Environmental Protection Commission
of Hillsborough County
Technical Report

The Epifaunal Community Structure on Artificial Reefs in Tampa Bay

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ABSTRACT

Three artificial reefs throughout Tampa Bay were sampled to characterize the epifaunal community. The Howard Frankland Reef is located in Old Tampa Bay, Bahia Beach Reef is located in Middle Tampa Bay and Egmont Key Reef is located in Lower Tampa Bay. Each reef was sampled 10 times in two seasons (wet and dry) for a total of 60 samples. Epifaunal samples were collected at different levels of the reef and different surface planes. The hydrographic and reef characteristics were recorded from each sample site.

The biomass and species composition was analyzed for each reef sample. The artificial reefs of Tampa Bay consist of 385 taxa within 14 phyla. The Howard Frankland Reef differs from the Egmont Key Reef in biomass and species composition, while Bahia Beach is a transitional reef with sites that are similar in biomass to Howard Frankland Reef and Egmont Key Reef, but the species composition is most similar to Egmont Key.

The Asian Green Mussel, *Perna viridis* dominates the biomass at the Howard Frankland Reef while Egmont Key Reef is dominated by a mixture of barnacles and ascidians. *Perna viridis* has invaded several Bahia Beach Reef sites. The biomass and species composition for the Bahia Beach and Egmont Key Reefs could potentially change over time and become more similar to Howard Frankland Reef if *Perna viridis* continues to colonize Lower Tampa Bay.

INTRODUCTION

Artificial reefs throughout the state have historically been used to promote recreational fishing and diving interests. The Artificial Reef Program is administered by the Environmental Protection Commission of Hillsborough County and was started October 23, 1986. Our program has extended this concept to include artificial habitats as restoration and mitigation alternatives. EPC's Artificial Reef Program has a total of eight sites that span from as far north as the Courtney Campbell Causeway to as far south as Egmont Key. Each reef site can accommodate various types and amounts of material and each is in a different stage of development. The Ballast Point Pier Reef and the Picnic Island Pier Reef are considered complete, with no immediate plans to add material to them. Conversely, the Egmont Key Reef is the newest addition to the program and will continue to develop for years to come.

The goal of the Artificial Reef Program at the Environmental Protection Commission of Hillsborough County is to increase biological diversity and productivity in Tampa Bay by providing hard-bottom substrates and communities which might not otherwise be available. The program has increased hard-bottom habitat by placing over 36,000 metric tons of concrete substrate in a series of artificial reefs throughout Tampa Bay, covering an approximate area of 0.51 km^2. Determining the success of the program is, in part, dependent on the benthic species diversity and benthic biomass found on the artificial reefs.

The community structure and seasonality of epibenthic organisms for the artificial reefs in Tampa Bay has never been studied. One other study was done on the hard bottom communities in Tampa Bay, but was on natural hard or rocky substrates (Derrenbacker, 1984). The objective of this study was to compile a comprehensive list of epibenthic organisms that make up the fouling community on the artificial reefs in Tampa Bay and to evaluate their community structure.

METHODS AND MATERIALS

Study sites

One artificial reef was selected from Old Tampa Bay, Middle Tampa Bay and Lower Tampa Bay (Figure.1). The Howard Frankland Reef (Old Tampa Bay) center is at 27° 54.70' N and 82° 33.25' W. The Howard Frankland Reef dimensions are 182.8 m by 365.8 m for a total area of 0.067 km^2. The Bahia Beach Reef (Middle Tampa Bay) center is at 27° 44.89' N and 82° 30.92'W and its dimensions are 182.8 m by 365.8 m for a total area of 0.067 km^2. The Egmont Key Reef (Lower Tampa Bay) center is at 27° 35.00' N and 82° 44.60' W and its dimensions are 365.8 m by 365.8 m for a total area of 0.134 km^2.

Ten samples were collected from each reef from March-April 2004 (dry season) and again in August 2004 (wet season) for a total of 60 samples (20 samples/reef and 10 samples/season). Sample sites and coordinates are listed in appendix A.

Sample sites on reef

Ten sampling locations were selected at each reef from random coordinates. The boat was anchored at each sample location and the coordinates, time, date, and conditions were recorded. Sample sites on the reef were randomly selected for one of the three different reef levels: top of reef, middle of reef, and bottom of reef. Also the sample sites were randomized for one of three surface orientations: with reef face in the horizontal position towards the surface (horizontal), with reef face in the horizontal position towards the bottom (inverted), or reef face in the vertical position (vertical).

Water and LI-COR® Profiles

A water column profile was performed at each sample site with a Hydrolab Surveyor III. This unit measured temperature, salinity, depth, dissolved oxygen, and pH. Measurements were

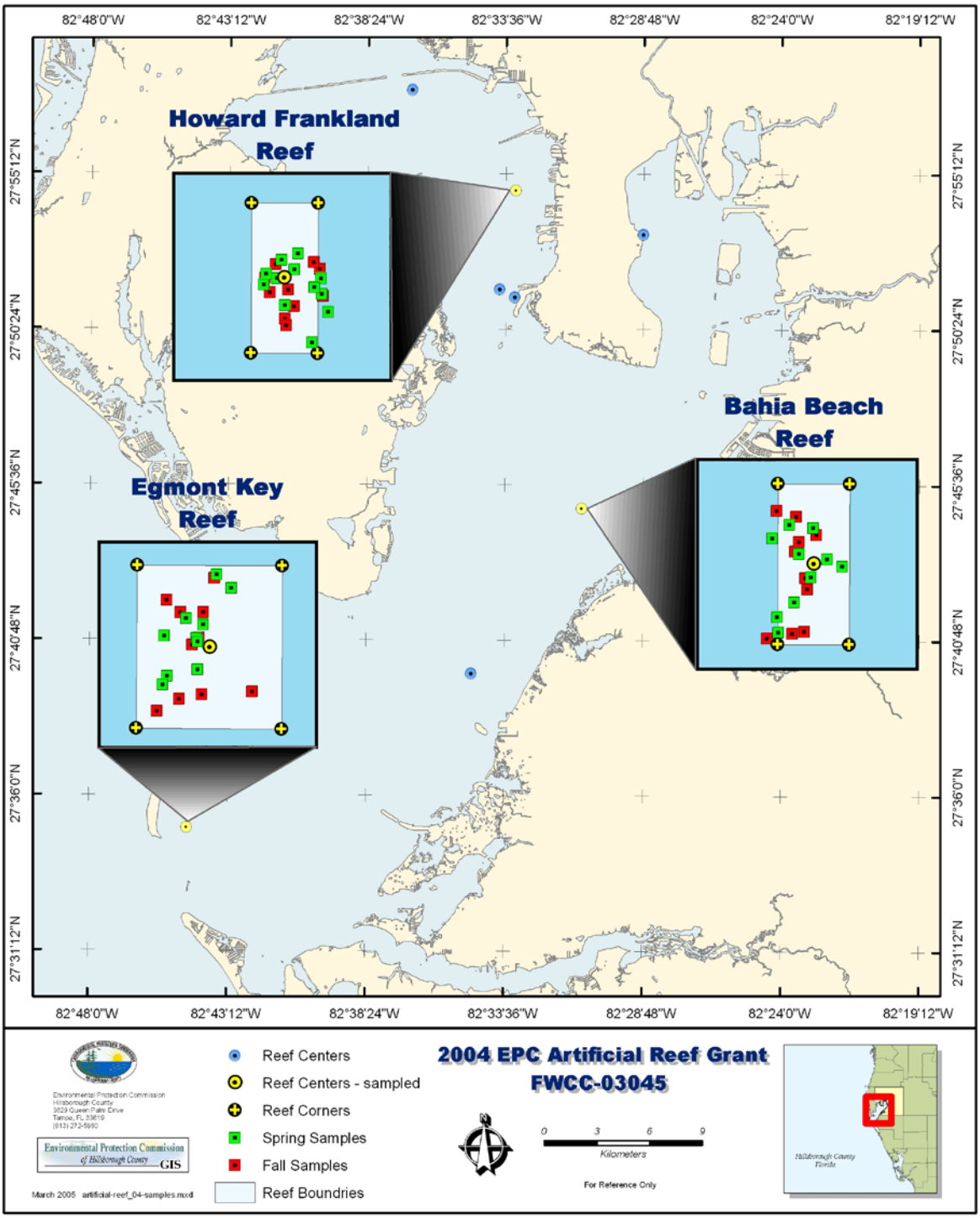

Figure 1. Tampa Bay artificial reefs

taken at the surface (depth = 0.1 m), mid depth and at the bottom. Secchi disk measurements were taken at each site to measure turbidity and estimate the light extinction coefficient (K). A LI-COR LI-1000 radiometer measured the photosynthetically active radiation (PAR) penetrating the water column at the surface (depth = 0.1 m), 0.5 m, 1 m, and 1.5 m.

Field Collection

Epifaunal samples were collected by SCUBA divers from each sample site. A metal frame (16 cm wide X 16 cm long) was placed at the sample site. Photographs were taken of the sampling area and the depth of epifauna growth was measured before the sample was collected.

A stainless steel epifaunal sampler was used to remove attached organisms and to transport the sample to the surface. The sampler was rectangular with dimensions: 16 cm wide X 10.5 cm high X 20.5 cm deep (bottom) and 16 cm wide X 10.5 cm high X 14.7 cm deep (top), with one handle on top (Figure. 2).

Figure 2. The epifaunal sampler

The aperture opening was 8.9 cm high and 15.3 cm wide (Figure. 3). The top and bottom lips were beveled. The back of sampler had an opening (6.9 cm wide X 4.6 cm high) with 0.5 mm metal

screen mesh attached to allow water to escape (Figure 4). If the metal screen mesh was damaged, the mesh could be removed and replaced with a new screen mesh. The aperture was temporarily sealed with a plastic cover and secured with a bungee cord for transporting the sample to the surface (Figure 5). Some of the samples were collected with a hand scraper after the original epifaunal sampler was lost in the field. A new sampler was fabricated prior to the next sampling event.

Figure 3. Epifaunal sampler front

Figure 4. The back of epifaunal sampler

One diver scraped the area of metal frame until the artificial substrate was exposed, while another diver placed 0.5 mm dip net downstream to catch any material that did not enter the epifaunal sampler. For sites sampled with the hand scraper, the epifauna within the 16 cm x 16 cm frame were scraped directly into the dip net.

Figure 5. Epifaunal sampler with cover

Sample Procedures

The sampler and dip net were thoroughly rinsed with seawater into a 0.5 mm mesh sieve and sieved in a plastic dish pan of seawater. The sample was transferred into pre-labeled, plastic, screw-top one gallon jars and relaxed with a solution of seawater and Epsom salts and stored on ice for transport back to the laboratory. Upon return to the lab, the samples were fixed in a 10% borax-buffered formalin/seawater solution with Rose Bengal stain. The samples were left in the fixation solution for at least 3 days then transferred into 70 % isopropyl alcohol. The samples were sorted under a dissecting microscope and the organisms were identified to the lowest practical taxonomic level.

Data Analysis

A species list was compiled for each reef. Descriptive statistics, Analysis of Variance (ANOVA) and/or Kruskal-Wallis Nonparametric test (KW), relative percent, and graphs for hydrographic and biological data were generated using SYSTAT 11 (SSPS Inc., 2004). The biomass was measured as wet weight (shell included) in grams. Species richness, Abundance, Shannon-Wiener diversity (H'), evenness (J') and multivariate analysis (Cluster analysis, Multi-Dimensional Scaling) and multivariate graphics were calculated using PRIMER ver. 5.1.2 o (Primer-E Ltd. 2001). Analysis on the updated dataset used PRIMER ver. 6 and SigmaPlot 10 with SigmaStat 3.5. Colonial taxa were assigned a raw count value of 0.0256 in the dataset. Raw count data was converted to densities (number/m2) by multiplying by a factor of 39, which converted the colonial taxa counts to a value of 1 for present or 0 for absent. For the cluster analysis, the data were 4^{th} root transformed. The Bray-Curtis similarity coefficient with the group-averaging clustering algorithm was used for both data sets (Primer-E Ltd. 2000). PRIMER's SIMPER (PRIMER-E LTd. 2001) program was used to rank the various taxa's contribution to the dissimilarity between identified clusters. Maps were generated using GIS Arcview ver. 9.1 (ESRI, 2005).

RESULTS

Hydrographic

The bottom water quality measures, including temperature, salinity, dissolved oxygen (DO), pH, Secchi depth, and the photosynthetically active radiation (PAR) as well as sample depth and station depth for the sites are presented by reef and season (Table 1 through Table 6). The station depth ranged from 4.3 m to 7.1 m with the sample depth ranging from 3.3 m to 6.5 m. The Howard Frankland Reef sites were shallower than the Bahia Beach Reef and Egmont Key Reef sites and Bahia Beach had the deepest sites.

The temperature for the spring ranged from 20.2 °C to 22.3 °C while the fall temperatures

ranged from 29.8 °C to 31.3 °C. The Bahia Beach Reef sites had the highest temperatures during the spring while Egmont Key had the lowest. The Egmont Key Reef sites had the highest temperatures during the fall while the Bahia Beach Reef sites had the lowest.

The salinity for the spring ranged from 23.6 ‰ to 33.1‰ while the fall salinity ranged from 20.3‰ to 32.5‰. The highest salinities were at the Egmont Key Reef sites for both the spring and fall while the Howard Frankland sites had the lowest salinities during both seasons.

The dissolved oxygen (DO) for the spring ranged from 6.4 mg/l to 7.2 mg/l while the fall DO ranged from 3.9 mg/l to 6.2 mg/l. The Howard Frankland sites had the highest DO during the spring while the Egmont Key sites had the highest DO during fall. The Bahia Beach sites had the lowest DO during the spring and fall.

The pH for the spring ranged from 8.0 to 8.1 while the fall pH ranged from 8.1 to 8.3. The pH is generally higher in the fall than spring. The pH values at Egmont Key were highest while the Bahia Beach sites were the lowest.

The Secchi depth for the spring ranged from 1.8 m to 4.5 m while the fall Secchi depth ranged from 0.4 m to 3.7 m. The Egmont Key Reef sites had the highest Secchi depth in the spring and fall while the Howard Frankland Reef sites had the lowest Secchi depth in the spring and the Bahia Beach sites were the lowest in the fall. The iridescence at the sample depth (I_{SD}) values for the spring ranged from 0.55 to 253.06 while the fall sample depth I values ranged from 0 to 169.73. More light reached the Egmont Key Reef sites during the spring and fall than the other reefs. The Bahia Beach sites received more light during the spring than the Howard Frankland sites but the opposite was true during the fall.

Table 1. Summary of Physical Variables: Howard Frankland Reef – Spring 2004

	Station Depth (meters)	Sample Depth (meters)	Temperature (°C)	Salinity (‰)	Dissolved Oxygen (mg/l)	pH	Secchi Depth (meters)	I_{1m}	I_{sd}
N	10	9	10	10	10	10	10	10	9
Min	4.3	3.3	21.6	23.6	6.7	8.1	1.8	4.28	0.55
Max	5.4	4.8	21.8	23.9	7.2	8.1	2.0	581.88	46.25
Median	4.8	4.1	21.7	23.6	6.9	8.1	2.0	512.24	32.66
Mean	4.8	4.2	21.7	23.7	6.9	8.1	1.9	464.28	32.94
SD	0.4	0.5	0.1	0.1	0.2	0.0	0.1	170.32	14.22

Table 2. Summary of Physical Variables: Howard Frankland Reef – Fall 2004

	Station Depth (meters)	Sample Depth (meters)	Temperature (°C)	Salinity (‰)	Dissolved Oxygen (mg/l)	pH	Secchi Depth (meters)	I_{1m}	I_{sd}
N	10	10	10	10	10	10	10	10	10
Min	4.3	3.8	30.3	20.3	4.1	8.0	1.2	364.82	5.08
Max	5.6	5.2	30.5	20.6	6.2	8.3	2.7	616.10	96.55
Median	5.1	4.3	30.4	20.4	4.6	8.1	1.4	428.04	8.71
Mean	4.9	4.3	30.4	20.4	4.9	8.1	1.7	464.22	29.47
SD	0.4	0.4	0.0	0.1	0.7	0.1	0.6	98.43	35.06

Table 3. Summary of Physical Variables: Bahia Beach Reef – Spring 2004

	Station Depth (meters)	Sample Depth (meters)	Temperature (°C)	Salinity (‰)	Dissolved Oxygen (mg/l)	pH	Secchi Depth (meters)	I_{1m}	I_{sd}
N	10	10	10	10	10	10	10	10	10
Min	5.8	4.7	22.1	27.3	6.4	8.0	2.6	391.65	18.84
Max	6.7	6.5	22.3	27.5	6.8	8.0	3.1	842.56	99.41
Median	6.2	5.6	22.2	27.3	6.7	8.0	2.9	747.21	63.96
Mean	6.3	5.5	22.2	27.3	6.6	8.0	2.9	700.95	62.66
SD	0.3	0.6	0.1	0.1	0.1	0.0	0.2	150.39	22.94

Table 4. Summary of Physical Variables: Bahia Beach Reef – Fall 2004

	Station Depth (meters)	Sample Depth (meters)	Temperature (°C)	Salinity (‰)	Dissolved Oxygen (mg/l)	pH	Secchi Depth (meters)	I_{1m}	I_{sd}
N	10	10	10	10	10	10	10	10	10
Min	5.3	3.2	29.8	23.5	3.9	8.1	0.4	10.49	0.00
Max	7.1	6.5	30.0	24.1	4.5	8.1	2.0	390.02	28.83
Median	6.6	5.6	29.9	23.9	4.3	8.1	1.9	257.41	4.23
Mean	6.5	5.6	29.9	23.8	4.2	8.1	1.6	246.84	5.78
SD	0.5	1.0	0.1	0.2	0.2	0.0	0.5	108.46	8.35

Table 5. Summary of Physical Variables: Egmont Key Reef – Spring 2004

	Station Depth (meters)	Sample Depth (meters)	Temperature (°C)	Salinity (‰)	Dissolved Oxygen (mg/l)	pH	Secchi Depth (meters)	I_{1m}	I_{sd}
N	10	10	10	10	10	10	10	10	10
Min	6.0	4.2	20.2	32.9	6.5	8.0	2.9	491.90	63.32
Max	6.3	6.0	20.5	33.1	7.1	8.1	4.5	1012.63	253.06
Median	6.1	5.1	20.3	33.0	6.7	8.1	3.2	913.74	104.06
Mean	6.1	5.1	20.3	33.0	6.8	8.1	3.4	849.52	127.62
SD	0.1	0.5	0.1	0.0	0.2	0.0	0.5	179.98	59.38

Table 6. Summary of Physical Variables: Egmont Key Reef – Fall 2004

	Station Depth (meters)	Sample Depth (meters)	Temperature (°C)	Salinity (‰)	Dissolved Oxygen (mg/l)	pH	Secchi Depth (meters)	I_{1m}	I_{sd}
N	10	10	10	10	10	10	10	10	10
Min	5.2	4.6	31.0	32.1	4.8	8.2	1.8	421.82	7.58
Max	6.6	6.1	31.3	32.5	5.3	8.2	3.7	798.18	169.73
Median	6.0	5.4	31.1	32.4	4.9	8.2	3.4	523.76	67.02
Mean	6.0	5.3	31.2	32.3	5.0	8.2	3.2	596.32	72.10
SD	0.4	0.5	0.1	0.1	0.2	0.0	0.6	144.88	41.81

Reef Characteristics

Ten to 20% of the samples were from the top of the reef, while the middle and bottom were sampled 30% to 50% (Table 7). The inverted surface orientation was sampled 10% to 20%, while horizontal and vertical surface orientations were sampled 30% to 50% (except at Egmont Key during the spring) (Table 7). The epifaunal growth for the spring ranged from 1.5 cm to 15.2 cm while the fall ranged from 1.0 cm to 19.0 cm (Table 8). The epifaunal growth during both seasons was the highest at the Howard Frankland Reef while the Egmont Key Reef sites had the lowest.

Table 7. Summary of Reef Sample Levels and Surface Orientations for Spring and Fall

Reef	Season	Reef Level			Surface Orientation		
		Top	Middle	Bottom	Horizontal	Vertical	Inverted
Howard Frankland	Spring	10%	40%	50%	50%	40%	10%
Howard Frankland	Fall	20%	30%	50%	40%	50%	10%
Bahia Beach	Spring	20%	50%	30%	50%	30%	20%
Bahia Beach	Fall	20%	40%	40%	50%	30%	20%
Egmont Key	Spring	10%	50%	40%	20%	70%	10%
Egmont Key	Fall	20%	30%	50%	40%	50%	10%

Table 8. Epifaunal Growth Heights by Reef and Season

	Epifaunal Growth (centimeters)					
	Howard Frankland Reef		Bahia Beach Reef		Egmont Key Reef	
	Spring	Fall	Spring	Fall	Spring	Fall
N	10	10	10	10	10	10
Min	5.1	5.0	1.5	1.0	1.5	1.0
Max	15.2	16.0	14.0	19.0	5.0	16.0
Median	7.6	9.0	4.8	7.0	3.0	3.0
Mean	8.6	9.0	6.4	7.7	3.3	5.0
SD	3.3	3.0	4.4	5.3	1.2	4.7

Benthic Community

The photographs of the sampling area were only taken during the spring (the camera was broken during the fall sampling event). Most of the Howard Frankland Reef was visually dominated by the Asian Green Mussel *Perna viridis* (Figure 6 and 7).

Figure 6. Howard Frankland Reef (04HFR104s)

Figure 7. Howard Frankland Reef (04HFR157s)

The Bahia Beach Reef was visually dominated by *Perna viridis*, cirripedia (barnacles), porifera (sponges) and ascidians (sea squirts) (Figure 8 and 9).

Figure 8. Bahia Beach Reef (04BBR050s)

Figure 9. Bahia Beach Reef (04BBR083s)

The Egmont Key Reef was visually dominated by ascidians, porifera (sponges), and cirripedia (Figure 10 and 11).

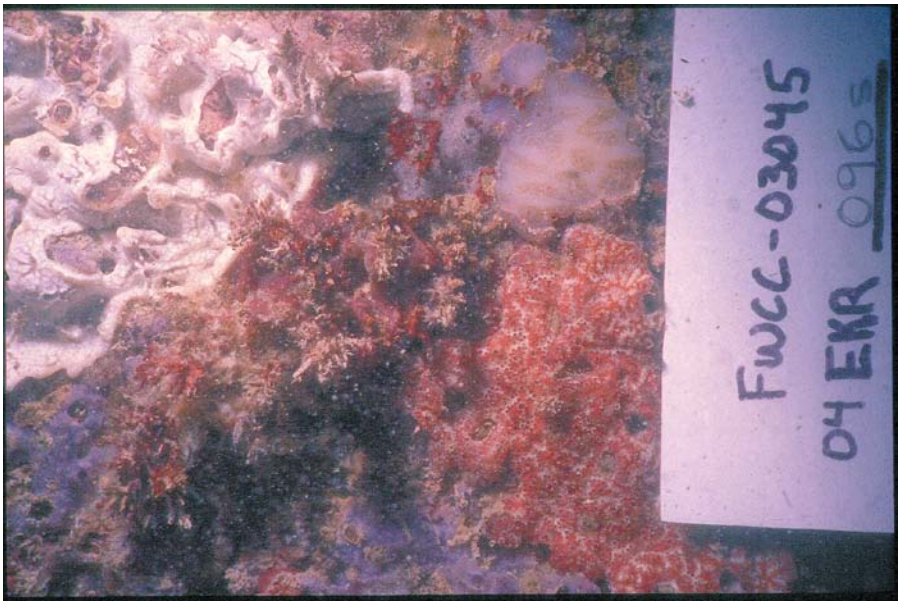

Figure 10. Egmont Key Reef (04EKR096s)

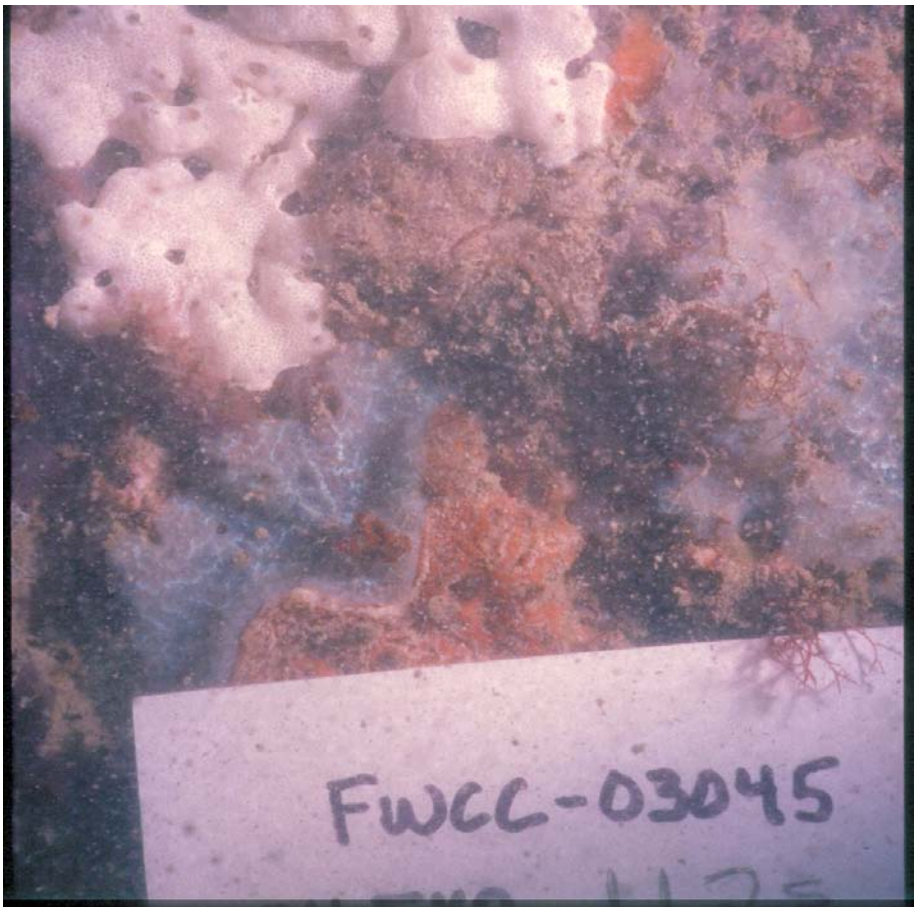

Figure 11. Egmont Key Reef (04EKR112s)

Biomass

Mollusca composed most of the total wet weight biomass for the Howard Frankland and Bahia Beach Reefs (Table 9 and Figure 12). The Egmont Key Reef total biomass was spilt between several phyla but was mainly dominated by arthropods and chordates (ascidians) (Table 9 and Figure 12).

The relative percent biomasses of the phyla for the 60 sites are presented in Appendix B. Molluscs dominated the biomass at the Howard Frankland Reef during both seasons (Figures 13 & 14). The Bahia Beach Reef has a mixture of different phyla that dominate but 40% of the sites were dominated by arthropods and 40% were dominated by mollusks (Figures 15 & 16). The Egmont Key Reef also was dominated by several different phyla, but 70% of the sites were dominated by arthropods and 20% by chordates (ascidians) (Figures 17 & 18).

The average relative percent biomass for mollusks was highest at the Howard Frankland Reef and lowest at the Egmont Key Reef (Table 10 and Figure 19). The average relative percent biomass for arthropods was highest at the Egmont Key Reef and lowest at the Howard Frankland Reef (Table 10 and Figure 19). The average relative percent biomass for chordates (ascidians) was highest for the Egmont Key Reef and lowest at the Howard Frankland Reef (Table 10 and Figure 19). The average relative percent biomass for porifera (sponges) was highest at Bahia Beach while the Howard Frankland and Egmont Key Reefs were similar (Table 10 and Figure 19). The other phyla comprised less than 7% of the average relative percent biomass for all reefs and seasons (Table 10 and Figure 19).

Mollusca Biomass

The mollusca were broken down into the relative percent biomass for each molluscan taxon (relative percent biomass = individual molluscan taxon grams / total molluscan grams).

