.093	1,2,5,7
4	0.088	4-7
4	0.087	1,4-6
4	0.082	1,2,4,5
4	0.081	2,4,5,7
4	0.073	1,3,4,7
4	0.070	1,3,5,7
4	0.059	3-5,7
4	0.057	1,3-5
4	0.033	1,4,5,7

Number of variables: 5

No. Vars	Corr.	Selections
5	0.280	1-3,6,7
5	0.261	1-4,6
5	0.219	2-4,6,7
5	0.199	1,2,4,6,7
5	0.178	1-3,5,6
5	0.171	1,3,4,6,7
5	0.168	2,3,5-7
5	0.156	2-6
5	0.149	1,2,5-7
5	0.135	1,2,4-6
5	0.135	1-4,7
5	0.131	2,4-7
5	0.127	1,3,5-7
5	0.116	1-3,5,7
5	0.112	1,3-6
5	0.111	3-7
5	0.105	1-5
5	0.102	2-5,7
5	0.088	1,4-7
5	0.080	1,2,4,5,7
5	0.058	1,3-5,7

Number of variables: 6

No. Vars	Corr.	Selections
6	0.218	1-4,6,7
6	0.167	1-3,5-7
6	0.154	1-6
6	0.149	2-7
6	0.130	1,2,4-7
6	0.110	1,3-7
6	0.101	1-5,7

Number of variables: 7

No. Vars	Corr.	Selections
7	0.148	All

Best results

No. Vars	Corr.	Selections
3	0.371	2,3,6
2	0.366	2,6
4	0.364	1-3,6
3	0.356	1,2,6
2	0.338	3,6
3	0.328	1,3,6
4	0.285	2,3,6,7
5	0.280	1-3,6,7
3	0.274	2,6,7
1	0.272	6

BIOENV for 1996.
Kendall Method

BIOENV
Biota and/or Environment
matching

Worksheet

File: C:\Files\Matt Lybolt\USF_thesis_primerall_density.pri
Sample selection: 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,73,77,81,85,89,93,97,101,105,109
Variable selection: 1-7

Similarity Matrix

File: Sheet1
Data type: Similarities
Sample selection: 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,73,77,81,85,89,93,97,101,105,109

Parameters

Rank correlation method: Kendall
Maximum number of variables: 7

Similarity Matrix Parameters for sample data worksheet:
Analyse between: Samples
Similarity measure: Bray Curtis
Standardise: No
Transform: None

Variables

1 G.ventalina - short
2 G.ventalina - medium
3 G.ventalina - tall
4 “other octocoral” - short
5 “other octocoral” - medium
6 “other octocoral” - tall
7 Scleraxonia

Number of variables: 1

No. Vars	Corr.	Selections
1	0.173	6
1	0.155	2
1	0.025	3
1	0.011	5
1	-0.016	1
1	-0.049	7
1	-0.078	4

Number of variables: 2

No. Vars	Corr.	Selections
2	0.316	2,6
2	0.224	3,6
2	0.183	1,6
2	0.158	1,2
2	0.155	2,4
2	0.141	2,3
2	0.110	4,6
2	0.096	6,7
2	0.076	2,5
2	0.056	1,3
2	0.051	5,6
2	0.031	3,4
2	0.031	3,5
2	0.024	2,7
2	0.012	1,5
2	0.002	5,7
2	0.001	4,5
2	-0.038	3,7
2	-0.045	1,7
2	-0.057	4,7
2	-0.066	1,4

Number of variables: 3

No. Vars	Corr.	Selections
3	0.317	1,2,6
3	0.311	2,3,6
3	0.247	2,4,6
3	0.230	1,3,6
3	0.164	2-4
3	0.159	2,6,7
3	0.155	3,4,6
3	0.154	1,2,4
3	0.144	1-3
3	0.119	1,4,6
3	0.111	2,5,6
3	0.105	3,6,7
3	0.101	1,6,7
3	0.092	2,3,5
3	0.075	1,2,5
3	0.069	3,5,6
3	0.060	2,4,5
3	0.054	2,5,7
3	0.051	1,5,6
3	0.047	4,6,7
3	0.041	4-6
3	0.039	1,3,4
3	0.037	5-7
3	0.033	1,3,5
3	0.031	2,4,7
3	0.029	2,3,7
3	0.027	1,2,7
3	0.017	3,5,7
3	0.016	3-5
3	0.002	1,5,7
3	0.002	1,4,5
3	-0.006	4,5,7
3	-0.030	1,3,7
3	-0.031	3,4,7
3	-0.054	1,4,7