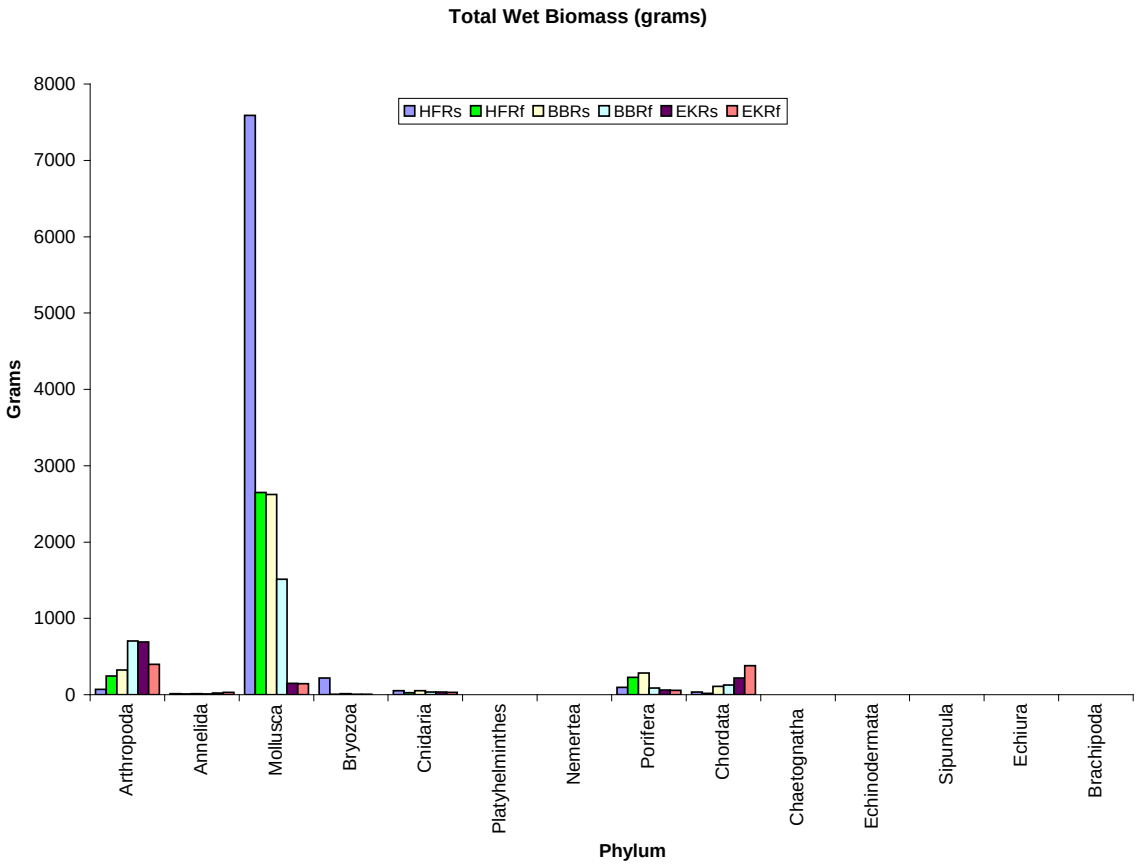

Figure 12. Total wet biomass at each reef and season for each phylum

Table 9. Total Wet Biomass in Grams at Each Reef and Season for Each Phylum

Phylum	Howard Frankland Reef		Bahia Beach Reef		Egmont Key Reef	
	Spring	Fall	Spring	Fall	Spring	Fall
Arthropod	71.3750	245.6486	323.3568	702.7795	690.6811	399.5413
Annelida	14.3063	7.0015	13.8260	9.5353	21.9267	30.7614
Mollusca	7587.4151	2648.3523	2624.3016	1511.9547	148.4721	146.1657
Bryozoa	217.0009	5.3016	13.2798	3.7909	3.5694	0.1450
Cnidaria	50.9333	27.4578	54.6001	36.1981	36.4131	30.1309
Platyhelminthes	0.2712	0.3398	0.1953	0.1436	0.4071	0.1172
Nemertea	0.2446	0.0344	0.1648	0.0254	0.2959	0.0586
Porifera	96.0559	227.1877	285.3438	89.0533	60.4851	55.9527
Chordata	36.6000	18.9571	109.2560	128.6556	216.6975	379.6115
Chaetognatha	0.0131	0.0036	0.0235	0.0032	0.0424	0.0390
Echinodermata	0.0000	2.0281	0.1516	1.4205	0.3203	0.8691
Sipuncula	0.0000	0.0000	0.0302	0.5826	0.1531	0.4270
Echiura	0.0000	0.0000	0.0000	0.0000	0.3079	0.0228
Brachipoda	0.0000	0.0000	0.0000	0.0000	0.0000	0.0041

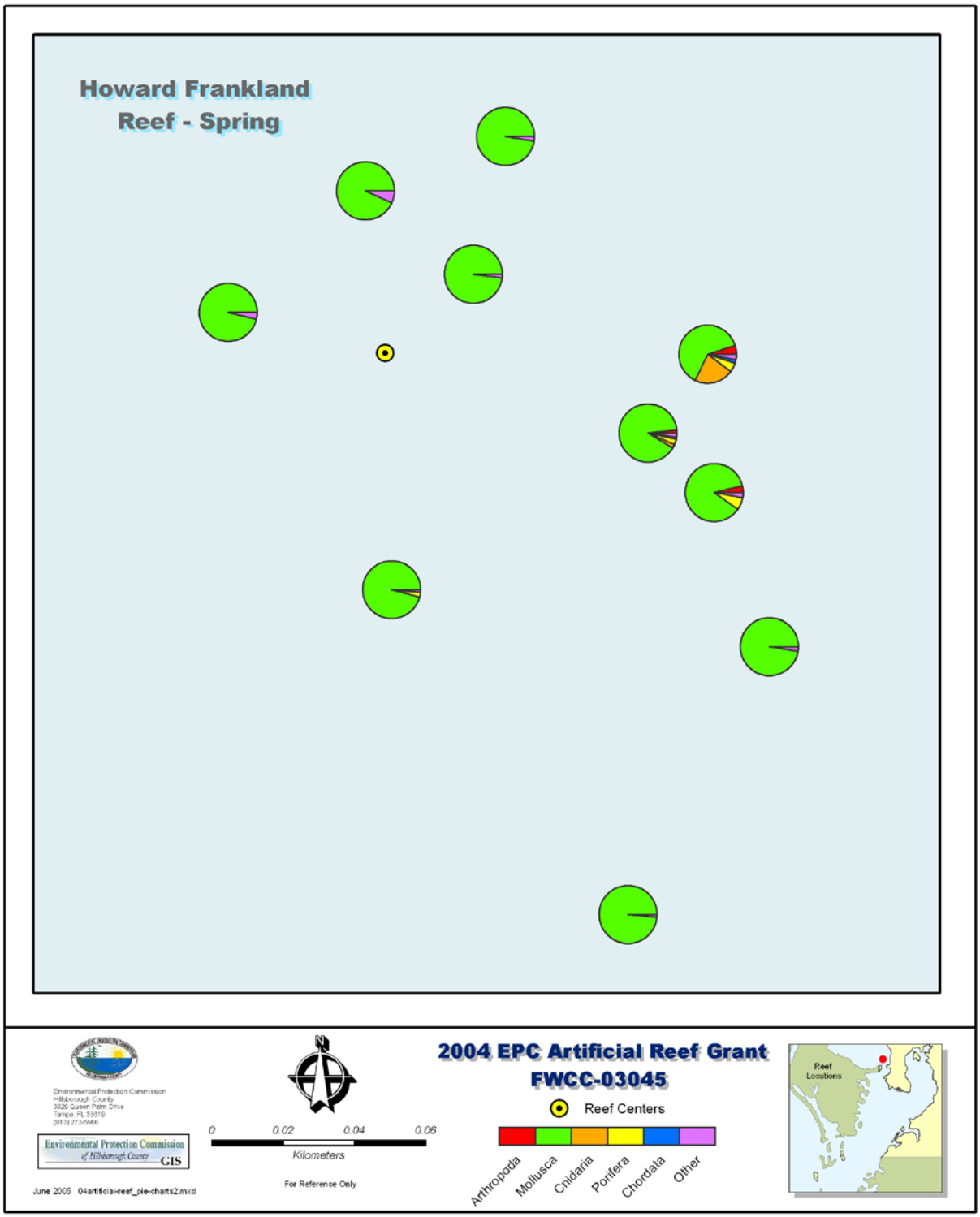

Figure 13. The relative percent biomass at Howard Frankland Reef in the spring

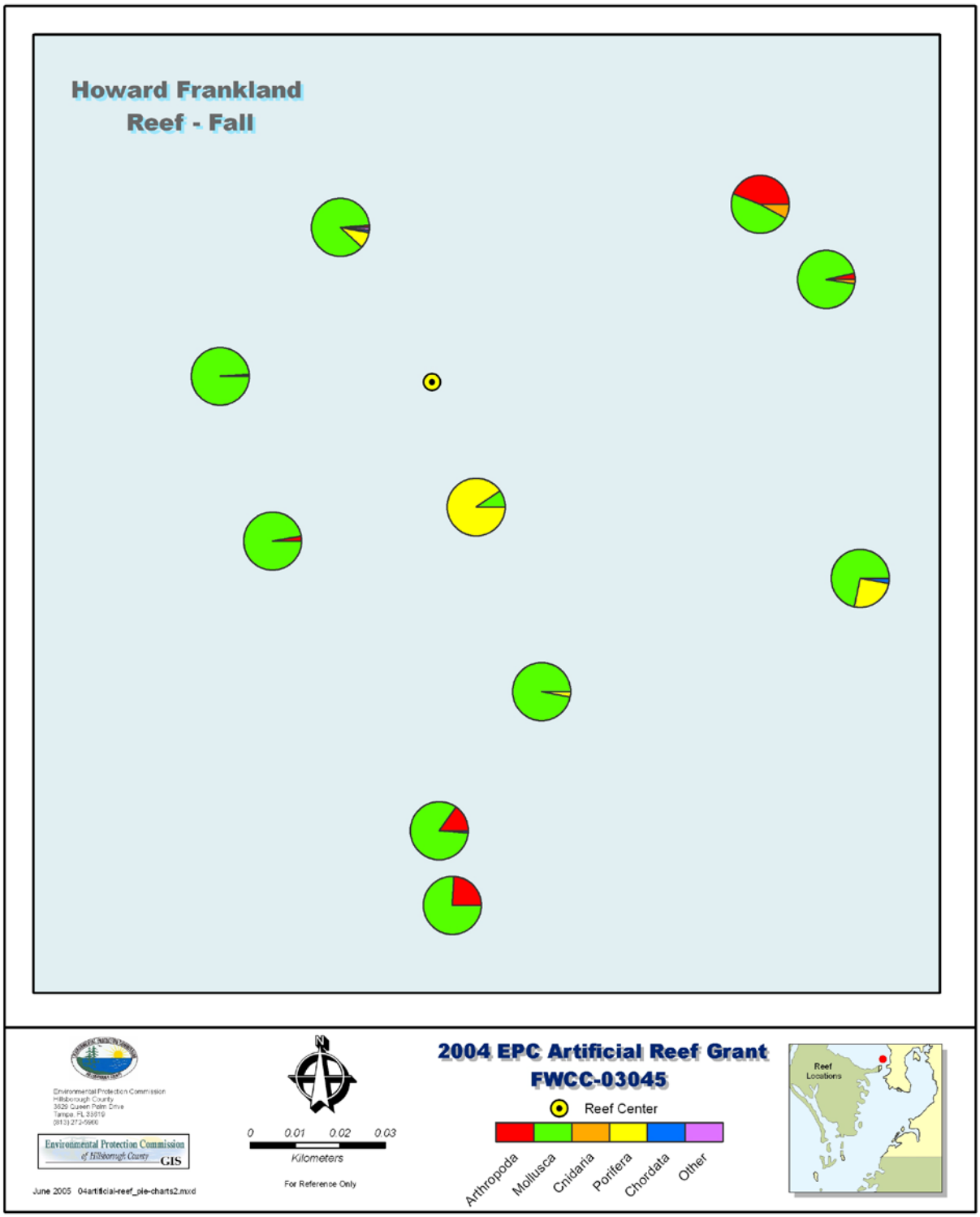

Figure 14. The relative percent biomass at Howard Frankland Reef in the fall

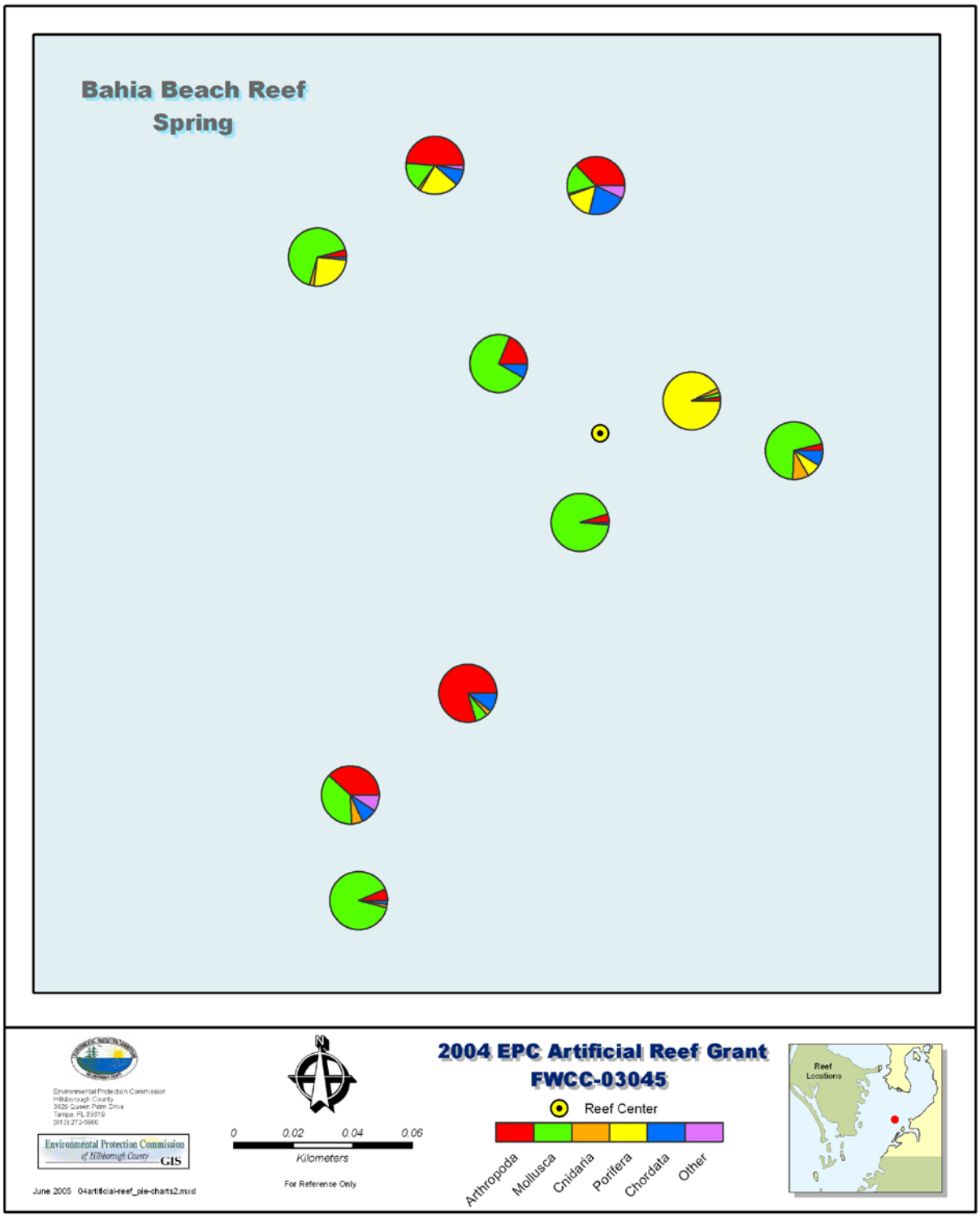

Figure 15. The relative percent biomass at Bahia Beach Reef in the spring

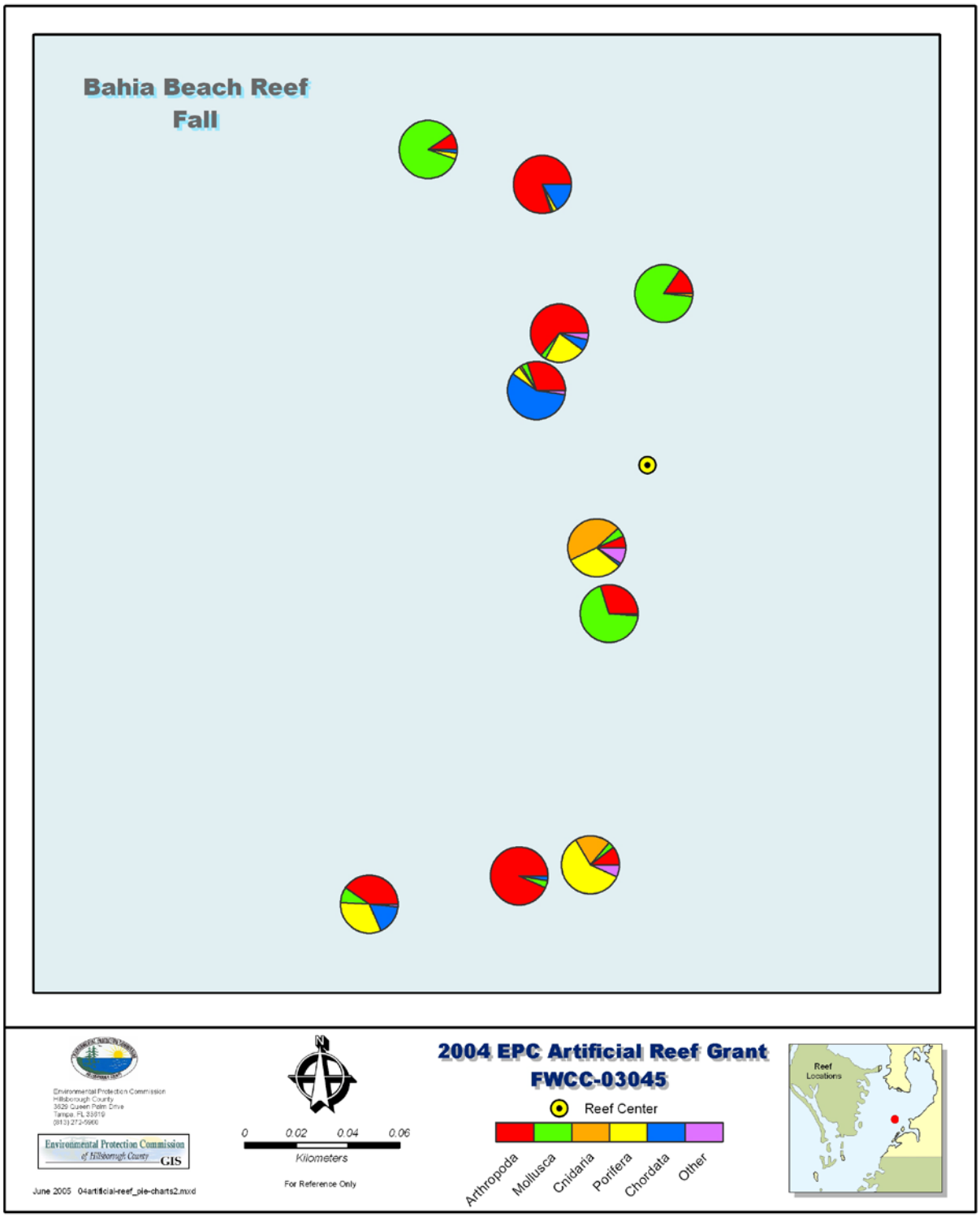

Figure 16. The relative percent biomass at Bahia Beach Reef in the fall

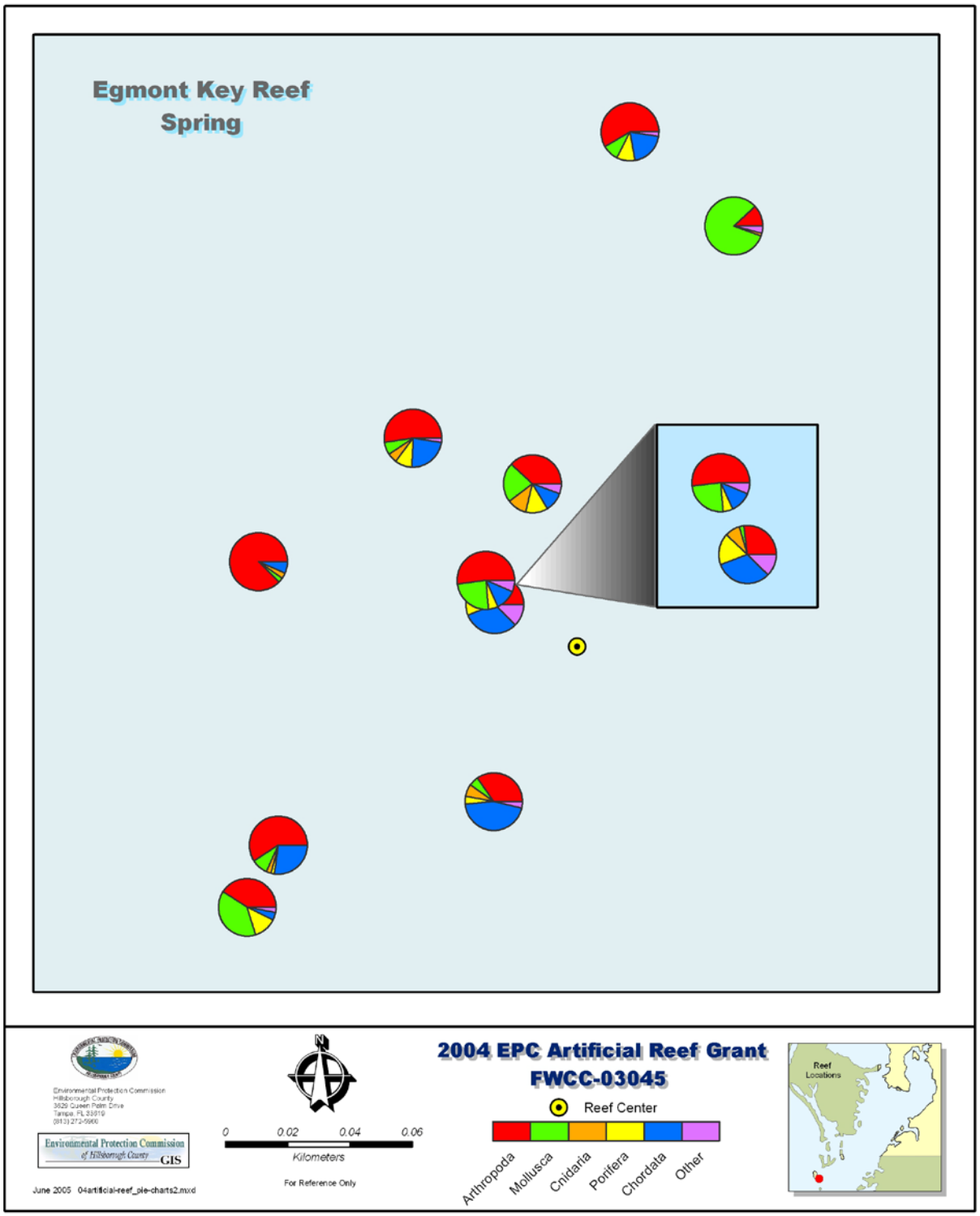

Figure 17. The relative percent biomass at Egmont Key Reef in the spring

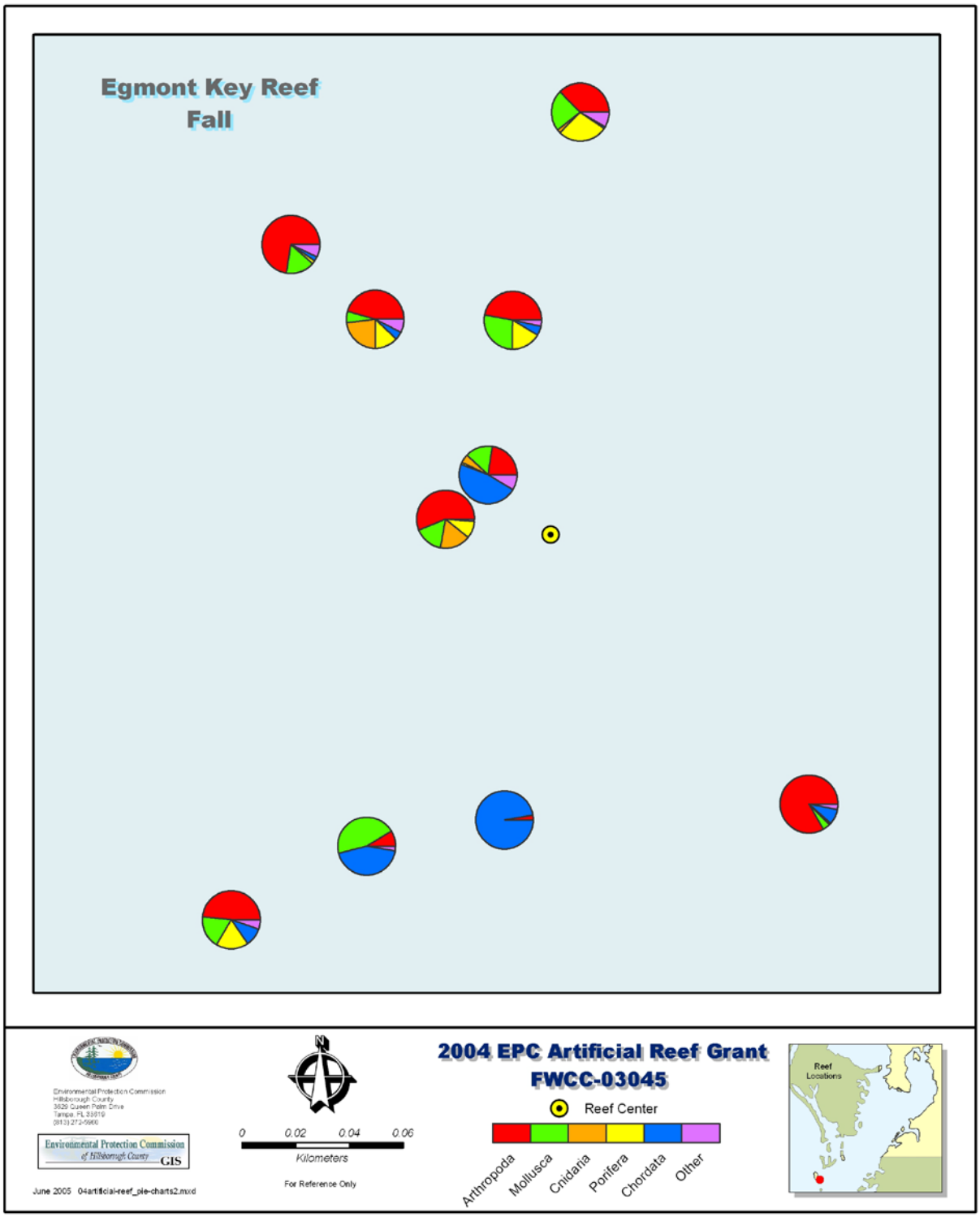

Figure 18. The relative percent biomass at Egmont Key Reef in the fall

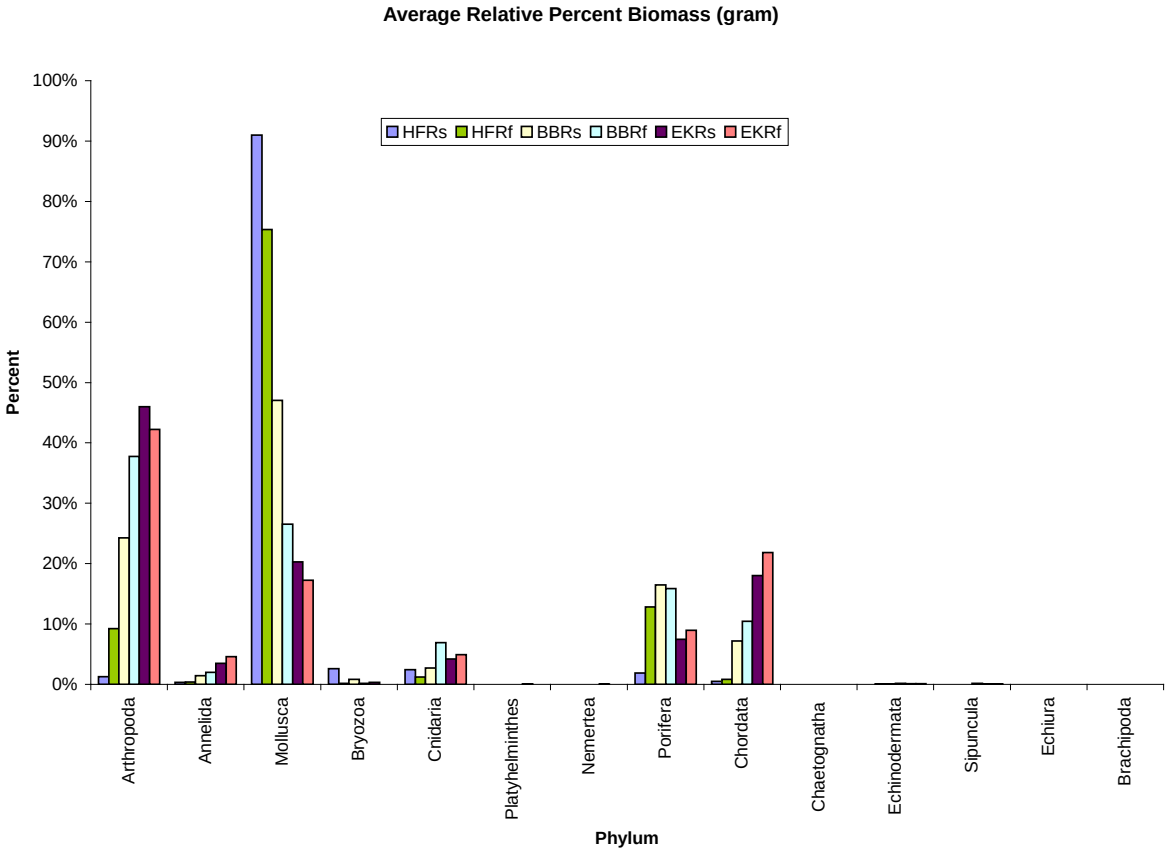

Figure 19. The average relative percent biomass at each reef and season for each phylum

Table 10. Average Relative Percent Biomass by Reef and Season for Each Phylum

Phylum	Howard Frankland Reef		Bahia Beach Reef		Egmont Key Reef	
	Spring	Fall	Spring	Fall	Spring	Fall
Arthropoda	1.27%	9.24%	24.26%	37.77%	45.99%	42.25%
Annelida	0.31%	0.39%	1.44%	1.98%	3.50%	4.59%
Mollusca	90.98%	75.33%	47.05%	26.54%	20.28%	17.27%
Bryozoa	2.60%	0.14%	0.81%	0.18%	0.33%	0.01%
Cnidaria	2.44%	1.22%	2.72%	6.88%	4.20%	4.93%
Platyhelminthes	0.003%	0.01%	0.01%	0.01%	0.04%	0.01%
Nemertea	0.008%	0.00%	0.01%	0.01%	0.05%	0.01%
Porifera	1.87%	12.82%	16.46%	15.86%	7.44%	8.95%
Chordata	0.52%	0.82%	7.18%	10.43%	17.99%	21.82%
Chaetognatha	0.001%	0.00%	0.01%	0.001%	0.01%	0.00%
Echinodermata	0.00%	0.04%	0.04%	0.16%	0.12%	0.09%
Sipuncula	0.00%	0.00%	0.003%	0.17%	0.04%	0.05%
Echiura	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%
Brachipoda	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

The average relative percent biomass for *Perna viridis* was highest at the Howard Frankland Reef and lowest at the Egmont Key Reef (Table 11 and Figure 20). *Crassostrea virginica* was only present at the Howard Frankland Reef (Table 11 and Figure 20). The average relative percent biomass for *Ostrea equestris* was highest at Egmont Key and lowest at Howard Frankland (Table 11 and Figure 20). The other molluscan taxa made up less than 17% of the average relative percent biomass for all reefs and seasons (Table 11 and Figure 20).

Arthropoda Biomass

The arthropoda were broken down into the relative percent biomass for each arthropod taxon (relative percent biomass = individual arthropoda taxon grams / total arthropoda grams). The average relative percent biomass for Cirripedia was highest at Bahia Beach and Egmont Key while the Howard Frankland Reef was lowest (Table 12 and Figure 21). The average relative percent biomass for other crustaceans was highest at the Howard Frankland Reef while the Bahia Beach and Egmont Key Reefs were much lower (Table 12 and Figure 21).

Chordata Biomass

The chordata were broken down into the relative percent biomass for each chordate taxon (relative percent biomass = individual chordata taxon grams / total chordata grams). The average relative percent biomass for Didemnidae sp. was highest at the Howard Frankland Reef and the Bahia Beach Reef (Table 13 and Figure 22). The average relative percent biomass for *Eudistoma* cf. *olivaceum* was highest at Egmont Key and this species was not present at the Howard Frankland Reef (Table 13 and Figure 22). The Howard Frankland Reef had high average relative percent biomass for Styelidae sp. and *Molgula* sp. (Table 13 and Figure 22). The Bahia Beach Reef had high average relative percent biomass for *Styela plicata* and *Didemnum* sp. and the Egmont Key Reef had high average relative percent biomass for *Molgula* sp., *Didemnum* sp.,

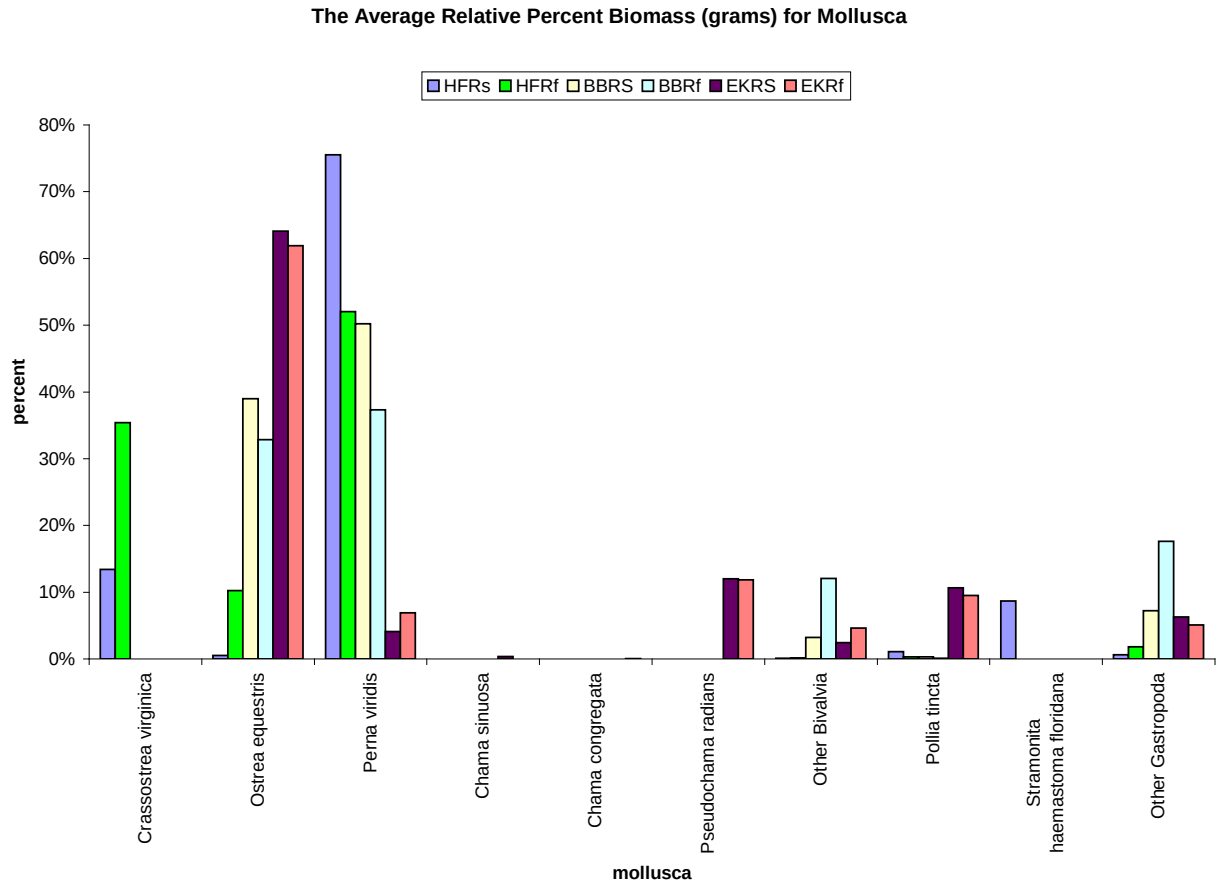

Figure 20. The average relative percent biomass at each reef and season for Mollusca

Table 11. Average Relative Percent Biomass by Reef and Season for Mollusca

Group	Howard Frankland Reef		Bahia Beach Reef		Egmont Key Reef	
	Spring	Fall	Spring	Fall	Spring	Fall
Crassostrea virginica	13.42%	35.38%	0.00%	0.00%	0.00%	0.00%
Ostrea equestris	0.53%	10.27%	39.00%	32.85%	64.09%	61.92%
Perna viridis	75.54%	52.04%	50.23%	37.34%	4.10%	6.90%
Chama sinuosa	0.00%	0.00%	0.00%	0.00%	0.36%	0.00%
Chama congregata	0.00%	0.00%	0.00%	0.00%	0.00%	0.07%
Pseudochama radians	0.00%	0.00%	0.00%	0.00%	12.03%	11.86%
Other Bivalvia	0.12%	0.15%	3.24%	12.08%	2.44%	4.64%
Pollia tincta	1.09%	0.33%	0.32%	0.12%	10.65%	9.52%
Stramonita haemastoma floridana	8.66%	0.00%	0.00%	0.00%	0.00%	0.00%
Other Gastropoda	0.63%	1.84%	7.21%	17.61%	6.31%	5.09%

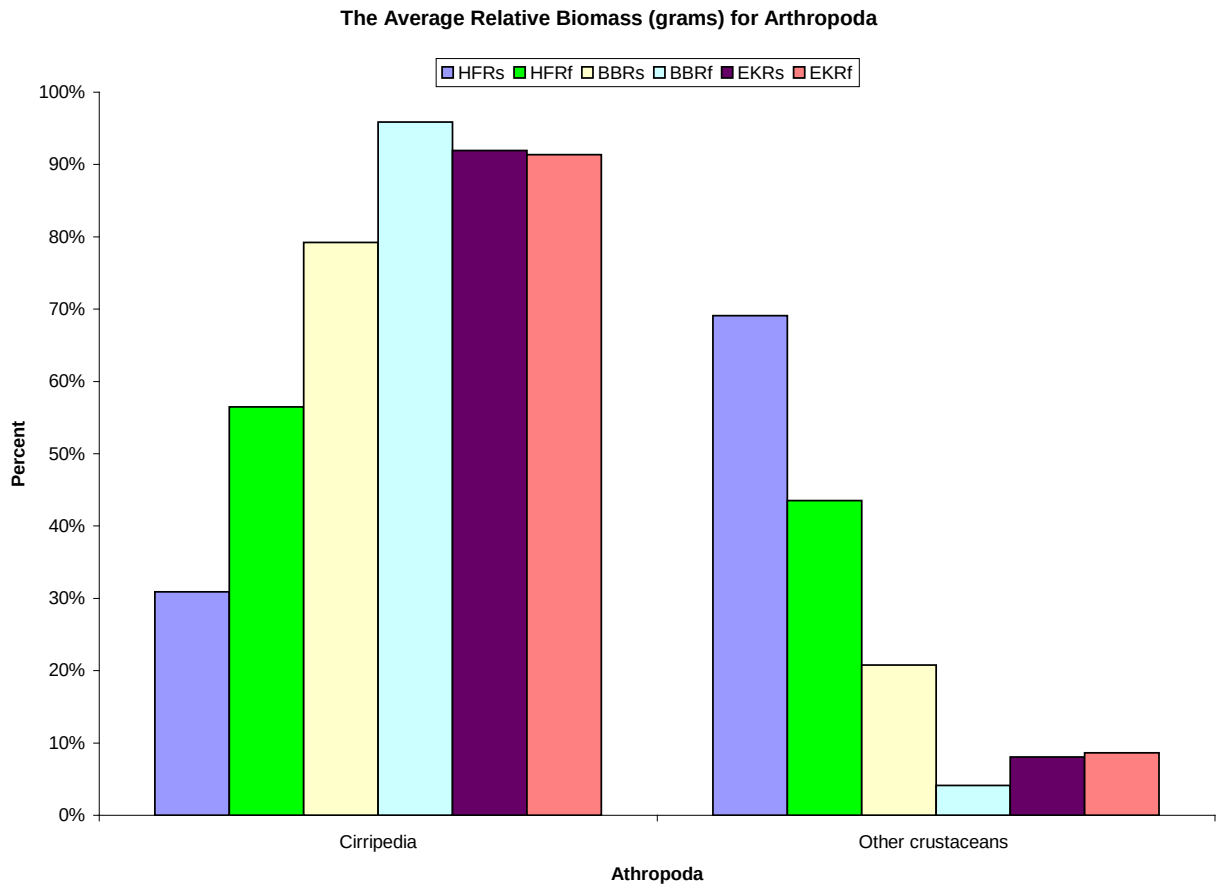

Figure 21. The average relative percent biomass at each reef and season for Arthropoda

Table 12. Average Relative Percent Biomass by Reef and Season for Arthropoda

Group	Howard Frankland Reef		Bahia Beach Reef		Egmont Key Reef	
	Spring	Fall	Spring	Fall	Spring	Fall
Cirripedia	30.88%	56.48%	79.25%	95.86%	91.93%	91.38%
Other crustaceans	69.12%	43.52%	20.75%	4.14%	8.07%	8.62%
Arthropod	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

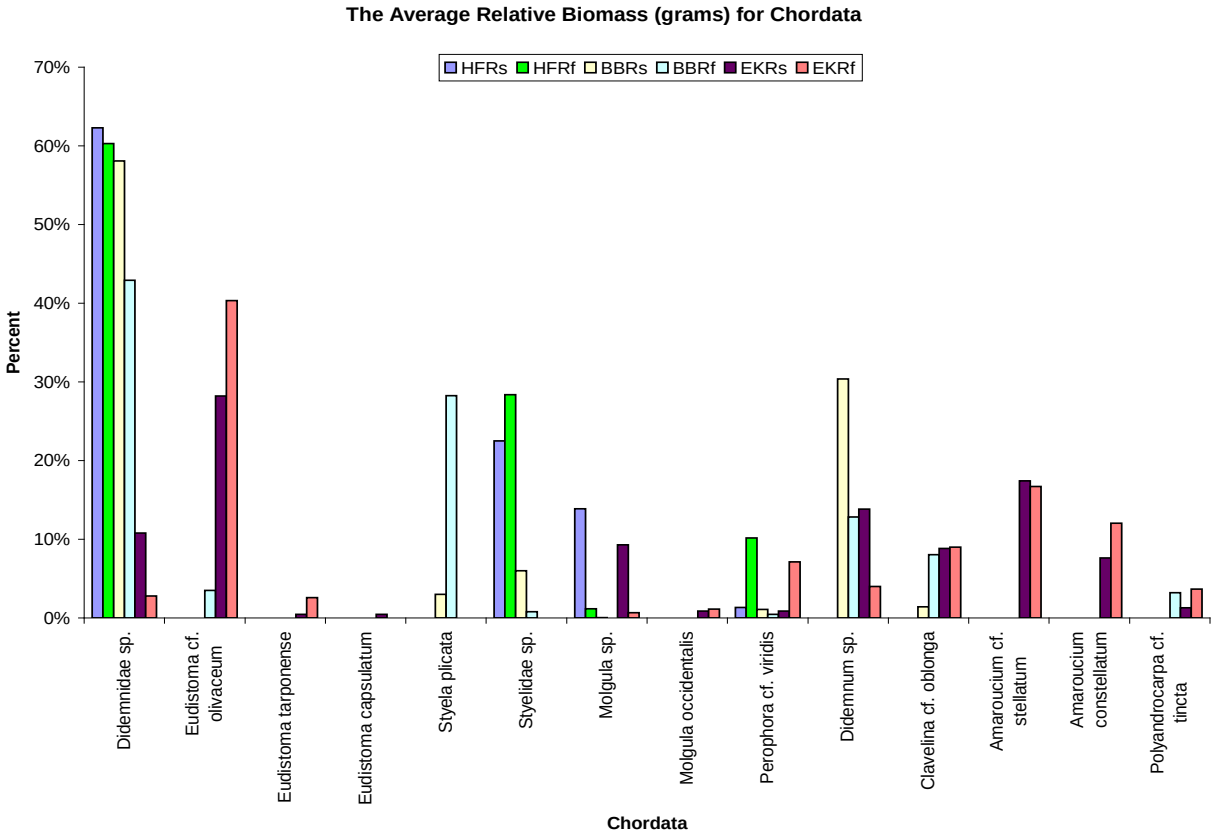

Figure 22. The average relative percent biomass at each reef and season for Chordata

Table 13. Average Relative Percent Biomass by Reef and Season for Chordata

Group	Howard Frankland Reef		Bahia Beach Reef		Egmont Key Reef	
	Spring	Fall	Spring	Fall	Spring	Fall
Didemnidae sp.	62.30%	60.28%	58.10%	42.93%	10.78%	2.80%
Eudistoma cf. olivaceum	0.00%	0.00%	0.00%	3.51%	28.21%	40.33%
Eudistoma tarponense	0.00%	0.00%	0.00%	0.00%	0.44%	2.59%
Eudistoma capsulatum	0.00%	0.00%	0.00%	0.00%	0.48%	0.00%
Styela plicata	0.00%	0.00%	2.99%	28.26%	0.00%	0.00%
Stylelidae sp.	22.48%	28.38%	6.01%	0.77%	0.00%	0.00%
Molgula sp.	13.88%	1.17%	0.05%	0.00%	9.31%	0.67%
Molgula occidentalis	0.00%	0.00%	0.00%	0.00%	0.86%	1.12%
Perophora cf. viridis	1.34%	10.17%	1.08%	0.45%	0.86%	7.11%
Didemnum sp.	0.00%	0.01%	30.36%	12.81%	13.84%	3.99%
Clavelina cf. oblonga	0.00%	0.00%	1.41%	8.04%	8.84%	8.98%
Amaroucium cf. stellatum	0.00%	0.00%	0.00%	0.00%	17.44%	16.71%
Amaroucium constellatum	0.00%	0.00%	0.00%	0.00%	7.64%	12.06%
Polyandrocarpa cf. tincta	0.00%	0.00%	0.00%	3.23%	1.30%	3.66%
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Clavelina cf. *oblonga*, *Amaroucium* cf. *stellatum*, and *Amaroucium constellatum* (Table 13 and Figure 22).

Porifera Biomass

The porifera were broken down into the relative percent biomass for each porifera taxon (relative percent biomass = individual porifera taxon grams / total porifera grams). The average relative percent biomass for Demospongiae sp. A of EPC was highest at Egmont Key and lowest at Howard Frankland (Table 14 and Figure 23). The average relative percent biomass for *Haliclona* sp. was highest at Egmont Key and Howard Frankland (Table 14 and Figure 23). The Howard Frankland Reef had the highest average relative percent biomass for *Cliona* sp. A of EPC and the Bahia Beach Reef had high average relative percent biomass for *Aplysilla sulphurea* and *Lissodendoryx* cf. *isodictyalis* (Table 14 and Figure 23).

Cnidaria Biomass

The cnidaria were broken down into the relative percent biomass for each cnidarian taxon (relative percent biomass = individual cnidaria taxon grams / total cnidaria grams). The average relative percent biomass for *Anthopleura* sp. was highest at the Howard Frankland Reef and the Egmont Key Reef (Table 15 and Figure 24). The average relative percent biomass for *Eudendrium* cf. *carneum* was highest at Howard Frankland and Bahia Beach (Table 15 and Figure 24). The Bahia Beach Reef had high average relative percent biomass for *Leptogorgia virgulata* and *Plumularia diaphana* and the Egmont Key Reef had high average relative percent biomass for *Clytia* sp. B of Joyce, 1961 (Table 15 and Figure 24).

Bryozoa Biomass

The bryozoa were broken down into the relative percent biomass for each bryozoan taxon (relative percent biomass = individual bryozoa taxon grams / total bryozoa grams). The average

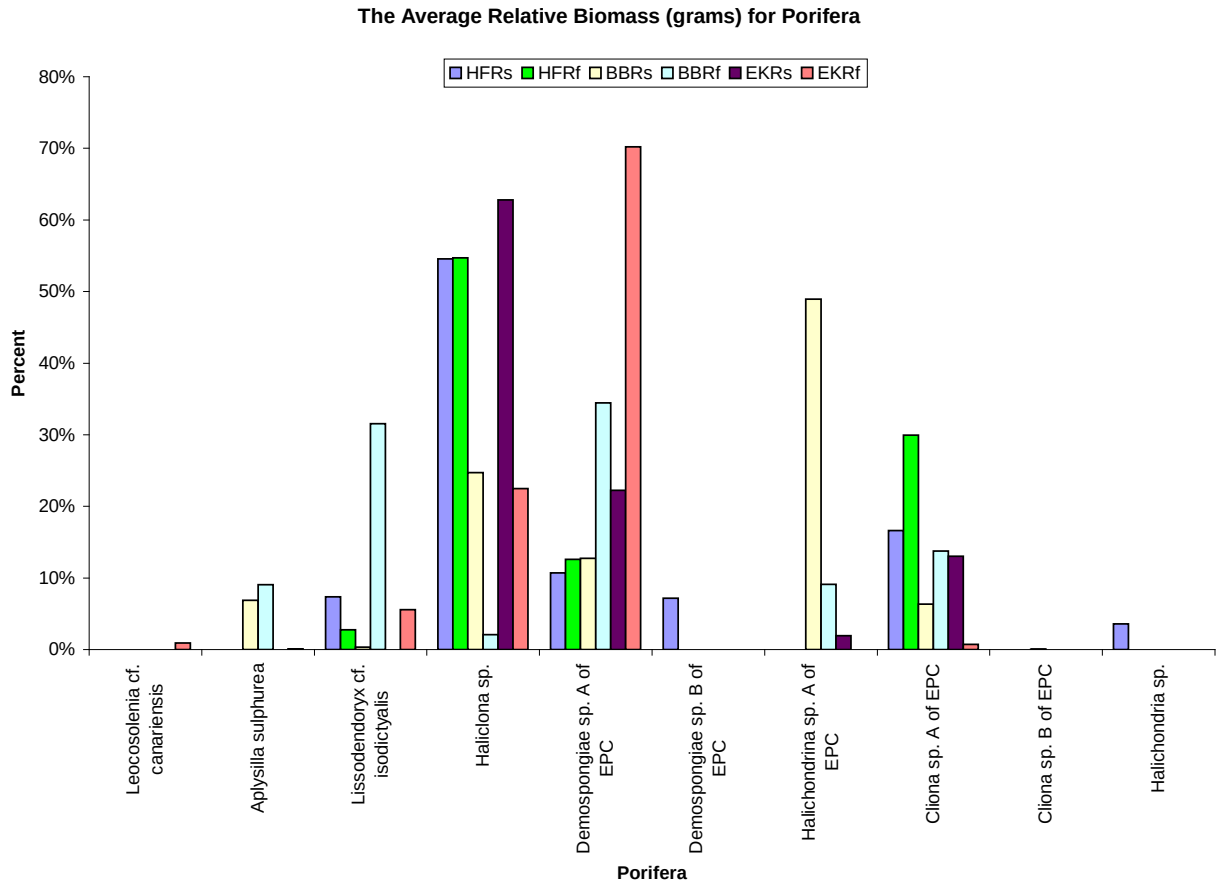

Figure 23. The average relative percent biomass at each reef and season for Porifera

Table 14. Average Relative Percent Biomass by Reef and Season for Porifera

Group	Howard Frankland Reef		Bahia Beach Reef		Egmont Key Reef	
	Spring	Fall	Spring	Fall	Spring	Fall
Leocosolenia cf. canariensis	0.00%	0.00%	0.00%	0.00%	0.00%	0.94%
Aplysilla sulphurea	0.00%	0.00%	6.87%	9.05%	0.00%	0.08%
Lissodendoryx cf. isodictyalis	7.34%	2.77%	0.35%	31.55%	0.00%	5.57%
Haliclona sp.	54.55%	54.69%	24.72%	2.07%	62.78%	22.49%
Demospongiae sp. A of EPC	10.70%	12.59%	12.73%	34.45%	22.25%	70.20%
Demospongiae sp. B of EPC	7.19%	0.00%	0.00%	0.00%	0.00%	0.00%
Halichondrina sp. A of EPC	0.00%	0.00%	48.95%	9.09%	1.95%	0.00%
Cliona sp. A of EPC	16.63%	29.95%	6.34%	13.78%	13.01%	0.72%
Cliona sp. B of EPC	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%
Halichondria sp.	3.58%	0.00%	0.00%	0.00%	0.00%	0.00%
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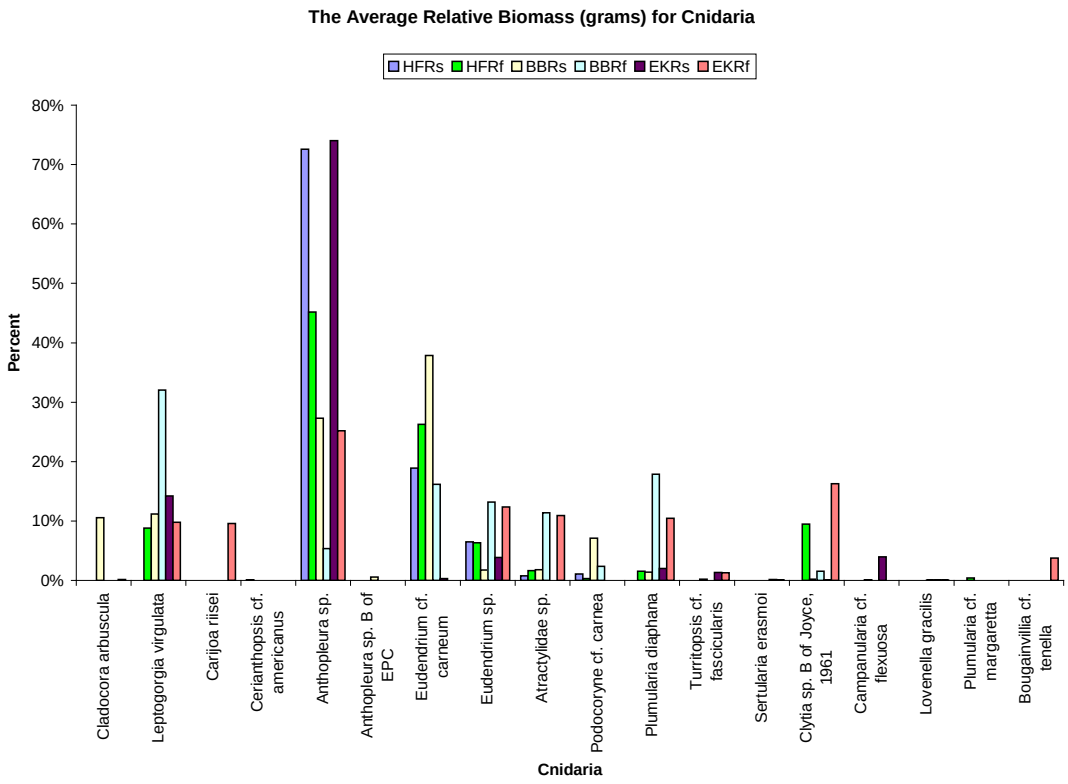

Figure 24. The average relative percent biomass at each reef and season for Cnidaria

Table 15. Average Relative Percent Biomass by Reef and Season for Cnidaria

Group	Howard Frankland Reef		Bahia Beach Reef		Egmont Key Reef	
	Spring	Fall	Spring	Fall	Spring	Fall
Cladocora arbuscula	0.00%	0.00%	10.55%	0.00%	0.00%	0.15%
Leptogorgia virgulata	0.00%	8.80%	11.17%	32.05%	14.24%	9.79%
Carijoa riisei	0.00%	0.00%	0.00%	0.00%	0.00%	9.57%
Cerianthopsis cf. americanus	0.11%	0.00%	0.00%	0.00%	0.00%	0.00%
Anthopleura sp.	72.59%	45.20%	27.28%	5.36%	74.03%	25.22%
Anthopleura sp. B of EPC	0.00%	0.00%	0.58%	0.00%	0.00%	0.00%
Eudendrium cf. carneum	18.93%	26.29%	37.87%	16.19%	0.31%	0.00%
Eudendrium sp.	6.51%	6.35%	1.76%	13.17%	3.88%	12.34%
Atractylidae sp.	0.79%	1.66%	1.83%	11.37%	0.00%	10.90%
Podocoryne cf. carnea	1.07%	0.31%	7.10%	2.35%	0.00%	0.00%
Plumularia diaphana	0.00%	1.52%	1.40%	17.88%	2.01%	10.48%
Turritopsis cf. fascicularis	0.00%	0.00%	0.21%	0.00%	1.32%	1.29%
Sertularia erasmoi	0.00%	0.00%	0.00%	0.00%	0.13%	0.12%
Clytia sp. B of Joyce, 1961	0.00%	9.46%	0.19%	1.56%	0.07%	16.30%
Campanularia cf. flexuosa	0.00%	0.00%	0.08%	0.01%	3.97%	0.00%
Lovenella gracilis	0.00%	0.02%	0.00%	0.06%	0.03%	0.07%
Plumularia cf. margaretta	0.00%	0.39%	0.00%	0.00%	0.00%	0.00%
Bougainvillia cf. tenella	0.00%	0.00%	0.00%	0.00%	0.00%	3.77%
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relative percent biomass for *Conopeum* cf. *seurati* was highest at the Howard Frankland Reef. This species was absent at the Egmont Key Reef (Table 16 and Figure 25). The average relative percent biomass for *Bugula neritina* was highest at Egmont Key, but was absent at the Howard Frankland Reef (Table 16 and Figure 25). The Howard Frankland Reef in the fall had high average relative percent biomass for *Akatopora cf. leucoypha* and *Hippoporina* cf. *verrilli* (Table 16 and Figure 25). The Bahia Beach Reef had high average relative percent biomass for *Membranipora* cf. *savartii* and *Schizoporella* cf. *floridana* (Table 16 and Figure 25).