Number of variables: 4

No. Vars	Corr.	Selections
4	0.311	1-3,6
4	0.248	2-4,6
4	0.245	1,2,4,6
4	0.163	1-4
4	0.162	2,3,6,7
4	0.161	1,2,6,7
4	0.160	1,3,4,6
4	0.124	2,3,5,6
4	0.121	2,4,6,7
4	0.112	1,2,5,6
4	0.108	1,3,6,7
4	0.099	2,4-6
4	0.092	1-3,5
4	0.086	2,5-7
4	0.077	2-5
4	0.069	1,3,5,6
4	0.066	3,4,6,7
4	0.065	2,3,5,7
4	0.060	1,2,4,5
4	0.055	1,2,5,7
4	0.054	3-6
4	0.050	3,5-7
4	0.048	1,4,6,7
4	0.043	2,4,5,7
4	0.042	2-4,7
4	0.042	1,4-6
4	0.037	1,5-7
4	0.034	1-3,7
4	0.033	1,2,4,7
4	0.026	4-7
4	0.017	1,3,5,7
4	0.016	1,3-5
4	0.005	3-5,7
4	-0.006	1,4,5,7
4	-0.029	1,3,4,7

Number of variables: 5

No. Vars	Corr.	Selections
5	0.248	1-4,6
5	0.165	1-3,6,7
5	0.128	2-4,6,7
5	0.123	1-3,5,6
5	0.122	1,2,4,6,7
5	0.110	2-6
5	0.099	1,2,4-6
5	0.098	2,3,5-7
5	0.087	1,2,5-7
5	0.076	1-5
5	0.074	2,4-7
5	0.067	1,3,4,6,7
5	0.065	1-3,5,7
5	0.056	1,3-6
5	0.055	2-5,7
5	0.051	1,3,5-7
5	0.044	1,2,4,5,7
5	0.042	1-4,7
5	0.039	3-7
5	0.028	1,4-7
5	0.005	1,3-5,7

Number of variables: 6

No. Vars	Corr.	Selections
6	0.128	1-4,6,7
6	0.111	1-6
6	0.099	1-3,5-7
6	0.085	2-7
6	0.074	1,2,4-7
6	0.055	1-5,7
6	0.040	1,3-7

Number of variables: 7

No. Vars	Corr.	Selections
7	0.085	All

Best results

No. Vars	Corr.	Selections
3	0.317	1,2,6
2	0.316	2,6
4	0.311	1-3,6
3	0.311	2,3,6
4	0.248	2-4,6
5	0.248	1-4,6
3	0.247	2,4,6
4	0.245	1,2,4,6
3	0.230	1,3,6
2	0.224	3,6

BIOENV for 1998.
Kendall Method

BIOENV
Biota and/or Environment matching

Worksheet

File: C:\Files\Matt Lybolt\USF_thesis_primerall_density.pri
Sample selection: 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78,82,86,90,94,98,102,106,110
Variable selection: 1-7

Similarity Matrix

File: Sheet1
Data type: Similarities
Sample selection: 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78,82,86,90,94,98,102,106,110

Parameters

Rank correlation method: Kendall
Maximum number of variables: 7

Similarity Matrix Parameters for sample data worksheet:
Analyse between: Samples
Similarity measure: Bray Curtis
Standardise: No
Transform: None

Variables

1 G.ventalina - short
2 G.ventalina - medium
3 G.ventalina - tall
4 “other octocoral” - short
5 “other octocoral” - medium
6 “other octocoral” - tall
7 Scleraxonia

Number of variables: 1

No. Vars	Corr.	Selections
1	0.367	6
1	0.106	5
1	0.078	3
1	0.053	2
1	0.011	4
1	-0.002	1
1	-0.050	7

Number of variables: 2

No. Vars	Corr.	Selections
2	0.443	3,6
2	0.398	2,6
2	0.371	1,6
2	0.326	6,7
2	0.304	4,6
2	0.189	5,6
2	0.181	3,4
2	0.174	2,4
2	0.147	3,5
2	0.144	2,5
2	0.107	5,7
2	0.106	1,5
2	0.090	4,5
2	0.069	3,7
2	0.068	1,3
2	0.066	2,3
2	0.059	1,2
2	0.054	2,7
2	0.014	1,4
2	0.010	4,7
2	-0.053	1,7

Number of variables: 3

No. Vars	Corr.	Selections
3	0.439	1,3,6
3	0.414	2,3,6
3	0.391	1,2,6
3	0.379	3,6,7
3	0.371	3,4,6
3	0.354	2,4,6
3	0.335	2,6,7
3	0.324	1,6,7
3	0.300	1,4,6
3	0.255	4,6,7
3	0.227	2-4
3	0.223	3,5,6
3	0.219	2,5,6
3	0.188	1,5,6
3	0.181	5-7
3	0.178	1,3,4
3	0.174	2,3,5
3	0.172	4-6
3	0.170	1,2,4
3	0.145	1,3,5
3	0.143	1,2,5
3	0.141	3,5,7
3	0.139	2,5,7
3	0.133	2,4,5
3	0.131	3,4,7
3	0.128	3-5
3	0.122	2,4,7
3	0.106	1,5,7
3	0.093	4,5,7
3	0.090	1,4,5
3	0.086	2,3,7
3	0.074	1-3
3	0.067	1,3,7
3	0.053	1,2,7
3	0.006	1,4,7

Number of variables: 4

No. Vars	Corr.	Selections
4	0.409	1-3,6
4	0.386	2-4,6
4	0.376	1,3,6,7
4	0.369	1,3,4,6
4	0.358	2,3,6,7
4	0.349	1,2,4,6
4	0.332	1,2,6,7
4	0.312	3,4,6,7
4	0.289	2,4,6,7
4	0.253	1,4,6,7
4	0.243	2,3,5,6
4	0.227	1-4
4	0.220	1,3,5,6
4	0.218	1,2,5,6
4	0.207	3,5-7
4	0.204	2,5-7
4	0.204	2,4-6
4	0.204	3-6
4	0.180	1,5-7
4	0.178	2-4,7
4	0.173	1-3,5
4	0.171	1,4-6
4	0.165	4-7
4	0.164	2,3,5,7
4	0.161	2-5
4	0.138	1,3,5,7
4	0.137	1,2,5,7
4	0.131	1,2,4,5
4	0.128	1,3-5
4	0.126	1,3,4,7
4	0.126	2,4,5,7
4	0.124	3-5,7
4	0.122	1,2,4,7
4	0.093	1,4,5,7
4	0.088	1-3,7

Number of variables: 5

No. Vars	Corr.	Selections
5	0.381	1-4,6
5	0.356	1-3,6,7
5	0.323	2-4,6,7
5	0.310	1,3,4,6,7
5	0.287	1,2,4,6,7
5	0.240	1-3,5,6
5	0.228	2,3,5-7
5	0.225	2-6
5	0.206	1,3,5-7
5	0.202	1,2,4-6
5	0.202	1,3-6
5	0.201	1,2,5-7
5	0.191	3-7
5	0.190	2,4-7
5	0.177	1-4,7
5	0.164	1,4-7
5	0.164	1-3,5,7
5	0.159	1-5
5	0.153	2-5,7
5	0.126	1,2,4,5,7
5	0.123	1,3-5,7

Number of variables: 6

No. Vars	Corr.	Selections
6	0.320	1-4,6,7
6	0.226	1-3,5-7
6	0.224	1-6
6	0.212	2-7
6	0.190	1,3-7
6	0.188	1,2,4-7
6	0.151	1-5,7

Number of variables: 7

No. Vars	Corr.	Selections
7	0.212	All

Best results

No. Vars	Corr.	Selections
2	0.443	3,6
3	0.439	1,3,6
3	0.414	2,3,6
4	0.409	1-3,6
2	0.398	2,6
3	0.391	1,2,6
4	0.386	2-4,6
5	0.381	1-4,6
3	0.379	3,6,7
4	0.376	1,3,6,7