Biomass Cluster Analysis

Two "primary" and five "secondary" clusters were identified in the classification analysis of sites based on the 4^{th} root transformed biomass data (Figure 26). Cluster A contains all but one Egmont Key Reef sites and Cluster B contain all Howard Frankland Reef sites (Figure 26). The Bahia Beach Reef sites are present in both clusters (Figure 26). SIMPER analyses (Clarke & Warwick, 2001) showed that dissimilarities between the biotic assemblages in Cluster A and B were primarily influenced by the higher biomass of *Perna viridis* and *Crassostrea virginica* in Cluster A and the higher biomass of Cirripedia in Cluster B (Appendix C).

Cluster A can be subdivided into clusters A1 and A2. Cluster A1 contains two sites: one at Egmont Key and the other at Bahia Beach. Cluster A1 has a higher biomass of *Halichondrina* sp. A of EPC, Pseudochama *radians*, and *Leptogorgia virgulata*. Cluster A2 has a higher biomass of Cirripedia, Demospongiae sp. A of EPC and *Eudistoma* cf. *olivaceum* (Appendix C).

Cluster A2 can further be subdivided into A2a and A2b. Cluster A2a contains most of the Egmont Key Reef sites along with four Bahia Beach Reef sites (Figure 26). Cluster A2b contains only Bahia Beach Reef sites (Figure 26). Cluster A2a has a higher biomass of *Eudistoma* cf. *olivaceum*, Demospongiae sp. A of EPC, *Ostrea equestris*, Cirripedia, *Haliclona sp., Amaroucium*

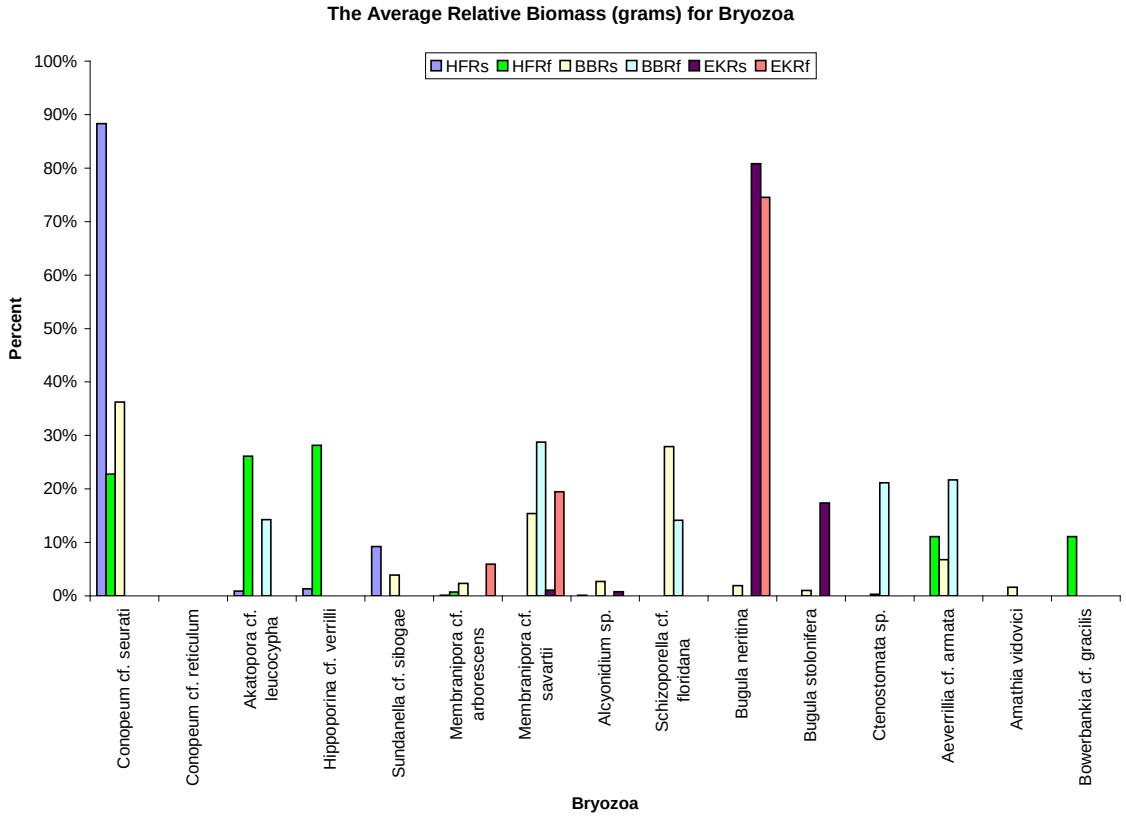

Figure 25. The average relative percent biomass at each reef and season for Bryozoa

Table 16. Average Relative Percent Biomass by Reef and Season for Bryozoa

Group	Howard Frankland Reef		Bahia Beach Reef		Egmont Key Reef	
	Spring	Fall	Spring	Fall	Spring	Fall
Conopeum cf. seurati	88.33%	22.77%	36.26%	0.00%	0.00%	0.00%
Conopeum cf. reticulum	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Akatopora cf. leucocypha	0.87%	26.11%	0.00%	14.29%	0.00%	0.00%
Hippoporina cf. verrilli	1.30%	28.15%	0.00%	0.00%	0.00%	0.00%
Sundanella cf. sibogae	9.24%	0.00%	3.90%	0.00%	0.00%	0.00%
Membranipora cf. arborescens	0.11%	0.74%	2.33%	0.00%	0.00%	5.94%
Membranipora cf. savartii	0.00%	0.00%	15.37%	28.74%	1.05%	19.49%
Alcyonidium sp.	0.13%	0.00%	2.67%	0.00%	0.77%	0.00%
Schizoporella cf. floridana	0.00%	0.00%	27.93%	14.12%	0.00%	0.00%
Bugula neritina	0.00%	0.00%	1.89%	0.00%	80.80%	74.56%
Bugula stolonifera	0.00%	0.00%	1.00%	0.00%	17.38%	0.00%
Ctenostomata sp.	0.00%	0.00%	0.30%	21.16%	0.00%	0.00%
Aeverrillia cf. armata	0.00%	11.11%	6.75%	21.70%	0.00%	0.00%
Amathia vidovici	0.00%	0.00%	1.61%	0.00%	0.00%	0.00%
Bowerbankia cf. gracilis	0.00%	11.11%	0.00%	0.00%	0.00%	0.00%
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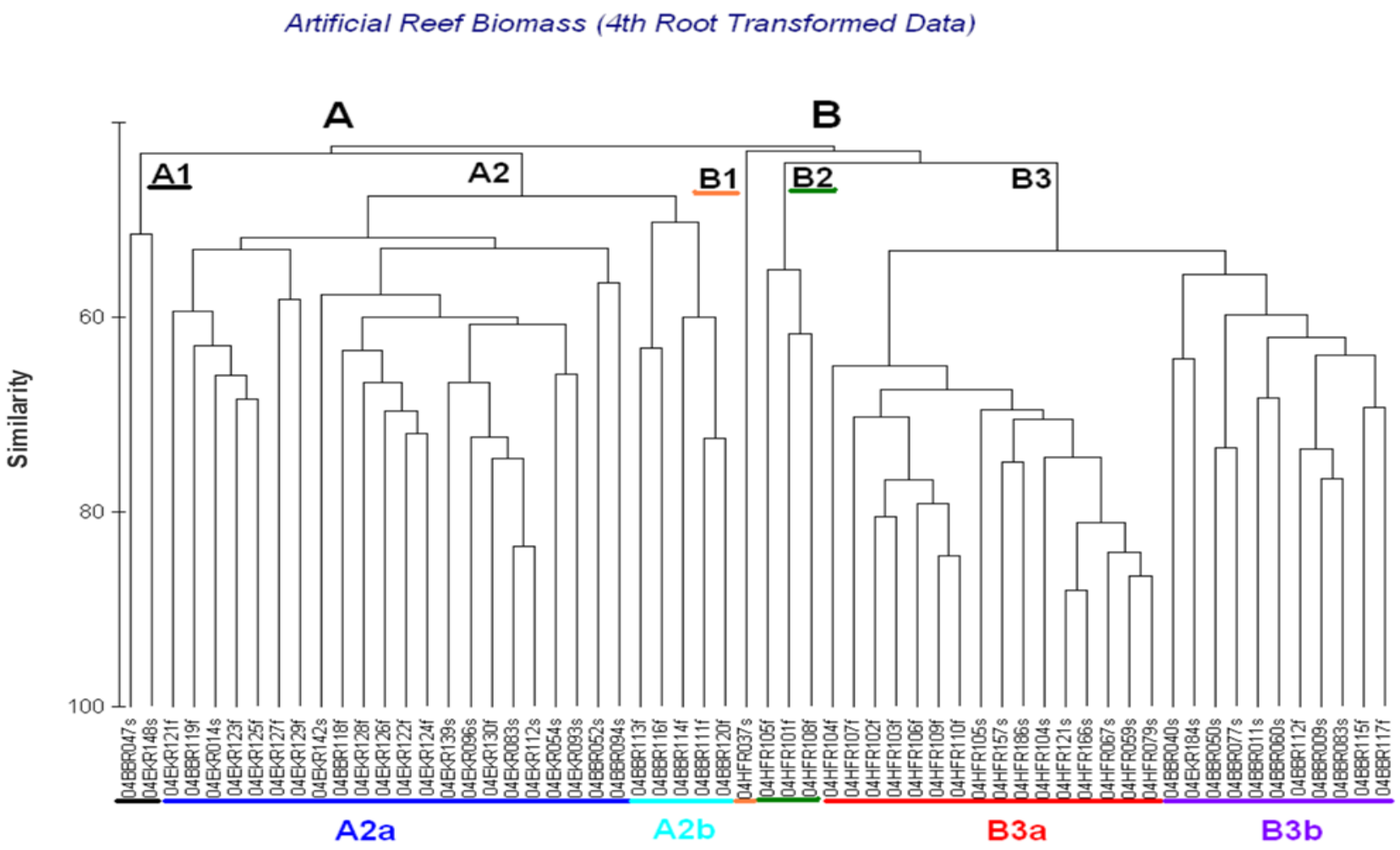

Figure 26. Bray-Curtis similarity of sites based on epifaunal biomass

cf. *stellatum*, and *Anthopleura* sp. Cluster A2b has a higher biomass of *Styela plicata*, *Lissodendoryx* cf. *isodictyalis*, Didemnidae sp., and *Leptogorgia virgulata* (Appendix C).

Cluster B can be subdivided into cluster B1, B2, and B3. Cluster B1 has one site from the Howard Frankland Reef, B2 has three Howard Frankland Reef sites from the fall season and B3 contains most of the Howard Frankland Reef sites, half of the Bahia Beach Reef sites, and one Egmont Key Reef site (Figure 26). Cluster B1 has a high biomass *Stramonita haemstoma floridana* and *Eudendrium* cf. *carneum*. Cluster B1 has no *Perna viridis* biomass and low biomass for *Crassostrea virginica* (Appendix C). Cluster B2 has a higher biomass of *Haliclona* sp. and B3 has a higher biomass of *Perna viridis*, Cirripedia, and *Crassostrea virginica* (Appendix C).

Cluster B3 can be further subdivided into B3a and B3b. Cluster B3a contains only Howard Frankland Reef sites and the seasons group together (Figure 26). Cluster B3b is mainly Bahia Beach Reef sites but contains one Egmont Key Reef site (Figure 26). Cluster B3a has a higher biomass of *Crassostrea virginica*, *Perna viridis*, and *Conopeum* cf. *seurati* while B3b has a higher biomass of Cirripedia, and *Haliclona* sp. (Appendix C).

Biomass Multi-Dimensional Scaling (MDS) plots

The Biomass MDS plot indicates that the three reefs form distinctive groups (Figure 27). The Howard Frankland Reef had a seasonality component, while seasonality is not evident at the Bahia Beach and Egmont Key Reefs. The highest total biomass was at the Howard Frankland and Bahia Beach Reef sites (Figure 28).

Perna viridis relative biomass was the highest at Howard Frankland and Bahia Beach (Figure 29). *Crassostrea virginica* relative biomass was only at the Howard Frankland Reef (Figure 30) while *Ostrea equestris* relative biomass was higher at the Egmont Key Reef and Bahia Beach Reef sites (Figure 31). Cirripedia relative biomass was the highest at Egmont Key and Bahia

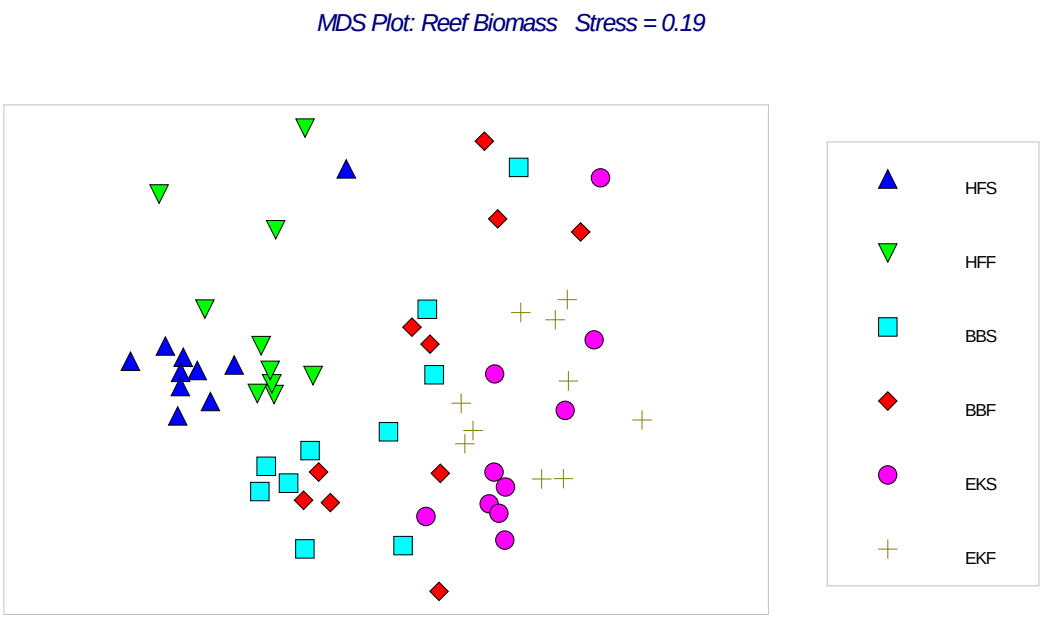

Figure 27. The biomass MDS plot for the reefs and seasons

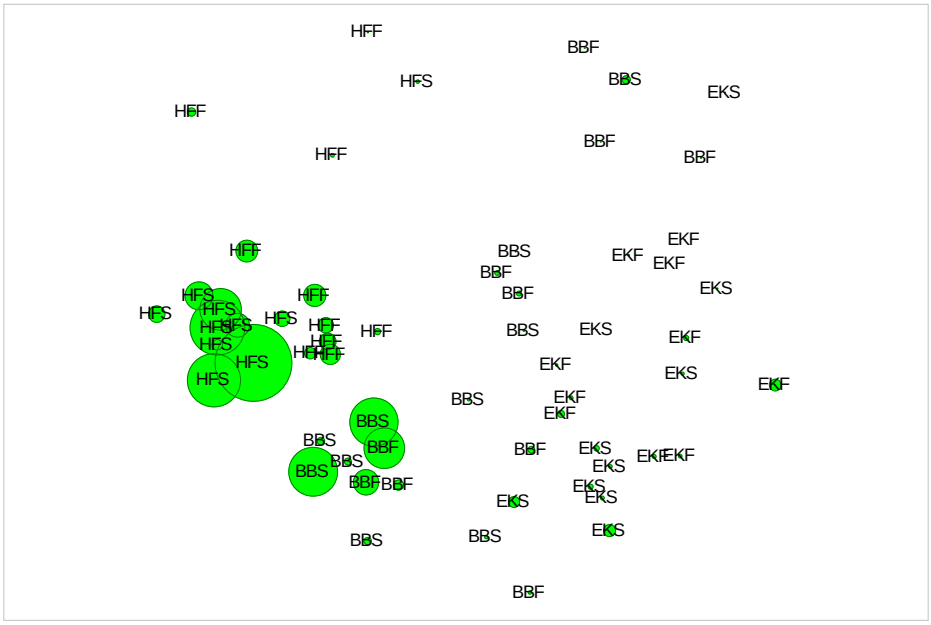

Figure 28. The total biomass MDS plot for the reefs and seasons

MDS Plot: Perna viridis Relative Biomass Stress = 0.19

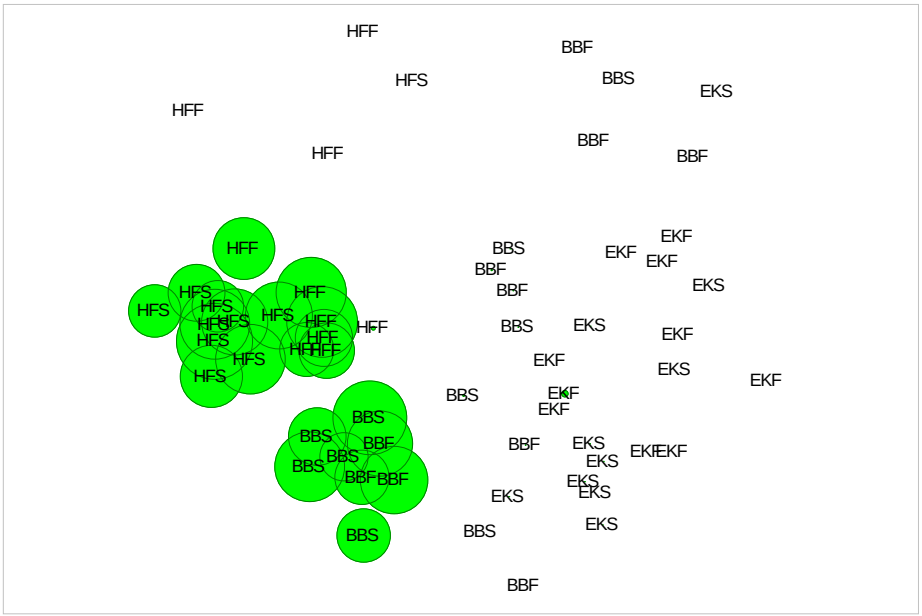

Figure 29. The relative percent biomass MDS plot for *Perna viridis*

MDS Plot: Crassostrea virginica Relative Biomass Stress = 0.19

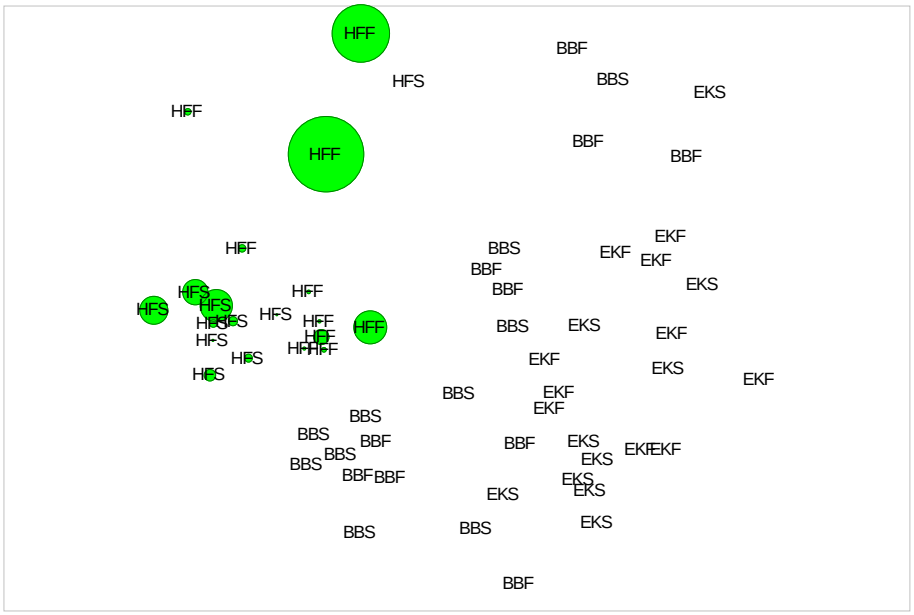

Figure 30. The relative percent biomass MDS plot for *Crassostrea virginica*

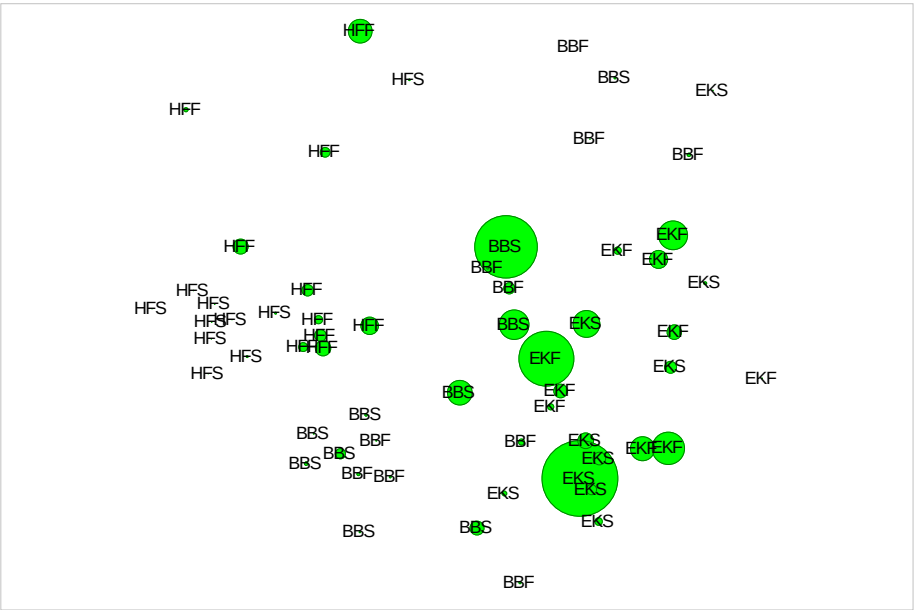

Figure 31. The relative percent biomass MDS plot for *Ostrea equestris*

Beach (Figure 32). Porifera relative biomass was the highest at the Bahia Beach Reef sites and was also high at one site at the Howard Frankland Reef (Figure 33). Ascidian relative biomass was the highest at Egmont Key and Bahia Beach Reef sites (Figure 34) as was the Annelid relative biomass (Figure 35). Bryozoan relative biomass was the highest at the Howard Frankland Reef sites and also one site at Bahia Beach (Figure 36). Anthozoan relative biomass was the highest at Bahia Beach and Egmont Key (Figure 37). While the hydrozoan relative biomass was highest at mainly one site at Howard Frankland Reef and one site at Bahia Beach (Figure 38).