BIOENV for 1999.
Kendall Method

BIOENV
Biota and/or Environment matching

Worksheet

File: C:\Files\Matt Lybolt\USF_thesis_primerall_density.pri
Sample selection: 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71,75,79,83,87,91,95,99,103,107,111
Variable selection: 1-7

Similarity Matrix

File: Sheet1
Data type: Similarities
Sample selection: 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71,75,79,83,87,91,95,99,103,107,111

Parameters

Rank correlation method: Kendall
Maximum number of variables: 7

Similarity Matrix Parameters for sample data worksheet:
Analyse between: Samples
Similarity measure: Bray Curtis
Standardise: No
Transform: None

Variables

1 G.ventalina - short
2 G.ventalina - medium
3 G.ventalina - tall
4 “other octocoral” - short
5 “other octocoral” - medium
6 “other octocoral” - tall
7 Scleraxonia

Number of variables: 1

No. Vars	Corr.	Selections
1	0.353	6
1	0.214	2
1	0.146	1
1	0.138	5
1	0.080	4
1	0.076	3
1	0.006	7

Number of variables: 2

No. Vars	Corr.	Selections
2	0.427	3,6
2	0.422	2,6
2	0.292	4,6
2	0.287	1,6
2	0.282	6,7
2	0.264	2,4
2	0.212	5,6
2	0.208	2,3
2	0.203	2,5
2	0.198	3,4
2	0.182	1,2
2	0.175	3,5
2	0.164	4,7
2	0.139	5,7
2	0.130	2,7
2	0.129	4,5
2	0.128	1,5
2	0.127	1,3
2	0.088	1,7
2	0.062	1,4
2	0.026	3,7

Number of variables: 3

No. Vars	Corr.	Selections
3	0.421	2,3,6
3	0.391	2,4,6
3	0.372	1,2,6
3	0.355	3,4,6
3	0.348	1,3,6
3	0.303	2,6,7
3	0.303	3,6,7
3	0.291	2-4
3	0.267	2,5,6
3	0.264	4,6,7
3	0.248	1,4,6
3	0.245	3,5,6
3	0.243	1,6,7
3	0.234	1,2,4
3	0.228	2,4,7
3	0.225	2,3,5
3	0.203	3,4,7
3	0.202	1,5,6
3	0.198	4-6
3	0.197	5-7
3	0.191	1,2,5
3	0.191	2,4,5
3	0.186	2,5,7
3	0.181	1-3
3	0.165	3,5,7
3	0.164	1,3,4
3	0.163	3-5
3	0.161	1,3,5
3	0.140	1,4,7
3	0.131	4,5,7
3	0.129	1,5,7
3	0.123	2,3,7
3	0.123	1,2,7
3	0.119	1,4,5
3	0.070	1,3,7

Number of variables: 4

No. Vars	Corr.	Selections
4	0.398	2-4,6
4	0.379	1-3,6
4	0.358	1,2,4,6
4	0.312	1,3,4,6
4	0.303	2,3,6,7
4	0.301	2,4,6,7
4	0.288	3,4,6,7
4	0.287	2,3,5,6
4	0.278	1,2,6,7
4	0.270	1-4
4	0.268	1,3,6,7
4	0.253	1,2,5,6
4	0.253	2,4-6
4	0.240	2-4,7
4	0.239	2,5-7
4	0.230	1,3,5,6
4	0.230	1,4,6,7
4	0.228	3-6
4	0.220	3,5-7
4	0.212	1,2,4,7
4	0.212	2-5
4	0.210	1-3,5
4	0.204	2,3,5,7
4	0.189	1,5-7
4	0.187	1,4-6
4	0.186	4-7
4	0.183	1,3,4,7
4	0.177	2,4,5,7
4	0.176	1,2,5,7
4	0.176	1,2,4,5
4	0.157	3-5,7
4	0.154	1,3,5,7
4	0.150	1,3-5
4	0.123	1,4,5,7
4	0.119	1-3,7

Number of variables: 5

No. Vars	Corr.	Selections
5	0.374	1-4,6
5	0.306	2-4,6,7
5	0.284	1-3,6,7
5	0.284	1,2,4,6,7
5	0.272	2-6
5	0.271	1-3,5,6
5	0.261	1,3,4,6,7
5	0.255	2,3,5-7
5	0.240	1,2,4-6
5	0.230	1,2,5-7
5	0.229	1-4,7
5	0.227	2,4-7
5	0.215	1,3-6
5	0.210	1,3,5-7
5	0.206	3-7
5	0.197	1-5
5	0.194	2-5,7
5	0.192	1-3,5,7
5	0.177	1,4-7
5	0.166	1,2,4,5,7
5	0.145	1,3-5,7

Number of variables: 6

No. Vars	Corr.	Selections
6	0.292	1-4,6,7
6	0.258	1-6
6	0.245	1-3,5-7
6	0.241	2-7
6	0.218	1,2,4-7
6	0.198	1,3-7
6	0.182	1-5,7

Number of variables: 7

No. Vars	Corr.	Selections
7	0.232	All

Best results

No. Vars	Corr.	Selections
2	0.427	3,6
2	0.422	2,6
3	0.421	2,3,6
4	0.398	2-4,6
3	0.391	2,4,6
4	0.379	1-3,6
5	0.374	1-4,6
3	0.372	1,2,6
4	0.358	1,2,4,6
3	0.355	3,4,6

BIOENV for 2002.
Kendall Method

BIOENV
Biota and/or Environment
matching

Worksheet

File: C:\Files\Matt
Lybolt\USF_thesis_primerall
_density.pri
Sample selection:
4,8,12,16,20,24,28,32,36,40,4
4,48,52,56,60,64,68,72,76,80,84,8
8,92,96,100,104,108,112
Variable selection: 1-7

Similarity Matrix

File: Sheet1
Data type: Similarities
Sample selection:
4,8,12,16,20,24,28,32,36,40,44,
48,52,56,60,64,68,72,76,80,84
,88,92,96,100,104,108,112

Parameters

Rank correlation method: Kendall
Maximum number of variables: 7

Similarity Matrix Parameters for
sample data worksheet:
Analyse between: Samples
Similarity measure: Bray Curtis
Standardise: No
Transform: None

Variables

1 G.ventalina - short
2 G.ventalina - medium
3 G.ventalina - tall
4 “other octocoral” - short
5 “other octocoral” - medium
6 “other octocoral” - tall
7 Scleraxonia

Number of variables: 1

No. Vars	Corr.	Selections
1	0.282	6
1	0.216	2
1	0.196	3
1	0.053	5
1	0.006	4
1	-0.014	1
1	-0.024	7

Number of variables: 2

No. Vars	Corr.	Selections
2	0.396	2,6
2	0.365	3,6
2	0.260	1,6
2	0.237	2,3
2	0.188	6,7
2	0.143	2,5
2	0.133	5,6
2	0.132	1,2
2	0.118	2,4
2	0.112	3,5
2	0.110	4,6
2	0.099	2,7
2	0.097	1,3
2	0.074	3,4
2	0.067	4,5
2	0.058	1,5
2	0.057	5,7
2	0.025	3,7
2	0.008	1,4
2	0.004	4,7
2	-0.044	1,7

Number of variables: 3

No. Vars	Corr.	Selections
3	0.406	2,3,6
3	0.380	1,2,6
3	0.351	1,3,6
3	0.287	2,6,7
3	0.250	3,6,7
3	0.208	2,5,6
3	0.199	2,4,6
3	0.184	2,3,5
3	0.181	3,5,6
3	0.167	1-3
3	0.165	3,4,6
3	0.163	1,6,7
3	0.150	2-4
3	0.147	1,2,5
3	0.137	1,5,6
3	0.134	2,5,7
3	0.134	2,4,5
3	0.125	4-6
3	0.120	5-7
3	0.116	1,3,5
3	0.116	1,2,4
3	0.114	2,3,7
3	0.108	1,4,6
3	0.108	3-5
3	0.105	3,5,7
3	0.092	2,4,7
3	0.080	4,6,7
3	0.072	1,3,4
3	0.068	1,4,5
3	0.067	1,2,7
3	0.062	4,5,7
3	0.058	1,5,7
3	0.050	3,4,7
3	0.002	1,4,7
3	0.001	1,3,7