Epifaunal Community Metrics

Species Richness (S)

The species richness values for each reef and season are presented in tables 17-22 and figure 39. Two-way Analysis of Variance (ANOVA) indicated that there were significant differences in species

richness between reefs (p<0.001) and significantly more taxa in the Spring than in the Fall (p=0.042). During the Spring the Egmont Key Reef had significantly higher species richness then the Howard Frankland Reef (==0.007) but there was no significant difference between Egmont Key Reef and the Bahia Beach Reef (p=0.284) or between the Bahia Beach and Howard Frankland Reefs (p=0.092). During the Fall, the Egmont Key Reef has significantly more species then both the Howard Frankland Reef and the Bahia Beach Reef (p=0.001), but there was no significant difference between the Bahia Beach Reef and Howard Frankland Reef (p=0.252). There were no significant differences between seasons at the Howard Frankland Reef (p=0.101) or the Egmont Key Reef (p=0.776), but species richness was higher in the Spring vs. Fall at the Bahia Beach Reef (p=0.03) (

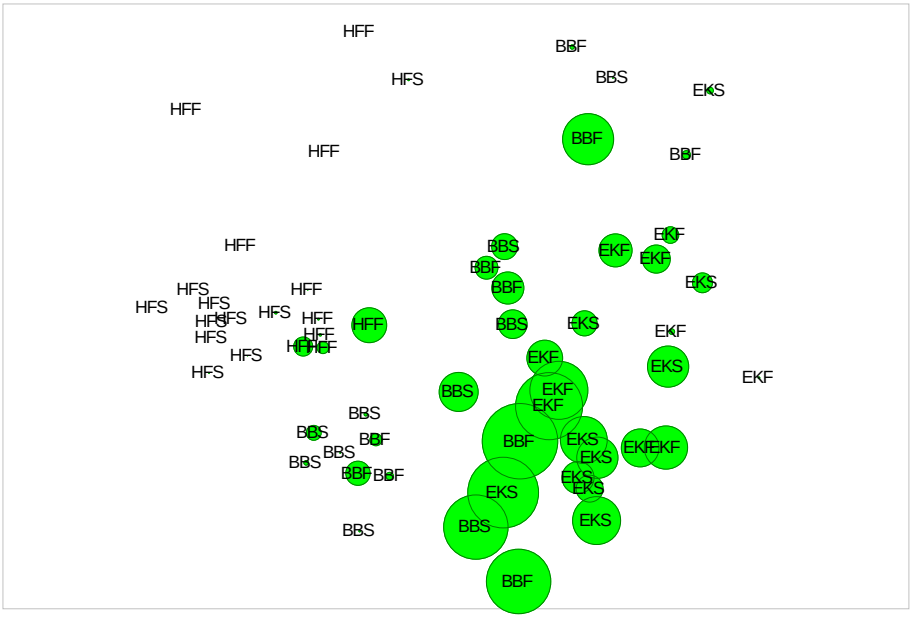

Figure 32. The relative percent biomass MDS plot for cirripedia

MDS Plot: Porifera Relative Biomass Stress = 0.19

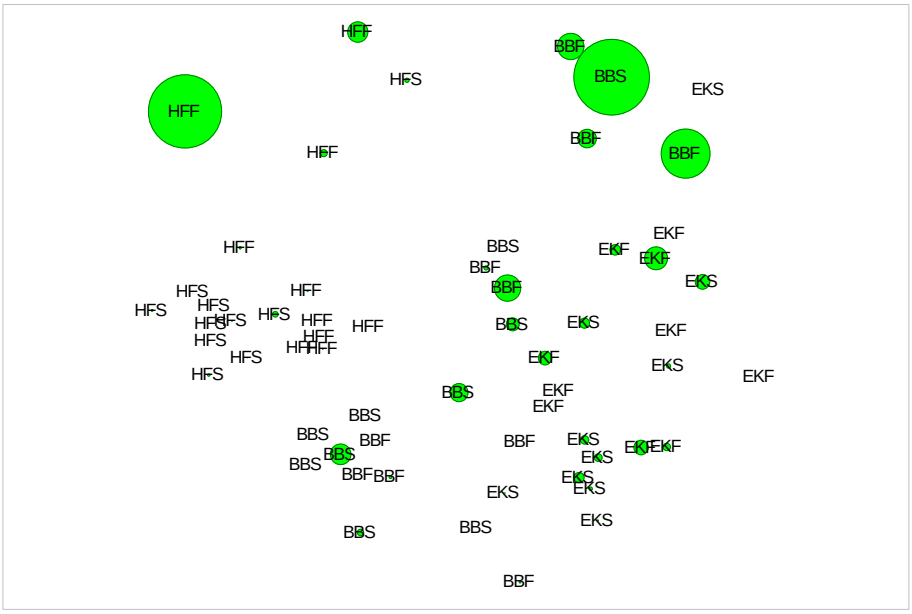

Figure 33. The relative percent biomass MDS plot for Porifera

MDS Plot: Ascidian Relative Biomass Stress = 0.19

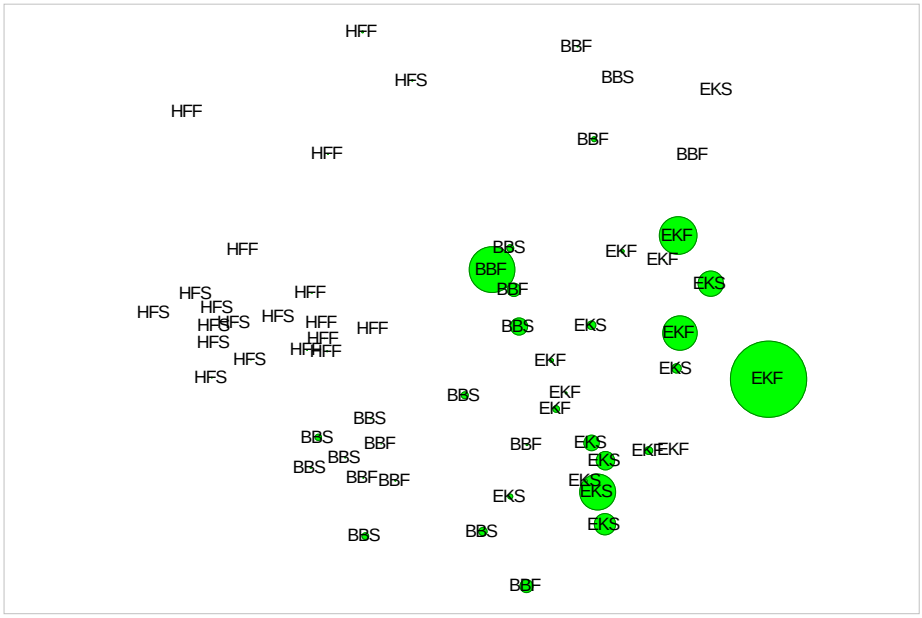

Figure 34. The relative percent biomass MDS plot for Ascidacea

MDS Plot: Annelid Relative Biomass Stress = 0.19

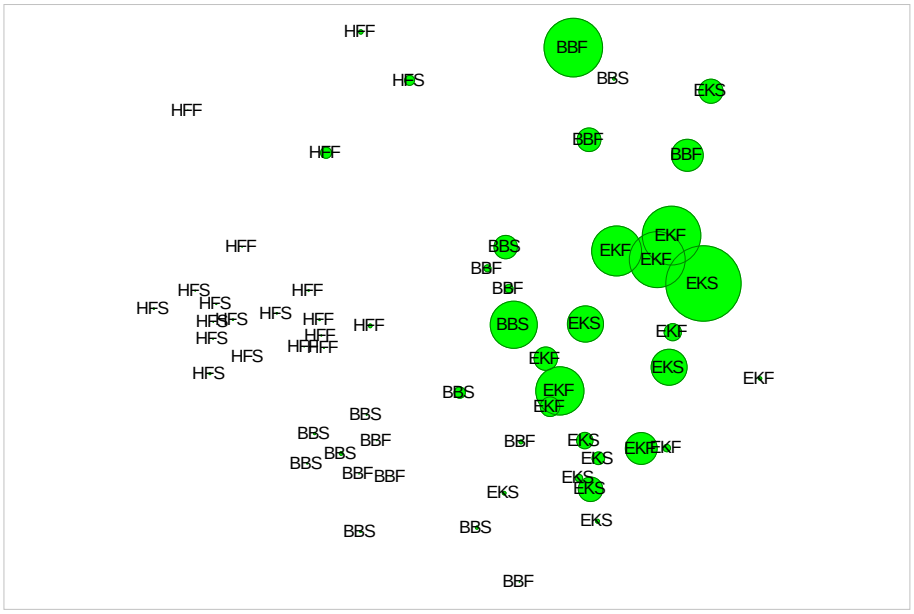

Figure 35. The relative percent biomass MDS plot for Annelida

MDS Plot: Bryozoan Relative Biomass Stress = 0.19

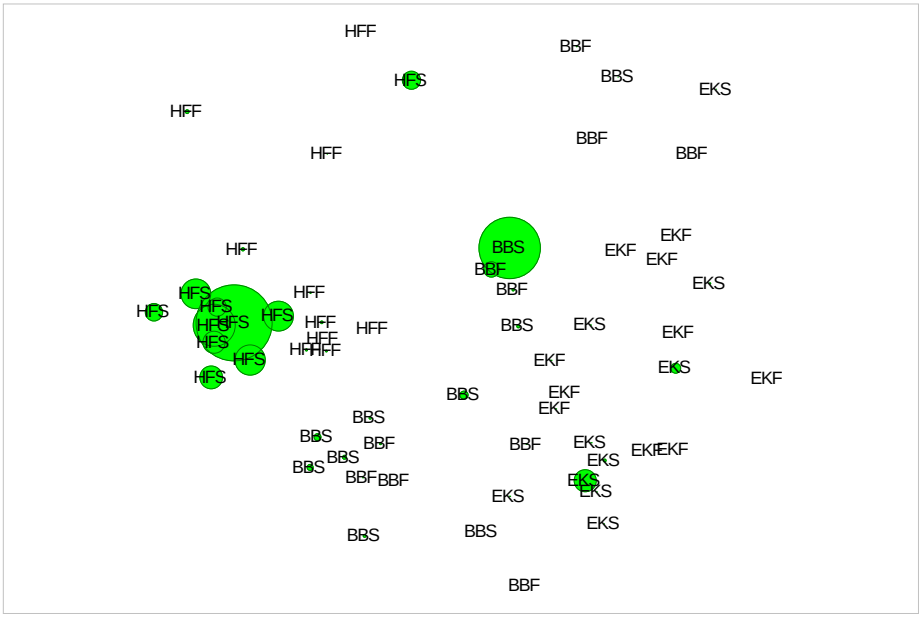

Figure 36. The relative percent biomass MDS plot for Bryozoa

MDS Plot: Anthozoan Relative Biomass Stress = 0.19

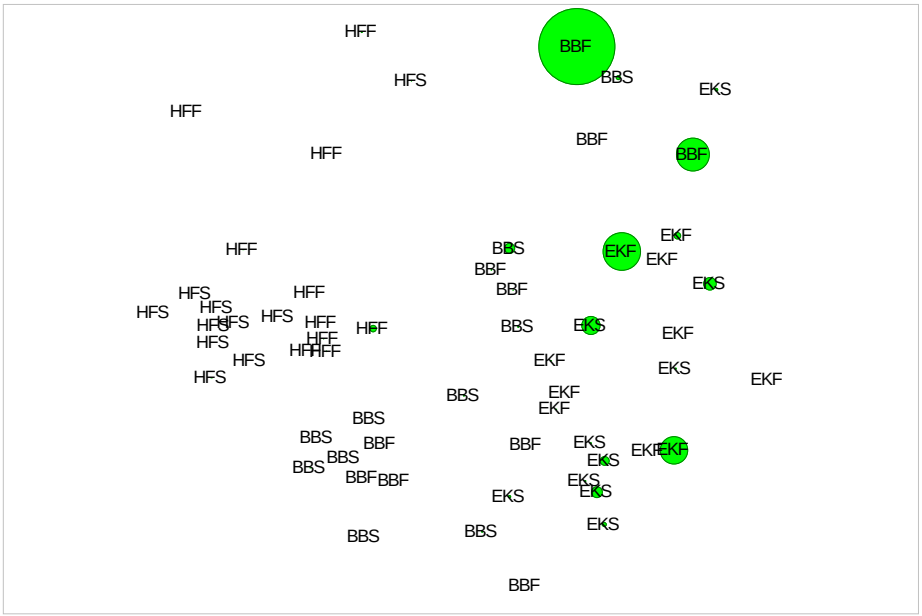

Figure 37. The relative percent biomass MDS plot for Anthozoa

MDS Plot: Hydrozoan Relative Biomass Stress = 0.19

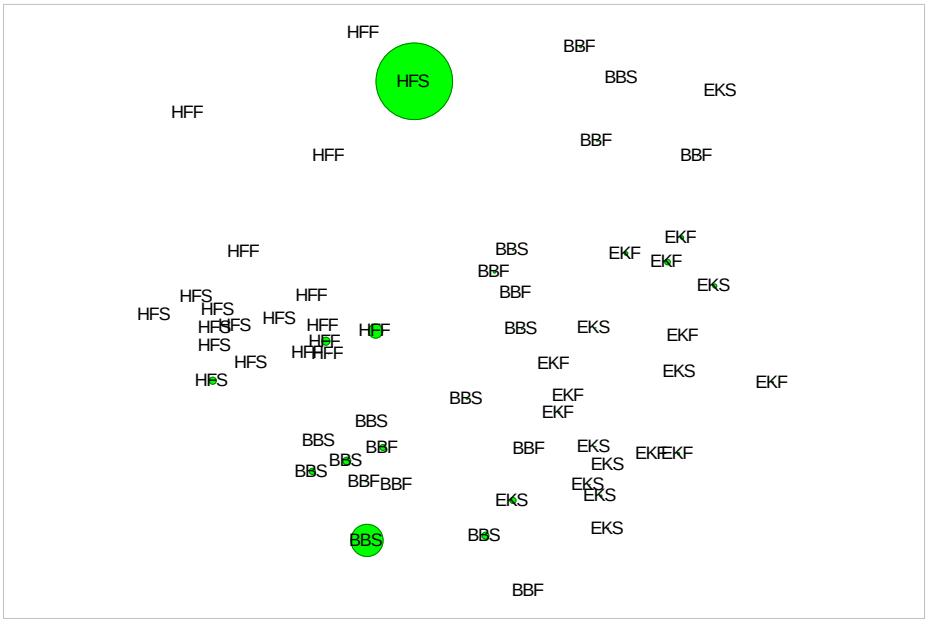

Figure 38. The relative percent biomass MDS plot for Hydrozoa

Table 17. Community Metrics Howard Frankland Reef - Spring 2004

	S	N	H’	J’
N	10	10	10	10
Min	46	24652	2.52	0.53
Max	77	315204	3.06	0.75
Median	60	44361	2.83	0.70
Mean	60.4	81382	2.71	0.67
SD	11.3	89801	0.30	0.08

Table 18. Community Metrics Howard Frankland Reef - Fall 2004

	S	N	H’	J’
N	10	10	10	10
Min	28	5004	2.16	0.54
Max	69	97160	3.15	0.74
Median	51	32393	2.48	0.70
Mean	49.3	41286	2.57	0.67
SD	12.5	31453	0.34	0.08

Table 19. Community Metrics Bahia Beach Reef - Spring 2004

	S	N	H’	J’
N	10	10	10	10
Min	42	26180	1.78	0.42
Max	87	625342	2.98	0.70
Median	76	83002	2.62	0.61
Mean	71.8	182342	2.57	0.61
SD	16.5	197498	0.32	0.08

Table 20. Community Metrics Bahia Beach Reef - Fall 2004

	S	N	H’	J’
N	10	10	10	10
Min	35	9149	1.48	0.39
Max	83	118484	3.38	0.79
Median	55	24211	2.77	0.68
Mean	57	42124	2.58	0.64
SD	16.1	37172	0.59	0.14

Table 21. Community Metrics Egmont Key Reef - Spring 2004

	S	N	H’	J’
N	10	10	10	10
Min	58	39224	2.11	0.49
Max	113	143648	3.35	0.73
Median	75	68895	2.78	0.64
Mean	79	78011	2.71	0.62
SD	16.3	33535	0.45	0.09

Table 22. Community Metrics Egmont Key Reef - Fall 2004

	S	N	H’	J’
N	10	10	10	10
Min	61	15008	2.56	0.61
Max	115	107432	3.65	0.81
Median	81	61829	3.22	0.73
Mean	80.9	59684	3.13	0.71
SD	15.7	28255	0.33	0.07

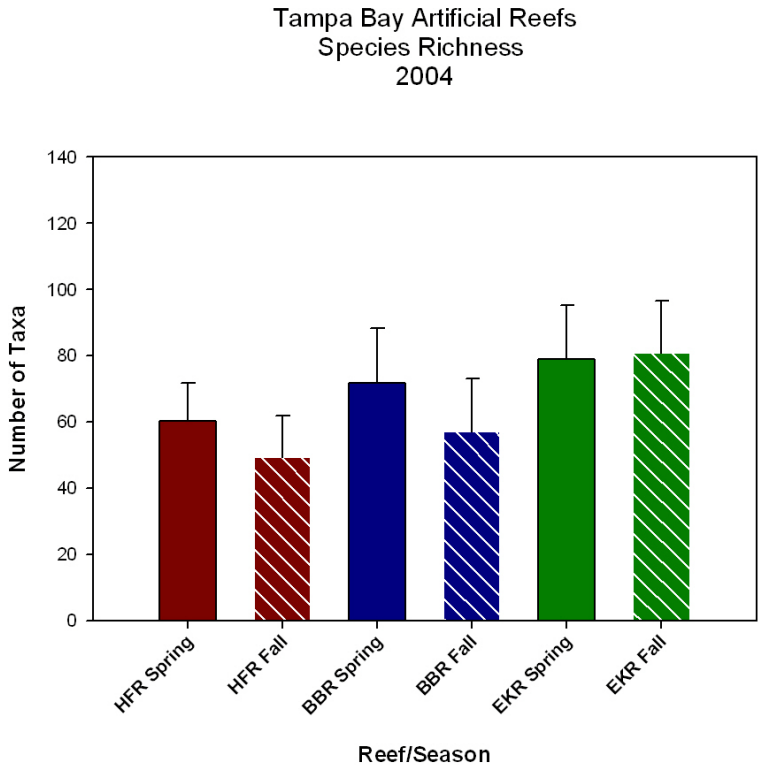

Figure 39. Mean species richness by reef and season; error bars = 1 standard deviation

Abundance (N)

The abundance (organisms/m^2) for each reef and season are presented in tables 17-22 and Figure 40. Two-way ANOVA indicated that overall there was no significant difference between reefs (p=0.261), but overall abundances were higher in the Spring than in the Fall (p<0.001). There was no significant between seasons at the Howard Frankland Reef p=0.0.07) or the Egmont Key Reef (p=0.397). The mean abundance at the Bahia Beach Reef was higher in the spring than in the fall (p=0.001).

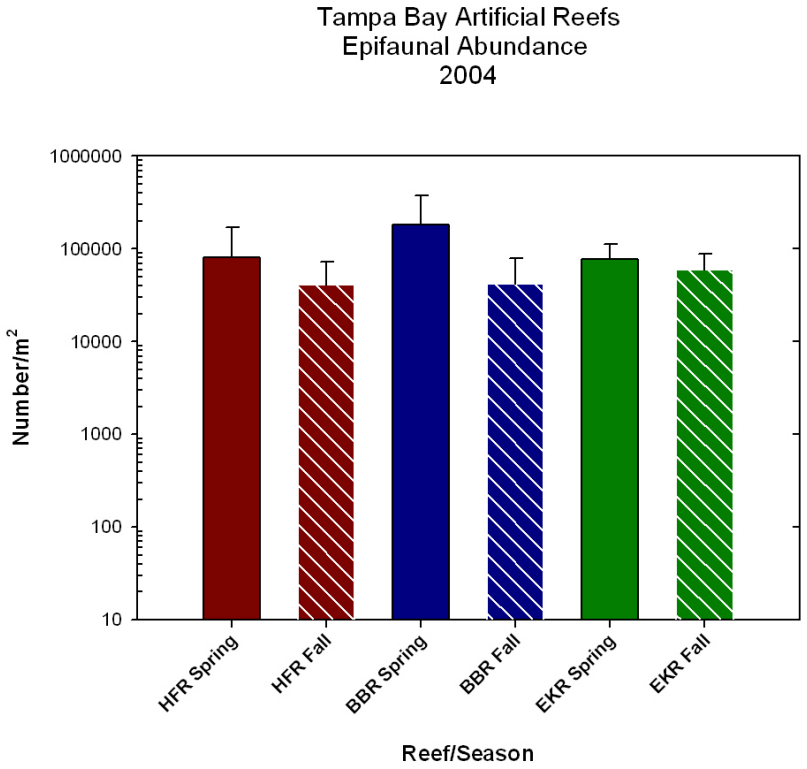

Figure 40. Mean abundance by reef and season; error bars = 1 standard deviation

Shannon-Weiner Diversity Index (H')

Shannon-Weiner diversity index values for each reef and season are presented in tables 17-22 and figure41. Two-way ANOVA indicated that there was no significant difference in overall diversity between seasons (p=0.355) but significant differences did occur between reefs (p=0.02). Overall the Egmont Key Reef had higher diversity relative to the Bahia Beach Reef (p=0.008), but was not

significantly higher than the Howard Frankland Reef. There was no significant difference between the Bahia Beach Reef and the Howard Frankland Reef. The H' was not significantly different between seasons at the Howard Frankland Reef or the Bahia Beach Reef., but Spring H' was significantly lower than the Fall at the Egmont Key Reef (p=0.023). Within seasons, there was no significant difference in H' between the three reefs during the spring, but the Egmont Key Reef had significantly higher diversity in the fall compared to the other two reefs.

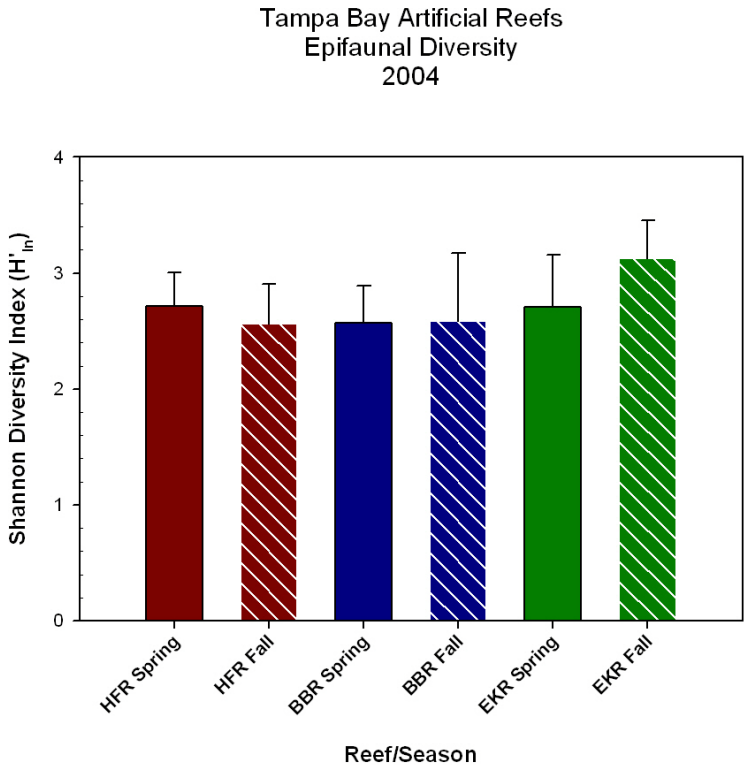

Figure 41. Mean diversity by reef and season; error bars = 1 standard deviation

Pielou's Evenness Index (J')

Evenness values for each reef and season are given in tables 17-22 and figure 42. Two-way ANOVA found no significant difference in J' between reefs (p=0.266) or seasons (p=0.064) or interactions between reef x season (p=0.259). (Evenness data were arcsine transformed for normality prior to

analysis of variance).

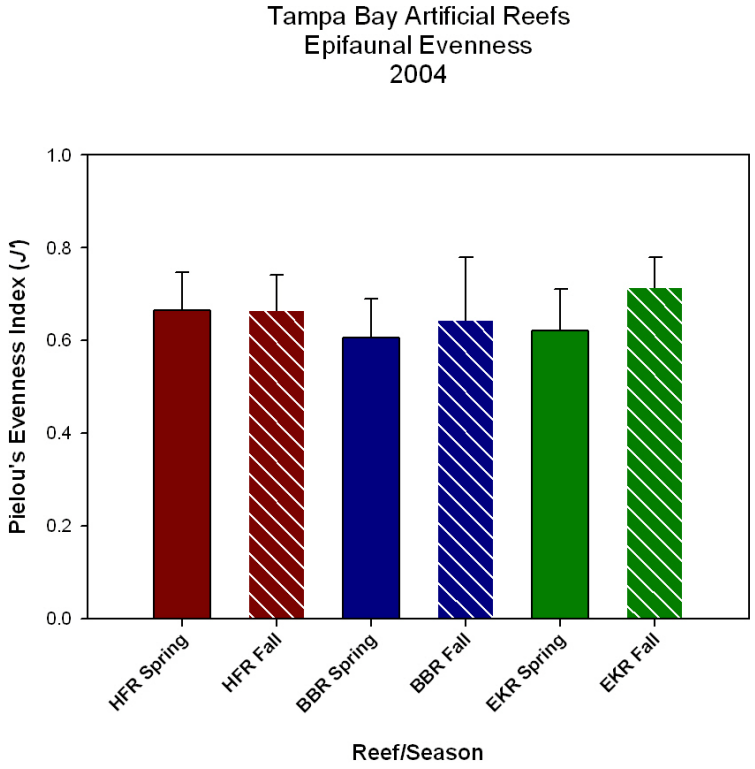

Figure 42. Mean evenness by reef and season; error bars = 1 standard deviation

Abundance Cluster Analysis

Fourteen distinct sample groupings were identified in the classification analysis based on their species composition and abundance (Figure 43). Two groups, designated as Group A and Group A', separated out from the remaining samples. Group A was comprised of two fall Howard Frankland Reef samples, while Group A' consisted of a single Egmont Key spring sample (Figure 43). The remaining samples fell into two main groups identified as Group B and Group C in figure 43. Group B was comprised of the Howard Frankland Reef samples, while Group C included the Bahia Beach Reef and Egmont Key Reef samples. Group B was further divided into two subgroups: B1 and B2. Group B1 was composed of remaining fall Howard Frankland Reef samples and Group B2 had the spring Howard Frankland Reef samples. Group C was split into two

primary subgroups designated C1 and C2 in figure 43. Group C1 was comprised of three spring Bahia Beach Reef samples, while Group C2 consisted of the remaining Bahia Beach Reef and Egmont Key Reef samples. Group C2 was further divided into Groups C2a and C2b. Group C2a included the remaining spring BBR samples plus two fall BBR samples. Group C2b was split into three subgroups: C2b1, C2b2 and C2b2'. Group C2b1 consisted of the rest of the spring BBR samples, C2b2' was represented by a single fall EKR sample. The remaining EKR samples fell into the C2b2 grouping. These further grouped by their respective seasons, with the Fall EKR samples being designated as Group D and the Spring EKR samples as Group E in figure 43.

SIMPER analysis (Clarke & Warwick, 2001) showed the biotic assemblages in Cluster A was represented by the oyster *Ostrea equestris,* the anemonae *Anthoplerura* sp., the syllid polychaete *Grubeosyllis nitidula* and orbinid polychaete *Naineris bicornis*. The two samples within Group A were further characterized by lower species richness relative to the other samples and by the absence of several commonly occurring taxa including the green mussel *Perna viridis,* the amphipods *Stenothoe* cf. *georgiana* and *Erichthonius brasiliensis* and the barnacles *Balanus reticulates* and *Balanus trigonus.* The overall abundance of barnacles was also lower at the Group A sites relative to the other samples. The single sample comprising Group A' was characterized by a high abundance of the caprellid amphipod *Caprella penantis.*

The biotic assemblage at the Group B sites (HFR) were characterized by higher abundances of the anemone *Anthopleura* sp., the syllid polychaete *Grubeosyllis nitidula* and the oyster *Crassostrea virginica*. The Group C sites (BBR + EKR) in contrast had higher abundances of barnacles (*Balanus trigonus* and unid. juveniles), the tanaidacean *Leptochelia dubia,* the oyster *Ostrea equestris* and green mussel *Perna viridis*. The oyster *Crassostrea virginica* was absent at the Group C sites.

The Group B1 sites (Fall HFR) were represented by higher abundances of barnacles (*Balanus*

reticulatus, Balanus eburneus and unid. juveniles), *Ostrea equestris*, and xanthoid crabs while the Group B2 sites (Spring HFR) were more dominated by the amphipods *Erichthonius brasiliensis* and *Stenothoe* cf. *georgiana* and the spionid polychaete *Polydora websteri.*

The species assemblage for the three Group C1 sites was represented by the polychaetes *Syllis gracilis, Exogone dispar* and *Syllis (Typosyllis) corallicola* while the remaining sites in Group C2 were characterized by higher abundances of juvenile barnacles, *Leptochelia dubia*, and *Ostrea equestris*.