Number of variables: 4

No. Vars	Corr.	Selections
4	0.394	1-3,6
4	0.311	2,3,6,7
4	0.265	1,2,6,7
4	0.242	2,3,5,6
4	0.226	1,3,6,7
4	0.226	2-4,6
4	0.210	1,2,5,6
4	0.197	1,2,4,6
4	0.192	2,5-7
4	0.189	1-3,5
4	0.186	2,4-6
4	0.185	1,3,5,6
4	0.172	2,3,5,7
4	0.168	2-5
4	0.165	3,5-7
4	0.165	3-6
4	0.163	1,3,4,6
4	0.160	2,4,6,7
4	0.145	1-4
4	0.136	1,2,4,5
4	0.134	1,2,5,7
4	0.126	1,4-6
4	0.125	3,4,6,7
4	0.125	1,5-7
4	0.124	2,4,5,7
4	0.120	2-4,7
4	0.115	4-7
4	0.110	1,3-5
4	0.105	1,3,5,7
4	0.101	3-5,7
4	0.090	1,2,4,7
4	0.086	1-3,7
4	0.077	1,4,6,7
4	0.063	1,4,5,7
4	0.049	1,3,4,7

Number of variables: 5

No. Vars	Corr.	Selections
5	0.291	1-3,6,7
5	0.244	1-3,5,6
5	0.224	2,3,5-7
5	0.223	1-4,6
5	0.215	2-6
5	0.193	1,2,5-7
5	0.189	2-4,6,7
5	0.185	1,2,4-6
5	0.173	1-3,5,7
5	0.172	2,4-7
5	0.170	1-5
5	0.167	1,3,5-7
5	0.164	1,3-6
5	0.156	1,2,4,6,7
5	0.155	2-5,7
5	0.149	3-7
5	0.126	1,2,4,5,7
5	0.123	1,3,4,6,7
5	0.116	1-4,7
5	0.115	1,4-7
5	0.102	1,3-5,7

Number of variables: 6

No. Vars	Corr.	Selections
6	0.224	1-3,5-7
6	0.214	1-6
6	0.199	2-7
6	0.185	1-4,6,7
6	0.173	1,2,4-7
6	0.157	1-5,7
6	0.150	1,3-7

Number of variables: 7

No. Vars	Corr.	Selections
7	0.199	All

Best results

No. Vars	Corr.	Selections
3	0.406	2,3,6
2	0.396	2,6
4	0.394	1-3,6
3	0.380	1,2,6
2	0.365	3,6
3	0.351	1,3,6
4	0.311	2,3,6,7
5	0.291	1-3,6,7
3	0.287	2,6,7
1	0.282	6

Appendix VIIIb. BIOENV-Kendall (continued)

BIOENV Summary of best ten results.
Kendall Method

Variables

1 G.ventalina - short
2 G.ventalina - med
3 G.ventalina - tall
4 “other octocoral” short
5 “other octocoral” med
6 “other octocoral” tall
7 Scleraxonia

BIOENV for All Years.
Kendall Method
Best results

No. Vars	Corr.	Selections
3	0.371	2,3,6
2	0.366	2,6
4	0.364	1-3,6
3	0.356	1,2,6
2	0.338	3,6
3	0.328	1,3,6
4	0.285	2,3,6,7
5	0.280	1-3,6,7
3	0.274	2,6,7
1	0.272	6

BIOENV for 1996.
Kendall Method
Best results

No. Vars	Corr.	Selections
3	0.317	1,2,6
2	0.316	2,6
4	0.311	1-3,6
3	0.311	2,3,6
4	0.248	2-4,6
5	0.248	1-4,6
3	0.247	2,4,6
4	0.245	1,2,4,6
3	0.230	1,3,6
2	0.224	3,6

BIOENV for 1998.
Kendall Method
Best results

No. Vars	Corr.	Selections
2	0.443	3,6
3	0.439	1,3,6
3	0.414	2,3,6
4	0.409	1-3,6
2	0.398	2,6
3	0.391	1,2,6
4	0.386	2-4,6
5	0.381	1-4,6
3	0.379	3,6,7
4	0.376	1,3,6,7

BIOENV for 1999.
Kendall Method
Best results

No. Vars	Corr.	Selections
2	0.427	3,6
2	0.422	2,6
3	0.421	2,3,6
4	0.398	2-4,6
3	0.391	2,4,6
4	0.379	1-3,6
5	0.374	1-4,6
3	0.372	1,2,6
4	0.358	1,2,4,6
3	0.355	3,4,6

BIOENV for 2002.
Kendall Method
Best results

No. Vars	Corr.	Selections
3	0.406	2,3,6
2	0.396	2,6
4	0.394	1-3,6
3	0.380	1,2,6
2	0.365	3,6
3	0.351	1,3,6
4	0.311	2,3,6,7
5	0.291	1-3,6,7
3	0.287	2,6,7
1	0.282	6

BIOENV Single Variable Correlation With Percent Cover Results.
Kendall Method

Variables

1 G.ventalina - short
2 G.ventalina - med
3 G.ventalina - tall
4 “other octocoral” short
5 “other octocoral” med
6 “other octocoral” tall
7 Scleraxonia

BIOENV for All Years.
Single Variable Results Kendall Method

No. Vars	Corr.	Selections
1	0.272	6
1	0.152	2
1	0.102	3
1	0.037	5
1	0.020	1
1	0.005	7
1	-0.027	4

BIOENV for 1996.
Single Variable Results Kendall Method

No. Vars	Corr.	Selections
1	0.173	6
1	0.155	2
1	0.025	3
1	0.011	5
1	-0.016	1
1	-0.049	7
1	-0.078	4

BIOENV for 1998.
Single Variable Results Kendall Method

No. Vars	Corr.	Selections
1	0.367	6
1	0.106	5
1	0.078	3
1	0.053	2
1	0.011	4
1	-0.002	1
1	-0.050	7

BIOENV for 1999.
Single Variable Results Kendall Method

No. Vars	Corr.	Selections
1	0.353	6
1	0.214	2
1	0.146	1
1	0.138	5
1	0.080	4
1	0.076	3
1	0.006	7

BIOENV for 2002.
Single Variable Results
Kendall Method

No. Vars	Corr.	Selections
1	0.282	6
1	0.216	2
1	0.196	3
1	0.053	5
1	0.006	4
1	-0.014	1
1	-0.024	7

Appendix VIIIb. BIOENV-Kendall (continued)

BIOENV
Biota and/or Environment matching

Worksheet

File: C:\Files\Matt Lybolt\USF_thesis_primerall_density.pri
Parameters

Rank correlation method: Kendall
Maximum number of variables: 8

Similarity Matrix Parameters for sample data worksheet:
Analyse between: Samples
Similarity measure: Bray Curtis
Standardise: No
Transform: None

Variables

1 G.ventalina - short
2 G.ventalina - medium
3 G.ventalina - tall
4 "other octocoral" - short
5 "other octocoral" - medium
6 "other octocoral" - tall
7 Scleraxonia
8 Total All Octocorals

Number of variables: 1

1996 Kendall method

No. Vars	Corr.	Selections
1	0.173	6
1	0.155	2
1	0.087	8
1	0.025	3
1	0.011	5
1	-0.016	1
1	-0.049	7
1	-0.078	4

1998 Kendall method

No. Vars	Corr.	Selections
1	0.367	6
1	0.161	8
1	0.106	5
1	0.078	3
1	0.053	2
1	0.011	4
1	-0.002	1
1	-0.050	7

1999 Kendall method

No. Vars	Corr.	Selections
1	0.353	6
1	0.228	8
1	0.214	2
1	0.146	1
1	0.138	5
1	0.080	4
1	0.076	3
1	0.006	7

2002 Kendall method

No. Vars	Corr.	Selections
1	0.282	6
1	0.216	2
1	0.196	3
1	0.091	8
1	0.053	5
1	0.006	4
1	-0.014	1
1	-0.024	7

All Years Kendall method

No. Vars	Corr.	Selections
1	0.272	6
1	0.152	2
1	0.121	8
1	0.102	3
1	0.037	5
1	0.020	1
1	0.005	7
1	-0.027	4