The Group C2 subgroups generally grouped by reef and season. Group C2a, primarily Fall BBR sites, was characterized by high a high abundance of juvenile barnacles. Within the Group C2b, the Spring BBR sites (Group C2b1) had high abundances of *Ostrea equestris, Perna viridis* and *Stenothoe* cf. *georgiana.* Group C2b2 was composed of the remaining EKR samples. Below the C2b2 grouping, the EKR sites formed three subgroups primarily by season. Group C2b2' included a single Fall EKR sample which was dominated by the amphipod *Erichthonius brasiliensis,* the spionid polychaete *Polydora websteri*, and the barnacle *Balanus trigonus*. Group D included the remaining Fall EKR samples + a single Spring EKR sample and was characterized by *Leptochelia dubia*, juvenile barnacles and the spionid polychaetes *Polydora websteri* and *Polydora* cf. *colonia*. Group E was composed of the rest of the Spring EKR samples and was represented by high abundances of *Anthopleura* sp., *Leptochelia dubia* and *Stenothoe* cf. *georgiana.*

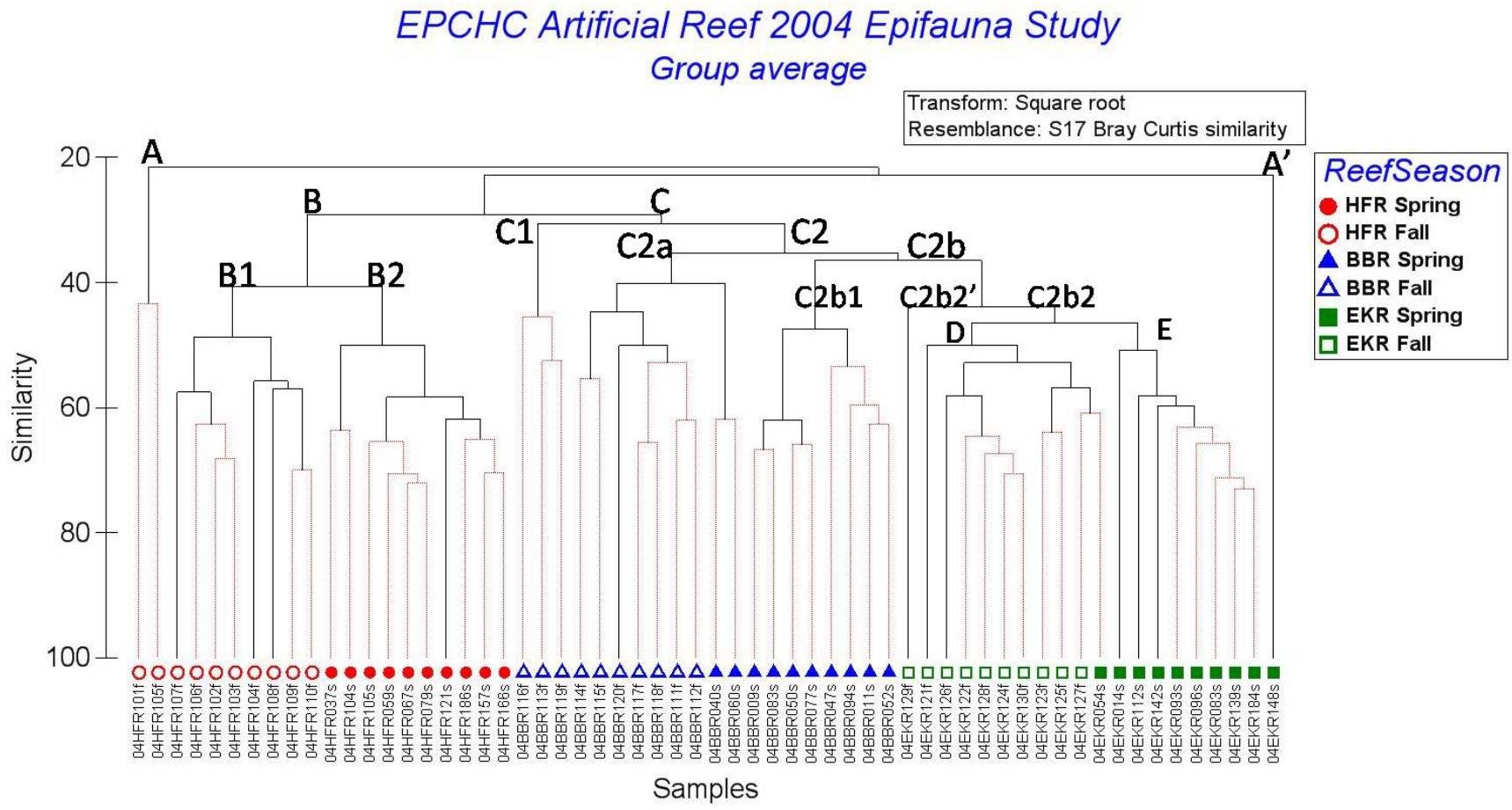

Figure 43. Bray-Curtis similarity of sites based on epifaunal abundance

Species Composition and Relative Abundances

A total of 385 species level taxa in 14 phyla were identified over all three reefs and both seasons with a total abundance of over 124,000 individual animals. Appendix D indicates the presence or absence of each taxon for each reef and season and its total raw count, while Table 23 shows the number and percentage of species and abundances by phyla. Three phyla comprised 80% of the taxa and over 88% of the total abundance (Table 23). Annelida had the highest species richness with 113 taxa (29.35%) and was the third most abundant phylum comprising 16.79% of the relative abundance. The Arthropoda was the second most species rich phylum with 101 taxa (26.23%) and had the highest overall abundance, accounting for nearly half (48%) of the relative abundance. The Mollusca was represented by 94 species (24.42%) and was the second most abundant phylum accounting for 23.43% of animals found. Forty taxa were present in ≥50% of the samples and six taxa were found in ≥90% of the samples (Table 24). The oyster *Ostrea equestris* was the most frequently occurring species being present in 59 of the 60 samples collected (Table 24). Six taxa accounted for ≥50% of the overall abundance, with theanemone *Anthopleura* sp. and the exotic Asian Green Mussel *Perna viridis* being the two most abundant taxa (Table 25).

The spring samples had a total of 318 species and an overall abundance of 87,484 individual animals. Forty-three taxa were present in ≥50% of the samples, and 9 were found in ≥90% (Table 26). There were 4 species present in all of the spring samples: *Stenothoe* cf. *georgiana*, *Ostrea equestris*, *Polydora websteri*, and *Dipolydora socialis* (Table 26). Five taxa accounted for ≥50% of the overall spring abundance, with *Perna viridis* being the most abundant species found (Table 27).

Species richness and abundance were both lower in the fall samples. There were a total of 275 taxa present in the fall with an overall abundance of 36,632 individuals. Forty-five taxa were present in ≥50% of the samples with 5 being found in ≥90% (Table 28). Seven taxa

accounted for ≥50% of the overall abundance, with juvenile barnacles by far dominating the fall epifaunal community (Table 29).

A total of 189 taxa were identified from the Howard Frankland Reef over both seasons with a total abundance of 31,403 individuals. Ten taxa were present in ≥90% of the HRF samples, six of which were found in all HRF samples (Table 30). Five taxa accounted for ≥50% of the overall abundance (Table 31). The anemone *Anthopleura* sp. was the most abundant species on the Howard Frankland Reef and was also present in all HRF samples. The spring HRF epifaunal community was composed of 150 taxa with a total abundance of 20,834 individuals. Eighteen taxa were present in 100% of the HRF Spring samples (n=10) and 4 taxa accounted for ≥50% of the spring abundance (Table 32). The two most abundant species were amphipods (Table 32). The Fall HRF epifaunal community had a total of 131 taxa with a total abundance of 10,569 individuals. Seven taxa were present in all fall samples and 4 taxa accounted for ≥50% of the abundance (Table 33). Two of the most abundant taxa were barnacles (*Balanus reticulatus* + juvenile *Balanus* spp), while the most abundant taxa was *Anthopleura* sp. (Table 33).

There were 229 taxa found at the Bahia Beach Reef over both seasons and a total abundance of 57,463 individuals. Eleven taxa were present in ≥90% of the BBR samples (Table 34) and 4 taxa comprised ≥50% of the abundance (Table 35). The Asian green mussel, *Perna viridis*, was the most abundant species found at the Bahia Beach Reef (Table 35). The BBR spring samples had a total of 189 taxa and a total abundance of 46, 680 individuals. Seventeen taxa were present in 100% of the spring samples and 4 taxa made up ≥50% of the overall abundance, with Perna viridis comprising over 25% (Table 36). The fall BBR samples had a total of 155 taxa with an overall abundance of 10,784 individuals. Only four taxa were present in all samples and three taxa comprised ≥50% of the abundance (Table 37). The fall epifaunal community was strongly dominated by barnacles, with *Balanus reticulatus* and unidentified juveniles together making up

over 45% of the total abundance (Table 37).

The Egmont Key Reef had a total of 290 taxa present over both seasons with a total abundance of 35,250 individuals. Eight taxa were present in 100% of the sample (Table 38) and 6 taxa accounted for ≥50% of the abundance (Table 39). The spring EKR samples had 219 taxa and 19,971 individuals. Fifteen taxa were present in all 10 EKR spring samples and 4 taxa made up ≥50% of the abundance (Table 40). The spring epifaunal community was largely dominated by the anemone *Anthopleura* sp., which accounted for 33% of the spring abundance (Table 40). The fall EKR samples had 206 taxa and 15,279 individuals. Nineteen taxa were present in all 10 EKR fall samples and 7 taxa made up ≥50% of the abundance (Table 41).

Table 23. Summary of Taxa and Abundance of Phyla for Artificial Reefs

Phylum	Total Number Taxa	% Total	Total Number Individuals**	% Total
Annelida	113	29.35%	20841	16.79%
Arthropoda	101	26.23%	59591	48.01%
Mollusca	94	24.42%	29085	23.43%
Cnidaria	16	4.16%	13311 + Colonial*	10.72%
Bryozoa	15	3.90%	(3) Colonial*	0.00%
Chordata	12	3.12%	359 + Colonial*	0.29%
Porifera	10	2.60%	(4) Colonial*	0.00%
Nemertea	10	2.60%	283	0.23%
Echinodermata	5	1.30%	109	0.09%
Platyhelminthes	4	1.04%	320	0.26%
Sipuncula	2	0.52%	95	0.08%
Chaetognatha	1	0.26%	100	0.08%
Echiura	1	0.26%	15	0.01%
Brachiopoda	1	0.26%	1	0.00%
TOTAL	385	100%	124,116	100%

*Colonial taxa were assigned a value of 0.0256 for raw count data (= $1/m^2$ density)
** Rounded values

Table 24. Frequency of Occurrence for all reefs and seasons combined

Taxon	% Frequency (n = 60 samples)
Ostrea equestris	98.33%
Polydora websteri	95.00%
Dipolydora socialis	93.33%
Syllis gracilis	91.67%
Anthopleura sp.	90.00%
Balanus spp. (juveniles)	90.00%

Table 25. Relative Abundance All Reefs x seasons

Taxa	% Abundance	Cumulative Abundance
Anthopleura sp.	10.72%	10.72%
Perna viridis	9.97%	20.69%
Stenothoe cf. *georgiana*	8.78%	29.46%
Balanus spp. (juveniles and damaged)	7.72%	37.19%
Erichthonius brasiliensis	7.10%	44.29%
Ostrea equestris	6.51%	50.80%

Table 26. Frequency of Occurrence for Spring samples (all Reefs)

Taxon	% Frequency (n = 30 samples)
Stenothoe cf. *georgiana*	100.00%
Ostrea equestris	100.00%
Polydora websteri	100.00%
Dipolydora socialis	100.00%
Anthopleura sp.	93.33%
Erichthonius brasiliensis	93.33%
Crepidula depressa	93.33%
Musculus lateralis	93.33%
Procerae cornuta	90.00%

Table 27. Relative abundance for Spring samples (all Reefs)

Taxa	% Abundance	Cumulative Abundance
Perna viridis	13.95%	13.95%
Stenothoe cf. *georgiana*	11.97%	25.92%
Anthopleura sp.	11.65%	37.57%
Erichthonius brasiliensis	8.31%	45.88%
Ostrea equestris	7.29%	53.17%

Table 28. Frequency of Occurrence for Fall samples (all Reefs)

Taxon	% Frequency (n = 30 samples)
Balanus spp. (juveniles and damaged)	96.67%
Syllis gracilis	96.67%
Ostrea equestris	96.67%
Polydora websteri	90.00%
Syllis (Typosyllis) corallicola	90.00%

Table 29. Relative Abundance for Fall samples (all Reefs)

Taxa	% Abundance	Cumulative Abundance
Balanus spp. (juveniles and damaged)	20.27%	20.27%
Anthopleura sp.	8.49%	28.76%
Syllis gracilis	5.12%	33.88%
Polydora websteri	4.97%	38.85%
Leptochelia dubia complex	4.83%	43.68%
Ostrea equestris	4.66%	48.34%
Erichthonius brasiliensis	4.23%	52.57%

Table 30. Frequency of Occurrence for Howard Frankland Reef samples (Spring + Fall)

Taxon	% Frequency (n = 20 samples)
Anthopleura sp.	100.00%
Grubeosyllis nitidula	100.00%
Crepidula depressa	100.00%
Ostrea equestris	100.00%
Crassostrea virginica	100.00%
Haliclona sp.	100.00%

Table 31. Relative Abundance for Howard Frankland Reef samples (Spring + Fall)

Taxa	% Abundance	Cumulative Abundance
Anthopleura sp.	16.45%	16.45%
Erichthonius brasiliensis	12.94%	29.40%
Stenothoe cf. *georgiana*	11.83%	41.23%
Polydora websteri	6.49%	47.72%
Grubeosyllis nitidula	5.35%	53.07%

Table 32. Relative Abundance for Howard Frankland Reef Spring samples

Taxa	% Abundance	Cumulative Abundance
Erichthonius brasiliensis	19.14%	19.14%
Stenothoe cf. *georgiana*	16.33%	35.47%
Anthopleura sp.	13.38%	48.85%
Polydora websteri	9.22%	58.06%

Table 33. Relative Abundance for Howard Frankland Reef Fall samples

Taxa	% Abundance	Cumulative Abundance
Anthopleura sp.	22.52%	22.52%
Balanus spp. (juveniles and damaged)	13.55%	36.07%
Ostrea equestris	10.40%	46.46%
Balanus reticulatus	8.92%	55.39%

Table 34. Frequency of Occurrence for Bahia Beach Reef samples (Fall + Spring)

Taxon	% Frequency (n = 20 samples)
Leptochelia dubia complex	100.00%
Syllis gracilis	100.00%

Table 35. Relative Abundance for Bahia Beach Reef samples (Fall + Spring)

Taxa	% Abundance	Cumulative Abundance
Perna viridis	21.08%	21.08%
Balanus spp. (juveniles and damaged)	10.92%	32.00%
Ostrea equestris	10.22%	42.23%
Stenothoe cf. *georgiana*	10.22%	52.44%

Table 36. Relative Abundance for Bahia Beach Reef Spring samples

Taxa	% Abundance	Cumulative Abundance
Perna viridis	25.79%	25.79%
Stenothoe cf. *georgiana*	12.37%	38.16%
Ostrea equestris	11.88%	50.04%

Table 37. Relative Abundance for Bahia Beach Reef Fall samples

Taxa	% Abundance	Cumulative Abundance
Balanus spp. (juveniles and damaged)	40.93%	40.93%
Syllis gracilis	7.55%	48.48%
Balanus reticulatus	4.68%	53.16%

Table 38. Frequency of Occurrence for Egmont Key Reef samples (Fall + Spring)

Taxon	% Frequency (n = 20 samples)
Leptochelia dubia complex	100.00%
Polydora websteri	100.00%
Erichthonius brasiliensis	100.00%
Syllis gracilis	100.00%
Cirriformia sp. A of Wolf, 1984	100.00%
Balanus trigonus	100.00%
Ostrea equestris	100.00%
Dipolydora socialis	100.00%

Table 39. Relative Abundance for Egmont Key Reef samples (Fall + Spring)

Taxa	% Abundance	Cumulative Abundance
Anthopleura sp.	20.17%	20.17%
Leptochelia dubia complex	10.13%	30.30%
Polydora websteri	6.49%	36.78%
Erichthonius brasiliensis	5.16%	41.95%
Balanus spp. (juveniles and damaged)	5.14%	47.09%
Syllis gracilis	3.78%	50.87%

Table 40. Relative Abundance for Egmont Key Reef Spring samples

Taxa	% Abundance	Cumulative Abundance
Anthopleura sp.	32.71%	32.71%
Leptochelia dubia complex	10.51%	43.22%
Stenothoe cf. *georgiana*	6.48%	49.70%
Syllis gracilis	3.77%	53.47%

Table 41. Relative Abundance for Egmont Key Reef Fall samples

Taxa	% Abundance	Cumulative Abundance
Polydora websteri	10.59%	10.59%
Balanus spp. (juveniles and damaged)	10.33%	20.92%
Leptochelia dubia complex	9.63%	30.56%
Erichthonius brasiliensis	7.99%	38.55%
Cirriformia sp. A of Wolf, 1984	5.26%	43.81%
Balanus trigonus	5.10%	48.90%
Polydora cf. *colonia*	4.03%	52.94%

DISCUSSION

The artificial reefs of Tampa Bay consist of 385 taxa within 14 phyla. The annelida, mollusca, and arthropoda represented 80% of the taxa and 88% of the total number of organisms. These hardbottom substrates increase the biotic communities in Tampa Bay and provide an important food resource for a wide range of foragers (for example fish and crabs) that visit or live on the reefs. These reefs contribute a large amount of biotic biomass especially the Howard Frankland Reef and Bahia Beach Reef.

The Howard Frankland Reef is widely different from Egmont Key Reef in biomass and species composition while the Bahia Beach Reef is transitional between the other two reefs. The Bahia Beach Reef has sites that are similar in biomass to Howard Frankland Reef sites and Egmont Key Reef sites. The species composition of Bahia Beach Reef sites was more similar to Egmont Key Reef sites, especially during the spring. Egmont Key has greater species richness than both the Bahia Beach Reef and Howard Frankland Reef. The abundance and evenness were the same for all reefs. Seasonality has some effect on each reef: at Howard Frankland Reef there was a shift in biomass but not at the other reefs, the abundances are higher in the spring for all reefs, and evenness and diversity are higher in the fall for Bahia Beach Reef and Egmont Key Reef. These shifts could be due to temperature and salinity difference for the seasons as well as seasonal recruitment patterns, particularly for barnacles.

The Howard Frankland Reef differs from the Egmont Key Reef due to the increased biomass and composition of mollusca which mainly consist of *Perna viridis*. The Egmont Key Reef biomass is higher for barnacles and ascidians and has a higher diversity than Howard Frankland Reef. The biomass for Bahia Beach Reef is a mixture of mollusca and barnacles. The mollusca at Bahia Beach Reef are mainly *Perna viridis* and *Ostrea equestris*. Howard Frankland is a shallow

reef and has lower salinities than Egmont Key Reef. These two factors may help explain the difference between the two reefs but the invasiveness of *Perna viridis* has changed the Howard Frankland Reef composition and biomass.

CONCLUSIONS

A seasonal change in the epifaunal community composition was evident at all three reefs and was due largely to the late summer recruitment of juvenile barnacles. The Howard Frankland Reef and Egmont Key Reefs are two very different epifaunal communities, while the Bahia Beach Reef shares characteristics of both the Howard Frankland and Egmont Key reefs. The species composition at the Bahia Beach Reef is more similar to the Egmont Key Reef but the biomass is split between the other two reefs. *Perna viridis* has a strong foothold on Bahia Beach Reef and could spread throughout the reef. If this happens, then Bahia Beach Reef species composition and biomass will be more similar to Howard Frankland Reef. Bahia Beach is of special concern and should be monitored for the advancement of *Perna viridis*. Egmont Key Reef should also be monitored but *Perna viridis* is not well established at this reef. If these two reefs change their composition and biomass and become more similar to Howard Frankland Reef then a loss of species diversity could result in a reduced supply of different prey items for foragers.

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APPENDIX A: SAMPLE LOCATIONS

Howard Frankland Sites	Latitude	Longitude	Bahia Beach Sites	Latitude	Longitude	Egmont Key Sites	Latitude	Longitude
04HFR037s	27.91167	82.55325	04BBR009s	27.74790	82.51540	04EKR014s	27.58345	82.74360
04HFR059s	27.91093	82.55307	04BBR011s	27.74898	82.51590	04EKR054s	27.58352	82.74363
04HFR067s	27.91208	82.55423	04BBR040s	27.74738	82.51578	04EKR083s	27.58393	82.74387
04HFR079s	27.91025	82.55347	04BBR047s	27.74827	82.51502	04EKR093s	27.58257	82.74440
04HFR104s	27.91147	82.55342	04BBR050s	27.74870	82.51630	04EKR096s	27.58288	82.74360
04HFR105s	27.91107	82.55415	04BBR052s	27.74892	82.51535	04EKR112s	27.58482	82.74317
04HFR121s	27.91222	82.55383	04BBR060s	27.74838	82.51568	04EKR139s	27.58275	82.74430
04HFR157s	27.91132	82.55323	04BBR077s	27.74812	82.51467	04EKR142s	27.58380	82.74348
04HFR166s	27.91177	82.55462	04BBR083s	27.74675	82.51615	04EKR148s	27.58455	82.74283
04HFR186s	27.91187	82.55392	04BBR094s	27.74707	82.51618	04EKR184s	27.58357	82.74437
04HFR101f	27.91128	82.55320	04BBR111f	27.74843	82.51577	04EKR121f	27.58353	82.74357
04HFR102f	27.91077	82.55415	04BBR112f	27.74877	82.51527	04EKR122f	27.58405	82.74348
04HFR103f	27.91062	82.55412	04BBR113f	27.74863	82.51568	04EKR123f	27.58405	82.74400
04HFR104f	27.91105	82.55392	04BBR114f	27.74915	82.51575	04EKR124f	27.58430	82.74432
04HFR105f	27.91142	82.55407	04BBR115f	27.74927	82.51620	04EKR125f	27.58475	82.74323
04HFR106f	27.91188	82.55328	04BBR116f	27.74788	82.51553	04EKR126f	27.58338	82.74373
04HFR107f	27.91203	82.55343	04BBR117f	27.74765	82.51548	04EKR127f	27.58228	82.74402
04HFR108f	27.91198	82.55438	04BBR118f	27.74673	82.51583	04EKR128f	27.58203	82.74453
04HFR109f	27.91168	82.55465	04BBR119f	27.74677	82.51555	04EKR129f	27.58237	82.74350
04HFR110f	27.91135	82.55453	04BBR120f	27.74663	82.51642	04EKR130f	27.58243	82.74235

APPENDIX B: RELATIVE PERCENT BIOMASS OF PHYLA FOR THE SAMPLE SITES

Phylum	Howard Frankland Reef Spring Site #									
	HFR037s	HFR059s	HFR067s	HFR079s	HFR104s	HFR105s	HFR121s	HFR157s	HFR166s	HFR186s
Arthropoda	4.81%	0.22%	0.30%	0.46%	1.60%	0.01%	0.96%	3.76%	0.30%	0.29%
Annelida	1.46%	0.15%	0.23%	0.15%	0.33%	0.23%	0.05%	0.25%	0.10%	0.16%
Mollusca	63.12%	97.03%	92.50%	97.59%	89.67%	95.64%	95.58%	86.30%	95.34%	97.03%
Bryozoa	1.54%	2.51%	6.43%	1.55%	1.93%	1.48%	2.57%	2.52%	3.55%	1.88%
Cnidaria	21.87%	0.01%	0.03%	0.01%	2.17%	0.08%	0.05%	0.07%	0.03%	0.04%
Platyhelminthes	0.01%	0.0004%	0.01%	0.00%	0.003%	0.002%	0.01%	0.002%	0.0002%	0.001%
Nemertea	0.05%	0.001%	0.004%	0.001%	0.005%	0.002%	0.001%	0.01%	0.001%	0.004%
Porifera	5.24%	0.05%	0.14%	0.09%	3.13%	2.43%	0.35%	6.94%	0.30%	0.07%
Chordata	1.89%	0.03%	0.36%	0.15%	1.16%	0.13%	0.42%	0.16%	0.37%	0.53%
Chaetognatha	0.01%	0.00%	0.00%	0.0003%	0.00%	0.00%	0.0003%	0.00%	0.00%	0.00%
Echinodermata	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sipuncula	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Echiura	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Brachipoda	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Phylum	Howard Frankland Reef Fall Site #									
	HFR101f	HFR102f	HFR103f	HFR104f	HFR105f	HFR106f	HFR107f	HFR108f	HFR109f	HFR110f
Arthropoda	0.99%	15.01%	23.83%	0.34%	0.46%	3.39%	43.41%	1.27%	1.07%	2.60%
Annelida	0.65%	0.09%	0.05%	0.10%	0.09%	0.17%	0.56%	1.64%	0.24%	0.26%
Mollusca	69.84%	82.14%	75.14%	95.38%	9.31%	93.01%	47.24%	86.84%	98.03%	96.37%
Bryozoa	0.02%	0.16%	0.19%	0.29%	0.34%	0.00%	0.00%	0.05%	0.12%	0.24%
Cnidaria	0.84%	0.43%	0.03%	0.27%	0.01%	2.51%	7.81%	0.10%	0.05%	0.12%
Platyhelminthes	0.00%	0.01%	0.00%	0.00%	0.00%	0.04%	0.00%	0.00%	0.02%	0.001%
Nemertea	0.00%	0.003%	0.00%	0.00%	0.00%	0.002%	0.00%	0.00%	0.00%	0.002%
Porifera	25.05%	0.87%	0.01%	2.95%	89.66%	0.19%	0.28%	8.88%	0.22%	0.11%
Chordata	2.62%	1.29%	0.75%	0.30%	0.14%	0.68%	0.69%	1.22%	0.25%	0.29%
Chaetognatha	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Echinodermata	0.00%	0.00%	0.00%	0.37%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Sipuncula	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Echiura	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Brachipoda	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

APPENDIX B. Continued.

Phylum	Bahia Beach Reef Spring Site #									
	BBR009s	BBR011s	BBR040s	BBR047s	BBR050s	BBR052s	BBR060s	BBR077s	BBR083s	BBR094s
Arthropoda	4.53%	48.78%	79.19%	2.05%	4.21%	37.08%	18.45%	3.81%	6.35%	38.15%
Annelida	0.16%	1.66%	0.47%	0.45%	0.57%	6.83%	0.36%	0.30%	0.20%	3.40%
Mollusca	92.82%	16.23%	6.94%	2.62%	65.82%	17.28%	72.42%	69.94%	88.88%	37.49%
Bryozoa	0.20%	0.70%	0.004%	0.02%	0.35%	0.26%	0.60%	0.26%	0.53%	5.19%
Cnidaria	0.05%	1.43%	2.77%	2.44%	2.28%	1.08%	0.00%	9.07%	1.83%	6.30%
Platyhelminthes	0.001%	0.004%	0.01%	0.002%	0.01%	0.00%	0.002%	0.04%	0.003%	0.07%
Nemertea	0.002%	0.02%	0.00%	0.00%	0.002%	0.04%	0.003%	0.01%	0.01%	0.04%
Porifera	0.67%	22.19%	0.00%	92.40%	25.34%	15.69%	0.00%	8.13%	0.05%	0.11%
Chordata	1.57%	8.97%	10.60%	0.004%	1.41%	21.70%	8.16%	8.43%	2.16%	8.84%
Chaetognatha	0.00%	0.002%	0.00%	0.002%	0.00%	0.00%	0.00%	0.001%	0.0001%	0.05%
Echinodermata	0.001%	0.00%	0.00%	0.01%	0.01%	0.00%	0.00%	0.01%	0.00%	0.37%
Sipuncula	0.00%	0.00%	0.00%	0.002%	0.00%	0.03%	0.00%	0.01%	0.00%	0.00%
Echiura	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Brachipoda	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Phylum	Bahia Beach Reef Fall Site #									
	BBR111f	BBR112f	BBR113f	BBR114f	BBR115f	BBR116f	BBR117f	BBR118f	BBR119f	BBR120f
Arthropoda	30.21%	15.30%	63.53%	79.55%	9.51%	6.45%	29.81%	92.63%	10.44%	40.31%
Annelida	1.03%	0.10%	3.44%	0.11%	0.05%	8.49%	0.08%	0.62%	4.65%	1.23%
Mollusca	3.60%	82.13%	3.12%	1.24%	84.90%	5.22%	68.92%	4.11%	3.37%	8.79%
Bryozoa	1.31%	0.17%	0.00%	0.00%	0.01%	0.09%	0.02%	0.02%	0.00%	0.21%
Cnidaria	1.24%	1.71%	0.60%	0.01%	0.11%	45.25%	0.06%	0.003%	19.55%	0.30%
Platyhelminthes	0.00%	0.001%	0.04%	0.004%	0.01%	0.00%	0.0004%	0.05%	0.00%	0.01%
Nemertea	0.01%	0.0004%	0.03%	0.00%	0.00%	0.00%	0.0004%	0.00%	0.01%	0.003%
Porifera	5.28%	0.04%	22.77%	2.43%	3.47%	32.30%	0.01%	0.03%	59.94%	32.29%
Chordata	57.10%	0.52%	6.37%	16.46%	1.87%	1.59%	1.09%	2.51%	0.00%	16.79%
Chaetognatha	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%
Echinodermata	0.14%	0.04%	0.00%	0.19%	0.09%	0.00%	0.002%	0.02%	1.11%	0.05%
Sipuncula	0.08%	0.00%	0.09%	0.00%	0.00%	0.59%	0.00%	0.00%	0.94%	0.03%
Echiura	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Brachipoda	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

APPENDIX B. Continued.

Phylum	Egmont Key Reef Spring Site #									
	EKR014s	EKR054s	EKR083s	EKR093s	EKR096s	EKR112s	EKR139s	EKR142s	EKR148s	EKR184s
Arthropoda	27.13%	51.61%	52.34%	40.44%	34.69%	58.08%	58.74%	38.13%	11.87%	86.88%
Annelida	10.93%	5.24%	1.86%	1.09%	3.57%	2.41%	0.60%	5.25%	3.52%	0.56%
Mollusca	2.30%	24.12%	7.16%	38.66%	5.34%	9.00%	9.11%	22.22%	82.10%	2.80%
Bryozoa	0.13%	0.85%	0.26%	1.87%	0.04%	0.01%	0.04%	0.06%	0.02%	0.01%
Cnidaria	8.58%	0.90%	5.40%	0.94%	7.00%	0.73%	2.70%	10.80%	1.68%	3.26%
Platyhelminthes	0.00%	0.01%	0.15%	0.03%	0.01%	0.005%	0.002%	0.05%	0.04%	0.07%
Nemertea	0.11%	0.05%	0.02%	0.01%	0.02%	0.01%	0.04%	0.10%	0.13%	0.01%
Porifera	17.85%	5.28%	9.56%	12.73%	4.38%	10.27%	1.77%	12.47%	0.00%	0.13%
Chordata	31.73%	11.79%	23.26%	4.23%	44.94%	19.49%	26.90%	10.92%	0.38%	6.28%
Chaetognatha	0.02%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.07%	0.001%
Echinodermata	1.19%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
Sipuncula	0.02%	0.13%	0.00%	0.00%	0.00%	0.003%	0.00%	0.00%	0.19%	0.00%
Echiura	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%
Brachipoda	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Phylum	Egmont Key Reef Fall Site #									
	EKR121f	EKR122f	EKR123f	EKR124f	EKR125f	EKR126f	EKR127f	EKR128f	EKR129f	EKR130f
Arthropoda	22.55%	46.64%	45.48%	72.39%	37.35%	55.62%	8.63%	48.32%	2.72%	82.75%
Annelida	8.51%	3.41%	7.25%	6.99%	8.13%	1.08%	2.53%	4.62%	0.53%	2.86%
Mollusca	15.46%	27.53%	6.50%	15.98%	23.04%	16.04%	45.04%	18.03%	0.91%	4.11%
Bryozoa	0.00%	0.01%	0.00%	0.04%	0.00%	0.00%	0.05%	0.00%	0.00%	0.02%
Cnidaria	4.93%	0.73%	23.15%	0.09%	2.08%	16.82%	0.20%	0.33%	0.38%	0.65%
Platyhelminthes	0.00%	0.01%	0.01%	0.01%	0.00%	0.04%	0.01%	0.02%	0.002%	0.01%
Nemertea	0.05%	0.01%	0.02%	0.01%	0.00%	0.01%	0.01%	0.01%	0.00%	0.002%
Porifera	1.12%	16.64%	12.98%	1.88%	28.04%	9.27%	0.33%	17.82%	0.45%	1.00%
Chordata	47.29%	5.00%	4.43%	2.52%	1.18%	0.93%	43.17%	10.12%	95.01%	8.54%
Chaetognatha	0.00%	0.00%	0.01%	0.002%	0.00%	0.00%	0.003%	0.01%	0.001%	0.004%
Echinodermata	0.00%	0.01%	0.01%	0.00%	0.15%	0.19%	0.00%	0.56%	0.00%	0.02%
Sipuncula	0.08%	0.00%	0.12%	0.08%	0.01%	0.00%	0.02%	0.17%	0.00%	0.05%
Echiura	0.00%	0.00%	0.04%	0.00%	0.01%	0.00%	0.004%	0.00%	0.00%	0.00%
Brachipoda	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.003%	0.00%	0.00%	0.00%

APPENDIX C: BIOMASS SIMILARITY PERCENTAGE (SIMPER) ANALYSIS

Group A
Average similarity: 52.00

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Cirripedia	40.56	9.07	3.94	17.44	17.44
Annelida	2.23	5.39	5.52	10.37	27.81
Ostrea equestris	6.68	5.35	2.50	10.28	38.09
Other crustaceans	1.52	4.98	5.34	9.57	47.67
Other Bivalvia	0.30	2.85	2.49	5.48	53.14
Other Gastropoda	0.87	2.73	2.35	5.25	58.40
Demospongiae sp. A of EPC	2.83	2.33	0.92	4.48	62.88
Haliclona sp.	1.79	2.07	1.09	3.99	66.87
Anthopleura sp.	0.92	1.92	1.24	3.68	70.55
Eudistoma cf. olivaceum	3.34	1.88	0.78	3.61	74.16
Perna viridis	0.66	1.14	0.83	2.20	76.36
Didemnidae sp.	1.17	1.00	0.55	1.92	78.28
Plumularia diaphana	0.04	0.98	1.00	1.88	80.15
Nemertea	0.01	0.91	1.20	1.74	81.90
Turbellaria	0.02	0.88	1.19	1.69	83.59
Didemnum sp.	1.17	0.79	0.57	1.53	85.11
Sipuncula	0.04	0.73	0.77	1.41	86.52
Clytia sp. B of Joyce, 1961	0.06	0.65	0.74	1.25	87.78
Leptogorgia virgulata	1.06	0.60	0.37	1.16	88.93
Cliona sp. A of EPC	0.33	0.59	0.48	1.14	90.08

Group B
Average similarity: 56.29

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Perna viridis	399.61	10.35	1.30	18.38	18.38
Ostrea equestris	10.22	6.03	3.60	10.72	29.11
Cirripedia	36.76	4.94	1.24	8.77	37.88
Other crustaceans	2.36	4.53	4.79	8.04	45.92
Other Gastropoda	2.76	3.96	3.33	7.04	52.96
Didemnidae sp.	4.19	3.93	1.85	6.98	59.94
Annelida	1.06	3.91	5.32	6.95	66.89
Crassostrea virginica	46.46	3.79	0.77	6.73	73.62
Anthopleura sp.	0.68	2.24	2.01	3.99	77.61
Conopeum cf. seurati	7.17	1.86	0.77	3.31	80.92
Other Bivalvia	0.45	1.82	1.42	3.23	84.15
Haliclona sp.	7.42	1.77	0.98	3.14	87.29
Styelidae sp.	0.51	1.05	0.78	1.87	89.15
Turbellaria	0.03	0.76	1.12	1.36	90.51

Groups A & B

Average dissimilarity = 57.54

Species	Group B Av.Abund	Group A Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Perna viridis	399.61	0.66	7.50	1.83	13.03	13.03
Crassostrea virginica	46.46	0.00	3.99	1.18	6.93	19.96
Cirripedia	36.76	40.56	2.87	1.38	4.98	24.94
Conopeum cf. seurati	7.17	0.00	2.19	1.08	3.80	28.74
Didemnidae sp.	4.19	1.17	2.10	1.42	3.66	32.39
Demospongiae sp. A of EPC	1.19	2.83	1.90	1.27	3.30	35.69
Eudistoma cf. olivaceum	0.01	3.34	1.87	1.16	3.24	38.93
Haliclona sp.	7.42	1.79	1.78	0.95	3.09	42.03
Ostrea equestris	10.22	6.68	1.47	1.21	2.55	44.57
Didemnum sp.	0.96	1.17	1.38	1.05	2.41	46.98
Eudendrium cf. carneum	3.92	0.04	1.33	0.74	2.32	49.30
Other Gastropoda	2.76	0.87	1.30	1.50	2.27	51.56
Cliona sp. A of EPC	1.27	0.33	1.30	0.95	2.27	53.83
Pollia tincta	1.12	1.04	1.18	0.83	2.05	55.88
Styelidae sp.	0.51	0.07	1.15	1.20	2.01	57.89
Anthopleura sp.	0.68	0.92	1.12	1.25	1.94	59.83
Leptogorgia virgulata	0.02	1.06	1.05	0.71	1.83	61.66
Amaroucium cf. stellatum	0.00	13.10	1.05	0.43	1.83	63.48
Halichondrina sp. A of EPC	2.12	7.89	1.02	0.45	1.78	65.26
Lissodendoryx cf. isodictyalis	0.23	0.61	0.93	0.67	1.62	66.88
Clavelina cf. oblonga	0.00	0.39	0.85	0.80	1.48	68.36
Other Bivalvia	0.45	0.30	0.84	1.29	1.46	69.82
Perophora cf. viridis	0.07	0.10	0.75	0.98	1.31	71.13
Eudendrium sp.	0.12	0.06	0.75	1.08	1.30	72.43
Echinodermata	0.09	0.07	0.74	0.99	1.29	73.72
Amaroucium constellatum	0.00	1.01	0.73	0.52	1.27	74.99
Plumularia diaphana	0.00	0.04	0.69	1.30	1.20	76.20
Annelida	1.06	2.23	0.68	1.29	1.19	77.38
Sipuncula	0.00	0.04	0.68	1.13	1.18	78.56
Other crustaceans	2.36	1.52	0.65	1.20	1.13	79.70
Clytia sp. B of Joyce, 1961	0.02	0.06	0.63	1.10	1.10	80.80
Styela plicata	0.15	3.19	0.63	0.38	1.09	81.89
Molgula sp.	0.06	0.02	0.62	0.93	1.08	82.97
Pseudochama radians	0.00	2.09	0.61	0.38	1.06	84.02
Hippoporina cf. verrilli	0.10	0.00	0.59	0.74	1.02	85.05
Bugula neritina	0.00	0.08	0.55	0.88	0.95	86.00
Akatopora cf. leucocypha	0.08	0.00	0.54	0.74	0.93	86.94
Polyandrocarpa cf. tincta	0.01	0.12	0.52	0.63	0.91	87.84
Atractylidae sp.	0.02	0.02	0.51	0.82	0.89	88.73
Turbellaria	0.03	0.02	0.50	1.22	0.87	89.61
Nemertea	0.01	0.01	0.42	1.13	0.74	90.34

Group A1

Average similarity: 51.45

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Cirripedia	1.84	7.84	#######	15.24	15.24
Other crustaceans	1.41	6.37	#######	12.39	27.63
Annelida	0.80	6.34	#######	12.32	39.95
Other Gastropoda	1.72	5.83	#######	11.34	51.29
Other Bivalvia	0.36	5.37	#######	10.43	61.72
Leptogorgia virgulata	2.54	5.24	#######	10.18	71.90
Ostrea equestris	1.08	3.56	#######	6.92	78.82
Didemnum sp.	0.01	2.12	#######	4.11	82.93
Plumularia diaphana	0.01	1.94	#######	3.77	86.70
Sipuncula	0.02	1.79	#######	3.48	90.18

Group A2

Average similarity: 53.35

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Cirripedia	43.43	9.40	4.15	17.62	17.62
Ostrea equestris	7.10	5.49	2.54	10.28	27.90
Annelida	2.33	5.36	5.46	10.05	37.96
Other crustaceans	1.53	4.86	5.42	9.12	47.07
Other Bivalvia	0.30	2.71	2.57	5.07	52.15
Demospongiae sp. A of EPC	3.03	2.70	1.06	5.05	57.20
Other Gastropoda	0.80	2.57	2.53	4.81	62.01
Haliclona sp.	1.92	2.40	1.30	4.50	66.51
Eudistoma cf. olivaceum	3.59	2.17	0.88	4.07	70.58
Anthopleura sp.	0.99	2.12	1.37	3.97	74.55
Perna viridis	0.71	1.20	0.85	2.25	76.80
Didemnidae sp.	1.25	1.15	0.60	2.16	78.96
Plumularia diaphana	0.04	0.94	0.93	1.75	80.71
Nemertea	0.01	0.92	1.31	1.73	82.44
Turbellaria	0.02	0.83	1.14	1.55	83.99
Didemnum sp.	1.26	0.76	0.53	1.43	85.42
Cliona sp. A of EPC	0.35	0.69	0.52	1.29	86.71
Clytia sp. B of Joyce, 1961	0.06	0.67	0.76	1.26	87.97
Clavelina cf. oblonga	0.42	0.67	0.50	1.26	89.24
Sipuncula	0.04	0.66	0.72	1.24	90.48

Groups A1 & A2
Average dissimilarity = 56.76

Species	Group A1 Av.Abund	Group A2 Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Halichondrina sp. A of EPC	95.72	1.39	5.09	1.02	8.97	8.97
Cirripedia	1.84	43.43	3.25	1.68	5.72	14.69
Pseudochama radians	7.22	1.71	3.24	1.00	5.71	20.40
Demospongiae sp. A of EPC	0.00	3.03	2.71	1.38	4.77	25.17
Leptogorgia virgulata	2.54	0.95	2.65	2.08	4.67	29.83
Eudistoma cf. olivaceum	0.00	3.59	2.46	1.28	4.34	34.18
Haliclona sp.	0.00	1.92	2.34	1.55	4.13	38.30
Ostrea equestris	1.08	7.10	2.10	1.45	3.69	42.00
Anthopleura sp.	0.00	0.99	1.72	1.37	3.04	45.03
Didemnidae sp.	0.00	1.25	1.66	0.96	2.93	47.96
Lissodendoryx cf. isodictyalis	0.37	0.63	1.56	0.99	2.75	50.71
Other Gastropoda	1.72	0.80	1.42	1.74	2.51	53.21
Amaroucium cf. stellatum	0.00	14.08	1.37	0.45	2.42	55.63
Perna viridis	0.03	0.71	1.35	1.19	2.38	58.02
Didemnum sp.	0.01	1.26	1.33	1.22	2.34	60.36
Pollia tincta	0.00	1.11	1.20	0.92	2.12	62.47
Clavelina cf. oblonga	0.00	0.42	1.13	0.85	1.98	64.45
Cliona sp. A of EPC	0.00	0.35	1.12	0.79	1.98	66.43
Anthopleura sp. B of EPC	0.13	0.00	0.97	0.97	1.71	68.15
Amaroucium constellatum	0.00	1.08	0.96	0.54	1.70	69.85
Echinodermata	0.01	0.08	0.85	1.09	1.50	71.35
Molgula sp.	0.03	0.02	0.84	1.07	1.49	72.84
Perophora cf. viridis	0.00	0.10	0.82	0.90	1.44	74.28
Annelida	0.80	2.33	0.79	1.56	1.40	75.68
Eudendrium sp.	0.00	0.06	0.74	0.96	1.30	76.97
Clytia sp. B of Joyce, 1961	0.00	0.06	0.73	1.02	1.28	78.25
Bugula neritina	0.00	0.09	0.73	1.55	1.28	79.53
Styela plicata	0.00	3.43	0.72	0.35	1.26	80.79
Sipuncula	0.02	0.04	0.71	1.49	1.25	82.04
Aeverrillia cf. armata	0.02	0.06	0.64	0.96	1.14	83.18
Other crustaceans	1.41	1.53	0.62	1.26	1.10	84.27
Polyandrocarpa cf. tincta	0.00	0.12	0.62	0.60	1.09	85.36
Nemertea	0.01	0.01	0.61	1.35	1.07	86.43
Plumularia diaphana	0.01	0.04	0.59	1.43	1.04	87.47
Chaetognatha sp.	0.01	0.00	0.58	1.31	1.03	88.50
Other Bivalvia	0.36	0.30	0.57	1.06	1.01	89.50
Bugula stolonifera	0.00	0.05	0.47	0.84	0.82	90.32

Group B1

Less than 2 samples in group

Group B2

Average similarity: 57.35

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Crassostrea virginica	34.01	13.77	16.41	24.01	24.01
Ostrea equestris	4.22	9.81	13.90	17.11	41.11
Other crustaceans	0.78	5.73	6.63	9.99	51.11
Other Gastropoda	2.16	5.12	3.35	8.93	60.04
Haliclona sp.	63.16	4.71	1.74	8.21	68.24
Annelida	0.63	4.59	14.92	8.01	76.26
Cliona sp. A of EPC	3.02	2.71	0.58	4.72	80.98
Anthopleura sp.	0.04	2.60	6.49	4.54	85.51
Cirripedia	0.03	2.20	9.13	3.83	89.34
Didemnidae sp.	0.14	1.53	0.58	2.67	92.01

Group B3

Average similarity: 60.21

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Perna viridis	458.81	13.71	2.23	22.77	22.77
Ostrea equestris	11.24	5.92	3.69	9.83	32.60
Cirripedia	42.13	5.71	1.35	9.49	42.09
Didemnidae sp.	4.79	4.62	2.77	7.68	49.77
Other crustaceans	2.54	4.44	4.72	7.38	57.15
Annelida	1.09	3.86	5.35	6.41	63.55
Other Gastropoda	2.89	3.84	3.40	6.37	69.92
Crassostrea virginica	49.55	3.21	0.69	5.32	75.25
Anthopleura sp.	0.76	2.24	1.87	3.72	78.97
Conopeum cf. seurati	8.20	2.02	0.78	3.36	82.33
Other Bivalvia	0.47	1.97	1.78	3.28	85.61
Haliclona sp.	1.50	1.49	0.94	2.47	88.08
Turbellaria	0.04	0.94	1.43	1.56	89.64
Styelidae sp.	0.50	0.92	0.76	1.53	91.17

Groups B1 & B2

Average dissimilarity = 56.45

Species	Group B1 Av.Abund	Group B2 Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Stramonita haemastoma floridana	49.32	0.00	6.91	18.22	12.24	12.24
Eudendrium cf. carneum	18.90	0.00	5.43	18.22	9.63	21.87
Crassostrea virginica	0.40	34.01	3.87	3.53	6.85	28.72
Pollia tincta	4.99	0.00	3.61	9.05	6.39	35.11
Haliclona sp.	0.20	63.16	3.34	0.79	5.92	41.03
Sundanella cf. sibogae	1.29	0.00	2.78	18.22	4.92	45.95
Lissodendoryx cf. isodictyalis	3.47	0.40	2.63	1.69	4.65	50.60
Eudendrium sp.	0.46	0.00	2.14	18.22	3.79	54.40
Cirripedia	2.06	0.03	2.11	5.30	3.75	58.14
Molgula sp.	0.55	0.01	1.92	2.83	3.40	61.55
Other Bivalvia	0.61	0.15	1.63	1.27	2.89	64.43
Cliona sp. A of EPC	1.05	3.02	1.63	1.48	2.89	67.32
Demospongiae sp. A of EPC	0.00	1.35	1.47	0.82	2.61	69.93
Perophora cf. viridis	0.23	0.21	1.36	1.86	2.41	72.34
Styelidae sp.	0.93	0.39	1.31	1.02	2.33	74.67
Ostrea equestris	0.76	4.22	1.30	11.40	2.31	76.98
Nemertea	0.05	0.00	1.21	18.22	2.15	79.13
Didemnidae sp.	0.00	0.14	1.20	1.14	2.13	81.26
Conopeum cf. seurati	0.09	0.23	1.07	3.11	1.90	83.16
Membranipora cf. arborescens	0.02	0.00	0.92	18.22	1.63	84.79
Anthopleura sp.	0.36	0.04	0.89	3.07	1.57	86.36
Halichondria sp.	0.01	0.00	0.83	18.22	1.48	87.84
Other Gastropoda	0.86	2.16	0.82	1.34	1.46	89.29
Other crustaceans	2.28	0.78	0.82	1.97	1.45	90.74

Groups B1 & B3

Average dissimilarity = 57.11

Species	Group B1 Av.Abund	Group B3 Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Perna viridis	0.00	458.81	8.47	2.90	14.83	14.83
Stramonita haemastoma floridana	49.32	0.00	5.68	9.18	9.95	24.78
Eudendrium cf. carneum	18.90	3.81	3.35	1.82	5.87	30.65
Crassostrea virginica	0.40	49.55	3.08	1.85	5.38	36.03
Pollia tincta	4.99	1.10	2.86	3.03	5.01	41.05
Didemnidae sp.	0.00	4.79	2.78	2.79	4.87	45.92
Lissodendoryx cf. isodictyalis	3.47	0.10	2.72	3.75	4.77	50.68
Cirripedia	2.06	42.13	2.39	1.48	4.18	54.86
Sundanella cf. sibogae	1.29	0.00	2.27	8.12	3.97	58.83
Cliona sp. A of EPC	1.05	1.09	1.75	2.37	3.06	61.89
Conopeum cf. seurati	0.09	8.20	1.66	1.32	2.90	64.80
Ostrea equestris	0.76	11.24	1.51	1.62	2.64	67.43
Molgula sp.	0.55	0.05	1.42	2.23	2.49	69.92
Styelidae sp.	0.93	0.50	1.26	1.61	2.21	72.13
Eudendrium sp.	0.46	0.13	1.25	2.29	2.19	74.33
Perophora cf. viridis	0.23	0.05	1.23	2.49	2.16	76.48
Haliclona sp.	0.20	1.50	0.99	1.42	1.73	78.21
Didemnum sp.	0.00	1.11	0.90	0.72	1.57	79.79
Demospongiae sp. A of EPC	0.00	1.22	0.87	0.70	1.52	81.30
Other Gastropoda	0.86	2.89	0.78	1.67	1.36	82.66
Membranipora cf. arborescens	0.02	0.03	0.75	5.98	1.31	83.97
Halichondria sp.	0.01	0.01	0.70	8.22	1.22	85.19
Other Bivalvia	0.61	0.47	0.69	1.18	1.21	86.40
Anthopleura sp.	0.36	0.76	0.62	1.16	1.09	87.49
Hippoporina cf. verrilli	0.00	0.12	0.57	0.77	0.99	88.48
Other crustaceans	2.28	2.54	0.49	1.30	0.86	89.34
Plumularia diaphana	0.01	0.00	0.48	2.37	0.84	90.18

Groups B2 & B3

Average dissimilarity = 55.81

Species	Group B3 Av.Abund	Group B2 Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Perna viridis	458.81	0.00	10.66	2.94	19.11	19.11
Cirripedia	42.13	0.03	4.35	1.45	7.80	26.91
Haliclona sp.	1.50	63.16	3.88	1.02	6.96	33.86
Crassostrea virginica	49.55	34.01	3.87	1.50	6.93	40.79
Cliona sp. A of EPC	1.09	3.02	2.37	1.35	4.25	45.05
Conopeum cf. seurati	8.20	0.23	2.35	1.24	4.21	49.25
Didemnidae sp.	4.79	0.14	2.33	1.71	4.17	53.42
Demospongiae sp. A of EPC	1.22	1.35	1.72	1.17	3.08	56.51
Other Bivalvia	0.47	0.15	1.45	1.59	2.60	59.10
Eudendrium cf. carneum	3.81	0.00	1.43	0.71	2.57	61.67
Styelidae sp.	0.50	0.39	1.27	1.34	2.28	63.95
Other Gastropoda	2.89	2.16	1.21	1.39	2.17	66.12
Ostrea equestris	11.24	4.22	1.15	1.61	2.07	68.19
Didemnum sp.	1.11	0.00	1.14	0.73	2.04	70.23
Lissodendoryx cf. isodictyalis	0.10	0.40	1.06	0.78	1.90	72.13
Anthopleura sp.	0.76	0.04	0.98	1.21	1.76	73.90
Perophora cf. viridis	0.05	0.21	0.94	0.86	1.69	75.59
Turbellaria	0.04	0.00	0.87	1.78	1.55	77.14
Other crustaceans	2.54	0.78	0.82	1.42	1.47	78.61
Akatopora cf. leucocypha	0.09	0.02	0.81	1.29	1.44	80.06
Hippoporina cf. verrilli	0.12	0.01	0.79	0.99	1.41	81.47
Pollia tincta	1.10	0.00	0.77	0.61	1.37	82.84
Eudendrium sp.	0.13	0.00	0.74	0.85	1.32	84.16
Nemertea	0.01	0.00	0.73	1.91	1.31	85.47
Annelida	1.09	0.63	0.73	1.73	1.31	86.78
Clytia sp. B of Joyce, 1961	0.02	0.02	0.66	1.23	1.19	87.97
Leptogorgia virgulata	0.02	0.05	0.62	0.74	1.11	89.08
Molgula sp.	0.05	0.01	0.61	0.95	1.10	90.18

Group A2a
Average similarity: 56.01

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Cirripedia	45.71	9.24	4.96	16.50	16.50
Ostrea equestris	8.29	6.35	4.71	11.34	27.84
Annelida	2.62	5.57	7.26	9.94	37.79
Other crustaceans	1.59	4.91	5.59	8.76	46.55
Demospongiae sp. A of EPC	3.50	3.34	1.36	5.97	52.52
Eudistoma cf. olivaceum	4.40	3.13	1.26	5.59	58.11
Haliclona sp.	2.31	2.66	1.34	4.75	62.86
Anthopleura sp.	1.21	2.61	1.79	4.65	67.51
Other Bivalvia	0.28	2.55	2.44	4.55	72.06
Other Gastropoda	0.83	2.50	3.43	4.46	76.52
Perna viridis	0.72	1.13	0.80	2.01	78.54
Nemertea	0.02	1.05	1.57	1.88	80.42
Plumularia diaphana	0.05	1.05	1.06	1.87	82.28
Didemnum sp.	1.55	1.03	0.62	1.84	84.12
Turbellaria	0.02	0.85	1.14	1.51	85.63
Pollia tincta	1.36	0.63	0.43	1.13	86.76
Clytia sp. B of Joyce, 1961	0.07	0.63	0.68	1.13	87.89
Didemnidae sp.	0.95	0.63	0.46	1.12	89.01
Bugula neritina	0.11	0.55	0.67	0.98	89.98
Sipuncula	0.04	0.52	0.65	0.93	90.92

Group A2b
Average similarity: 55.72

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Cirripedia	33.39	9.67	2.94	17.36	17.36
Didemnidae sp.	2.61	5.17	3.98	9.28	26.64
Other crustaceans	1.29	4.66	5.24	8.37	35.01
Annelida	1.06	4.63	3.87	8.31	43.32
Lissodendoryx cf. isodictyalis	2.85	3.96	1.04	7.10	50.42
Other Bivalvia	0.38	3.36	4.22	6.03	56.45
Other Gastropoda	0.70	3.07	1.52	5.50	61.95
Styela plicata	18.51	2.75	0.62	4.94	66.89
Ostrea equestris	1.87	2.35	1.05	4.22	71.10
Cliona sp. A of EPC	0.56	2.06	1.11	3.70	74.80
Clavelina cf. oblonga	0.17	1.72	1.02	3.09	77.89
Haliclona sp.	0.23	1.45	1.13	2.59	80.48
Sipuncula	0.05	1.34	1.11	2.40	82.88
Perna viridis	0.66	1.32	0.95	2.38	85.26
Leptogorgia virgulata	2.06	1.12	0.61	2.00	87.27
Eudendrium sp.	0.01	1.11	1.06	1.99	89.26
Perophora cf. viridis	0.01	0.90	1.11	1.61	90.87

Groups A2a & A2b

Average dissimilarity = 52.44

	Group A2a	Group A2b				
Species	Av.Abund	Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Styela plicata	0.00	18.51	3.28	1.18	6.25	6.25
Lissodendoryx cf. isodictyalis	0.12	2.85	2.75	1.55	5.25	11.50
Eudistoma cf. olivaceum	4.40	0.00	2.59	1.65	4.95	16.45
Demospongiae sp. A of EPC	3.50	1.00	2.33	1.38	4.44	20.88
Didemnidae sp.	0.95	2.61	2.25	1.68	4.29	25.18
Ostrea equestris	8.29	1.87	2.25	1.31	4.28	29.46
Cirripedia	45.71	33.39	2.19	1.31	4.17	33.63
Leptogorgia virgulata	0.70	2.06	1.83	1.01	3.49	37.12
Haliclona sp.	2.31	0.23	1.65	1.29	3.15	40.27
Amaroucium cf. stellatum	17.27	0.00	1.55	0.51	2.96	43.23
Anthopleura sp.	1.21	0.04	1.54	1.29	2.93	46.16
Cliona sp. A of EPC	0.31	0.56	1.49	1.25	2.85	49.01
Didemnum sp.	1.55	0.01	1.44	0.99	2.74	51.75
Perna viridis	0.72	0.66	1.38	1.33	2.63	54.38
Clavelina cf. oblonga	0.47	0.17	1.31	1.40	2.50	56.89
Pollia tincta	1.36	0.03	1.24	0.85	2.36	59.25
Halichondrina sp. A of EPC	0.04	7.32	1.24	0.57	2.36	61.61
Other Gastropoda	0.83	0.70	1.13	1.86	2.16	63.76
Amaroucium constellatum	1.33	0.00	1.09	0.61	2.07	65.84
Echinodermata	0.08	0.08	0.92	1.19	1.76	67.60
Annelida	2.62	1.06	0.86	1.20	1.64	69.24
Perophora cf. viridis	0.13	0.01	0.82	1.49	1.56	70.80
Polyandrocarpa cf. tincta	0.13	0.11	0.79	0.78	1.51	72.31
Sipuncula	0.04	0.05	0.79	1.36	1.50	73.81
Plumularia diaphana	0.05	0.02	0.74	1.35	1.42	75.23
Eudendrium sp.	0.07	0.01	0.73	1.53	1.40	76.62
Bugula neritina	0.11	0.00	0.73	0.95	1.39	78.01
Other crustaceans	1.59	1.29	0.72	1.25	1.37	79.39
Ctenostomata sp.	0.00	0.06	0.71	1.12	1.35	80.73
Aeverrillia cf. armata	0.00	0.31	0.69	0.72	1.32	82.05
Other Bivalvia	0.28	0.38	0.66	1.35	1.25	83.30
Clytia sp. B of Joyce, 1961	0.07	0.01	0.66	1.16	1.25	84.55
Styelidae sp.	0.07	0.07	0.65	0.76	1.23	85.78
Pseudochama radians	2.10	0.00	0.59	0.38	1.13	86.91
Atractylidae sp.	0.02	0.02	0.58	0.88	1.11	88.03
Eudendrium cf. carneum	0.01	0.19	0.53	0.59	1.01	89.03
Eudistoma tarponense	0.17	0.00	0.50	0.52	0.95	89.98
Nemertea	0.02	0.00	0.49	1.16	0.93	90.91

Group B3a
Average similarity: 70.22

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Perna viridis	525.80	16.49	4.29	23.48	23.48
Crassostrea virginica	83.61	9.38	4.12	13.35	36.83
Ostrea equestris	13.34	5.56	3.17	7.92	44.75
Other Gastropoda	3.90	4.64	4.40	6.61	51.36
Other crustaceans	2.39	4.16	4.03	5.92	57.28
Annelida	1.13	3.75	5.71	5.34	62.62
Didemnidae sp.	2.24	3.71	3.33	5.29	67.90
Cirripedia	17.00	3.55	1.18	5.05	72.95
Conopeum cf. seurati	13.39	3.41	1.12	4.86	77.81
Haliclona sp.	2.50	3.21	2.89	4.57	82.38
Anthopleura sp.	0.82	2.54	4.33	3.61	85.99
Styelidae sp.	0.84	1.91	1.62	2.72	88.71
Other Bivalvia	0.33	1.76	2.43	2.51	91.22

Group B3b

Average similarity: 60.74

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Cirripedia	78.69	10.18	2.68	16.76	16.76
Perna viridis	361.38	10.09	1.49	16.61	33.37
Didemnidae sp.	8.52	6.55	3.33	10.78	44.16
Ostrea equestris	8.17	6.48	4.67	10.67	54.83
Other crustaceans	2.76	4.87	7.48	8.01	62.84
Annelida	1.04	3.99	5.02	6.56	69.41
Didemnum sp.	2.71	3.15	1.73	5.19	74.60
Other Gastropoda	1.43	3.04	4.76	5.01	79.60
Other Bivalvia	0.68	2.34	1.54	3.86	83.46
Anthopleura sp.	0.66	1.79	1.13	2.95	86.41
Turbellaria	0.03	1.36	4.50	2.23	88.64
Eudendrium cf. carneum	5.41	0.95	0.44	1.56	90.20

Groups B3a & B3b

Average dissimilarity = 46.78

Species	Group B3a Av.Abund	Group B3b Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Crassostrea virginica	83.61	0.00	6.01	3.32	12.85	12.85
Perna viridis	525.80	361.38	4.27	1.24	9.13	21.97
Cirripedia	17.00	78.69	3.31	1.43	7.08	29.05
Conopeum cf. seurati	13.39	0.66	2.52	1.43	5.39	34.44
Didemnum sp.	0.00	2.71	2.16	2.10	4.62	39.06
Haliclona sp.	2.50	0.04	1.91	1.71	4.09	43.15
Eudendrium cf. carneum	2.70	5.41	1.81	1.03	3.87	47.02
Didemnidae sp.	2.24	8.52	1.34	1.38	2.87	49.88
Styelidae sp.	0.84	0.01	1.30	1.70	2.78	52.67
Demospongiae sp. A of EPC	0.91	1.67	1.27	0.95	2.72	55.38
Other Gastropoda	3.90	1.43	1.24	1.54	2.65	58.03
Ostrea equestris	13.34	8.17	1.23	1.55	2.63	60.66
Halichondrina sp. A of EPC	0.00	5.98	1.17	0.59	2.50	63.16
Cliona sp. A of EPC	1.75	0.11	1.09	0.86	2.34	65.49
Hippoporina cf. verrilli	0.20	0.00	1.02	1.32	2.18	67.67
Anthopleura sp.	0.82	0.66	0.96	1.23	2.04	69.71
Other Bivalvia	0.33	0.68	0.89	1.47	1.90	71.62
Pollia tincta	1.59	0.37	0.82	0.59	1.75	73.37
Akatopora cf. leucocypha	0.16	0.00	0.78	1.07	1.67	75.03
Molgula sp.	0.09	0.00	0.76	1.26	1.63	76.66
Eudendrium sp.	0.04	0.25	0.75	1.06	1.60	78.26
Other crustaceans	2.39	2.76	0.69	1.34	1.46	79.73
Membranipora cf. savartii	0.00	0.16	0.66	0.85	1.41	81.14
Echinodermata	0.13	0.06	0.63	0.94	1.34	82.47
Atractylidae sp.	0.01	0.06	0.61	0.99	1.30	83.77
Podocoryne cf. carnea	0.01	0.15	0.61	0.74	1.30	85.07
Schizoporella cf. floridana	0.00	0.33	0.52	0.63	1.12	86.19
Perophora cf. viridis	0.07	0.02	0.49	0.75	1.04	87.23
Turbellaria	0.04	0.03	0.47	1.36	1.01	88.23
Clytia sp. B of Joyce, 1961	0.03	0.00	0.45	0.93	0.95	89.19
Annelida	1.13	1.04	0.43	1.28	0.91	90.10

APPENDIX D: ARTIFICIAL REEF EPIFAUNAL TAXA RAW COUNTS BY REEF/SEASON AND TOTAL COUNTS

PHYLUM	Taxa	Howard Frankland Spring	Howard Frankland Fall	Bahia Beach Spring	Bahia Beach Fall	Egmont Key Spring	Egmont Key Fall	Total Count
PORIFERA	Demospongiae sp. A (of EPC)	X	X	X	X	X	X	Colonial
PORIFERA	Demospongiae sp. B (of EPC)	X						Colonial
PORIFERA	Leucosolenia cf. canariensis						X	Colonial
PORIFERA	Aplysilla sulphurea			X	X		X	Colonial
PORIFERA	Haliclona sp.	X	X	X	X	X	X	Colonial
PORIFERA	Lissodendoryx cf. isodictyalis	X	X	X	X		X	Colonial
PORIFERA	Halichondrina sp. B (of EPC)	X		X				Colonial
PORIFERA	Halichondrina sp. A (of EPC)			X	X	X		Colonial
PORIFERA	Cliona sp. A (of EPC)	X	X	X	X	X	X	Colonial
PORIFERA	Cliona sp. B (of EPC)			X				Colonial
CNIDARIA	Bougainvillia cf. tennella						X	Colonial
CNIDARIA	Turritopsis cf. fascicularis			X		X	X	Colonial
CNIDARIA	Eudendrium carneum	X	X	X	X	X	X	Colonial
CNIDARIA	Podocoryne cf. carnea	X	X	X	X			Colonial
CNIDARIA	Atractylidae sp.	X	X	X	X		X	Colonial
CNIDARIA	Campanularia cf. flexuosa			X	X	X		Colonial
CNIDARIA	Clytia sp. B (Joyce, 1961)		X	X	X	X	X	Colonial
CNIDARIA	Sertularia erasmoi					X	X	Colonial
CNIDARIA	Plumularia cf. margaretta		X					Colonial
CNIDARIA	Plumularia diaphana	X	X	X	X	X	X	Colonial
CNIDARIA	Lovenella gracilis		X		X	X	X	Colonial
CNIDARIA	Ceriantheopsis cf. americanus	1						1
CNIDARIA	Carijoa riisei						X	Colonial
CNIDARIA	Leptogorgia virgulata		X	X	X	X	X	Colonial
CNIDARIA	Anthopleura sp.	2791	2384	876	153	6543	578	13326
CNIDARIA	Cladocora arbuscula			X	X		X	Colonial
PLATYHELMINTHES	Stylochus floridanus	9		2	1	1		13
PLATYHELMINTHES	Eustylochus meridianalis	4	12	32	39	22	21	130
PLATYHELMINTHES	Stylochoplana floridana						2	2

PLATYHELMINTHES	Euplana gracilis	21	2	123		14	15	175

APPENDIX D. Continued.

PHYLUM	Taxa	Howard Frankland Spring	Howard Frankland Fall	Bahia Beach Spring	Bahia Beach Fall	Egmont Key Spring	Egmont Key Fall	Total Count
NEMERTEA	Archinemertea sp. A (of EPC)	2						2
NEMERTEA	Archinemertea sp. B (of EPC)						1	1
NEMERTEA	Tubulanus pellucidus	5	1	21	1	6		34
NEMERTEA	Carinomella cf. lactea					1		1
NEMERTEA	Tarrhomyos cf. luridus					7		7
NEMERTEA	Lineus cf. ruber					2		2
NEMERTEA	Micrura leidyi	1		1		1		3
NEMERTEA	Amphiporus cf. caecus			4		8		12
NEMERTEA	Zygonemertes virescens	29	5	22	17	50	30	153
NEMERTEA	Tetrastemma candidum	46	2	4	5	4	7	68
ANNELIDA	Lepidonotus sublevis			2				2
ANNELIDA	Lepidonotus variabilis	2		7	1		4	14
ANNELIDA	Lepidametria commensalis		1	7	17	4	12	41
ANNELIDA	Malmgreniella maccraryae			5				5
ANNELIDA	Sthenelais sp. A of Wolf, 1984					3		3
ANNELIDA	Bhawania heteroseta	1				2		3
ANNELIDA	Nereiphylla castanea	6	24	2	7	7	19	65
ANNELIDA	Paranaitis gardineri		1					1
ANNELIDA	Eumida cf. sanguinea			1			1	2
ANNELIDA	Phyllodoce arenae	1			1		1	3
ANNELIDA	Pterocirrus macrocerus						2	2
ANNELIDA	Gyptis crypta				1			1
ANNELIDA	Parahesione luteola						3	3
ANNELIDA	Ophiodromus obscura						1	1
ANNELIDA	Podarkeopsis levifuscina	1	1		2	1	1	6
ANNELIDA	Sigambra tentaculata				2			2
ANNELIDA	Autolytus sp.					12		12
ANNELIDA	Procerae sp. A of EPC	2						2
ANNELIDA	Procerae cornuta	361	143	146	48	53	66	817
ANNELIDA	Haplosyllis spongicola				129			129

APPENDIX D. Continued.

PHYLUM	Taxa	Howard Frankland Spring	Howard Frankland Fall	Bahia Beach Spring	Bahia Beach Fall	Egmont Key Spring	Egmont Key Fall	Total Count
ANNELIDA	Trypanosyllis cf. vittigera						1	1
ANNELIDA	Syllis cornuta				3	1	2	6
ANNELIDA	Syllis gracilis	86	482	467	815	753	583	3186
ANNELIDA	Syllis alternata	7	5	29	76	48	162	328
ANNELIDA	Syllis (Typosyllis) sp. B of Uebelacker			1				1
ANNELIDA	Syllis (Typosyllis) corallicola		112	39	373	117	376	1017
ANNELIDA	Syllis (Typosyllis) alosa	1						1
ANNELIDA	Exogone dispar	36	52	64	180	40	295	668
ANNELIDA	Sphaerosyllis aciculata			2		3		5
ANNELIDA	Sphaerosyllis taylori	1		2		1		4
ANNELIDA	Sphaerosyllis longicauda			1				1
ANNELIDA	Grubeosyllis clavata	3	6	3	5	15	10	42
ANNELIDA	Grubeosyllis nitidula	1235	449	91	16	10	8	1809
ANNELIDA	Odontosyllis enopla (Verrill, 1900)			2	1			3
ANNELIDA	Syllides floridanus					1		1
ANNELIDA	Branchiosyllis oculata						4	4
ANNELIDA	Branchiosyllis exilis	1	1		2		4	8
ANNELIDA	Nereis succinea (Frey & Leukert,1847)	168	15	55	36	4	23	301
ANNELIDA	Nereis pelagica			1				1
ANNELIDA	Nereis falsa			1				1
ANNELIDA	Nereis lamellosa			1	9		4	14
ANNELIDA	Nereis riisei			1	1		10	12
ANNELIDA	GONIADIDAE				1			1
ANNELIDA	Kinbergonuphis simoni			1		4		5
ANNELIDA	Eunice weintraubi						1	1
ANNELIDA	Marphysa cf. sanguinea	1	4		7	2		14
ANNELIDA	Lysidice ninetta	1	4	4	1	2	3	15
ANNELIDA	Nematonereis hebes	3	7	4	1		2	17
ANNELIDA	Lumbrineris sp.	1						1
ANNELIDA	Lumbrineris inflata			2	2	61	57	122

APPENDIX D. Continued.

PHYLUM	Taxa	Howard Frankland Spring	Howard Frankland Fall	Bahia Beach Spring	Bahia Beach Fall	Egmont Key Spring	Egmont Key Fall	Total Count
ANNELIDA	Ophryotrocha sp.	32	15	8	21		1	77
ANNELIDA	Naineris bicornis	157	72			3		232
ANNELIDA	Scoloplos texana		1					1
ANNELIDA	Leitoscoloplos foliosus					1		1
ANNELIDA	Aricidea taylori			1	3			4
ANNELIDA	Dipolydora socialis	276	72	719	110	168	238	1585
ANNELIDA	Polydora websteri	1923	119	483	83	669	1621	4898
ANNELIDA	Polydora cf. colonia	1				10	617	628
ANNELIDA	Prionospio multibranchiata	1		6	19		8	34
ANNELIDA	Prionospio heterobranchia		4					4
ANNELIDA	Prionospio steenstrupi		1		1		1	3
ANNELIDA	Prionospio cristata				1	4		5
ANNELIDA	Prionospio perkinsi	3			38	3	9	53
ANNELIDA	Prionospio cirrifera						4	4
ANNELIDA	Spio pettiboneae					1		1
ANNELIDA	Paraprionospio pinnata	2			1			3
ANNELIDA	Carazziella hobsonae					4		4
ANNELIDA	Spiochaetopterus costarum					2	1	3
ANNELIDA	Caulleriella cf. alata					17	2	19
ANNELIDA	Caulleriella cf. zetlandica						45	45
ANNELIDA	Tharyx acutus	5	2	157	195	50	11	421
ANNELIDA	Monticellina dorsobranchialis	36		1				37
ANNELIDA	Chaetozone sp. A of Wolf,1984					1		1
ANNELIDA	Dodecaceria sp. A of Wolf, 1984	35	63	5		68	56	227
ANNELIDA	Cirriformia sp. A of Wolf, 1984			52	141	474	804	1471
ANNELIDA	Piromis roberti			1				1
ANNELIDA	Armandia maculata					1	1	2
ANNELIDA	Capitella capitata complex	3	22	2		10	68	105
ANNELIDA	Capitella jonesi	235	5	34	2	2	2	280
ANNELIDA	Mediomastus californiensis	17	9	7	43	102	221	400

APPENDIX D. Continued.

PHYLUM	Taxa	Howard Frankland Spring	Howard Frankland Fall	Bahia Beach Spring	Bahia Beach Fall	Egmont Key Spring	Egmont Key Fall	Total Count
ANNELIDA	Axiothella mucosa				1	6		7
ANNELIDA	Lumbriclymeniae sp. A of EPC			1		29	154	184
ANNELIDA	Galathowenia oculata	1						1
ANNELIDA	Sabellaria floridensis		2	27	12	11	8	60
ANNELIDA	Sabellaria sp. A of Uebelacker, 1984	47	1	63	9	32	7	159
ANNELIDA	Pectinaria gouldii		4			1		5
ANNELIDA	Eupolymnia nebulosa		1				3	4
ANNELIDA	Neoamphitrite sp. A of Kritzler, 1984	27						27
ANNELIDA	Pista sp.					1		1
ANNELIDA	Polycirrus eximius dubius			2				2
ANNELIDA	Polycirrus cf. hematodes	1		4	2		1	8
ANNELIDA	Polycirrus plumosa					3	4	7
ANNELIDA	Polycirrus sp. B of Kritzler, 1984			1				1
ANNELIDA	Lysilla cf. alba			1	3	1		5
ANNELIDA	Lysilla sp. A of Kritzler,1984		2			2		4
ANNELIDA	Loimia medusa			1			1	2
ANNELIDA	Terebella nr. rubra		2	75	64	101	154	397
ANNELIDA	Streblosoma hartmanae	4	50	14	21	4	24	117
ANNELIDA	Chone cf. americana				1	1		2
ANNELIDA	Branchiomma sp.		2			2	53	57
ANNELIDA	Megalomma pigmentum				2		7	9
ANNELIDA	Megalomma sp. B of Uebelacker, 1984				15	58	32	105
ANNELIDA	Pseudopotamilla cf. reniformis			2	57	5	19	83
ANNELIDA	Bispira melanostigma				1	47	75	123
ANNELIDA	Fabricinuda trilobata			1		21		22
ANNELIDA	Demonax micropthalma	10	23	2			15	50
ANNELIDA	Hydroides dianthus	8	61	6	19	4	10	108
ANNELIDA	Hydroides sanctaecrucis	2						2
ANNELIDA	Hydroides cf. parva						1	1
ANNELIDA	Pileolaria cf. quasimilitaris						1	1

APPENDIX D. Continued.

PHYLUM	Taxa	Howard Frankland Spring	Howard Frankland Fall	Bahia Beach Spring	Bahia Beach Fall	Egmont Key Spring	Egmont Key Fall	Total Count
ANNELIDA	Boguea enigmatica			1				1
ANNELIDA	TUBIFICINAE (not T. wasselli)	45	2	2	3	8		60
ANNELIDA	Tubificoides wasselli	2		1				3
MOLLUSCA	Diodora cf. cayenensis						1	1
MOLLUSCA	Parviturboides interruptus					60	20	80
MOLLUSCA	Caecum pulchellum		3	1			1	5
MOLLUSCA	Bittiolum varium	3	9			1	7	20
MOLLUSCA	Cerithiopsis sp.	1					7	8
MOLLUSCA	Joculator fusiformis		7			3		10
MOLLUSCA	Seila adamsii		5		3	1	2	11
MOLLUSCA	Cerithium atratum						1	1
MOLLUSCA	Cerithium muscarum						2	2
MOLLUSCA	Finella cf. dubia						4	4
MOLLUSCA	Marshallora nigrocincta				1		7	8
MOLLUSCA	Epitonium candeanum					9	6	15
MOLLUSCA	Epitonium matthewsae					1		1
MOLLUSCA	Epitonium albidum		1					1
MOLLUSCA	Melanella sp. B of EPC						1	1
MOLLUSCA	Crepidula fornicata			3		4		7
MOLLUSCA	Crepidula aculeata		1	17	14	17	35	84
MOLLUSCA	Crepidula maculosa	2		5		3		10
MOLLUSCA	Crepidula depressa	1226	342	1142	89	19	17	2835
MOLLUSCA	Erato maugeriae					1	1	2
MOLLUSCA	Tectonatica pusilla			1			1	2
MOLLUSCA	Murchisonella tampaensis						2	2
MOLLUSCA	Urosalpinx tampaensis					2		2
MOLLUSCA	Stramonita haemastoma floridana	1						1
MOLLUSCA	Astyris lunata	643	246	362	110	16	81	1458
MOLLUSCA	Parvanachis obesa	23	8	31	93	19	3	177
MOLLUSCA	Suturoglypta iontha				1	2	5	8

APPENDIX D. Continued.

PHYLUM	Taxa	Howard Frankland Spring	Howard Frankland Fall	Bahia Beach Spring	Bahia Beach Fall	Egmont Key Spring	Egmont Key Fall	Total Count
MOLLUSCA	Pollia tincta	3	5	47	1	54	32	142
MOLLUSCA	Jaspidella blanesi					1	1	2
MOLLUSCA	Gibberula lavalleenana					54	171	225
MOLLUSCA	Pyrgocythara plicosa		1					1
MOLLUSCA	Granoturris presleyi					1	3	4
MOLLUSCA	Boonea seminuda			6		4	1	11
MOLLUSCA	Sayella laevigata				1			1
MOLLUSCA	Turbonilla cf. dalli	1				1		2
MOLLUSCA	Turbonilla hemphilli				3	35	61	99
MOLLUSCA	Turbonilla cf. constricta			1				1
MOLLUSCA	Turbonilla textilis				3			3
MOLLUSCA	Turbonilla sp. K of EPC					1		1
MOLLUSCA	Boonea impressa	58	170	33	4			265
MOLLUSCA	Rictaxis punctostriatus					2		2
MOLLUSCA	Acteocina canaliculata	1	1					2
MOLLUSCA	Aglajidae sp.					2	2	4
MOLLUSCA	Bulla striata					59	1	60
MOLLUSCA	Haminoea succinea						1	1
MOLLUSCA	Aeolidoidea sp. A of EPC			4		1		5
MOLLUSCA	Doridiidae sp. A of EPC					1		1
MOLLUSCA	Polycera cf. rycia			2		6		8
MOLLUSCA	Polycera sp. A of EPC					2		2
MOLLUSCA	Okenia cf. impexa	7		4		1		12
MOLLUSCA	Corambe obscura	58		1				59
MOLLUSCA	Doto sp.	155		15		8		178
MOLLUSCA	Eubranchus cf. coniclus	19		10		22		51
MOLLUSCA	Cratena cf. pilata		1			29		30
MOLLUSCA	Aeolidina sp.			1				1
MOLLUSCA	Nucula proxima	8	2	2		1	1	14
MOLLUSCA	Anadara transversa	8	1	91	2	23	1	126

APPENDIX D. Continued.

PHYLUM	Taxa	Howard Frankland Spring	Howard Frankland Fall	Bahia Beach Spring	Bahia Beach Fall	Egmont Key Spring	Egmont Key Fall	Total Count
MOLLUSCA	Musculus lateralis	28	4	951	15	205	8	1211
MOLLUSCA	Brachidontes exustus	11	20	10	3	1		45
MOLLUSCA	Amygdalum papyrium	3						3
MOLLUSCA	Lithophaga bisulcata			3	9	86	58	156
MOLLUSCA	Perna virdis	115	55	12060	75	52	32	12390
MOLLUSCA	Pinctada imbricata						7	7
MOLLUSCA	Anomia simplex			2				2
MOLLUSCA	Ostrea equestris	96	1101	5556	328	733	282	8096
MOLLUSCA	Parvilucina crenella					13		13
MOLLUSCA	Ctena orbiculata					1		1
MOLLUSCA	Crassostrea virginica	359	190					549
MOLLUSCA	Phlyctiderma semiaspera	1		11		11		23
MOLLUSCA	Mysella planulata	13	1	5				19
MOLLUSCA	Crassinella lunulata			1		1		2
MOLLUSCA	Laevicardium mortoni		2					2
MOLLUSCA	Dinocardium robustum					1		1
MOLLUSCA	Mulinia lateralis	2						2
MOLLUSCA	Macoma tenta			3		3		6
MOLLUSCA	Macoma constricta					5		5
MOLLUSCA	Angulus cf. versicolor			1	1	45		47
MOLLUSCA	Angulus tampaensis					3		3
MOLLUSCA	Tagelus plebeius	1						1
MOLLUSCA	Tagelus divisus			5				5
MOLLUSCA	Semele purpurascens				3			3
MOLLUSCA	Abra aequalis	3		7	1	18	1	30
MOLLUSCA	Cumingia vanhyningi			11				11
MOLLUSCA	Semele sp.						3	3
MOLLUSCA	Transennella sp.					7		7
MOLLUSCA	Timoclea grus			14	3	98	10	125
MOLLUSCA	Choristodon robustus						4	4

APPENDIX D. Continued.

PHYLUM	Taxa	Howard Frankland Spring	Howard Frankland Fall	Bahia Beach Spring	Bahia Beach Fall	Egmont Key Spring	Egmont Key Fall	Total Count
MOLLUSCA	Chama congregata					1	1	2
MOLLUSCA	Chama sinuosa					1		1
MOLLUSCA	Chama radians					3	3	6
MOLLUSCA	Sphenia fragilis	19	8	173	59	3	4	266
MOLLUSCA	Caryocorbula contracta			1				1
MOLLUSCA	Lamychaena hians					5	5	10
MOLLUSCA	Asthenothaerus sp. A					1		1
ARTHROPODA	Achelia cf. sawayai			3		9	4	16
ARTHROPODA	Anoplodactylus sp.						3	3
ARTHROPODA	Balanus spp. (juveniles and damaged)	68	1434	1863	4421	233	1582	9601
ARTHROPODA	Balanus cf. amphitrite	22	98	10	213	33	4	381
ARTHROPODA	Balanus eburneus	9	215	47	146	9		427
ARTHROPODA	Balanus improvisus	41	54	17	25	1		138
ARTHROPODA	Balanus trigonus		2	7	291	447	780	1527
ARTHROPODA	Balanus venustus		8	18	74	71	34	205
ARTHROPODA	Balanus reticulatus	13	945	153	506	234	41	1892
ARTHROPODA	Conopea galeata						1	1
ARTHROPODA	Mysidopsis furca	2		4			3	9
ARTHROPODA	Mysidopsis mortenseni complex	2	1					3
ARTHROPODA	Americamysis stucki	37				1	22	60
ARTHROPODA	Oxyurostylis smithi					6	8	14
ARTHROPODA	Cyclaspis pustulata					2		2
ARTHROPODA	Cyclaspis cf. varians	39				1	24	64
ARTHROPODA	Apseudes intermedius bermudeus complex				1			1
ARTHROPODA	Leptochelia dubia complex		3	2319	293	2101	1474	6191
ARTHROPODA	Paracerceis caudata	1			1	2	11	15
ARTHROPODA	Erichsonella attenuata	2						2
ARTHROPODA	Carpias sp.					246	4	250
ARTHROPODA	Uromunna hayesi			1		12		13
ARTHROPODA	Ampelisca abdita					1		1

APPENDIX D. Continued.

PHYLUM	Taxa	Howard Frankland Spring	Howard Frankland Fall	Bahia Beach Spring	Bahia Beach Fall	Egmont Key Spring	Egmont Key Fall	Total Count
ARTHROPODA	Ampelisca vadorum	2						2
ARTHROPODA	Ampelisca holmesi	1				1		2
ARTHROPODA	Ampelisca shellenbergi					23	23	46
ARTHROPODA	Ampelisca sp. C (of LeCroy,2002)	2				1		3
ARTHROPODA	Ampelisca sp. A (of LeCroy,2002)					1		1
ARTHROPODA	Hourstonius laguna	329	39	3		6	1	378
ARTHROPODA	Ampithoe cf. ramondi					14	168	182
ARTHROPODA	Cymadusa compta	2						2
ARTHROPODA	Lembos cf. hypacanthus			346	5	12	2	365
ARTHROPODA	Globosolembos smithi				5			5
ARTHROPODA	Bemlos mackinneyi					6		6
ARTHROPODA	Paramicrodeutopus cf. myersi					1		1
ARTHROPODA	Rudilemboides naglei	17	1		1	10		29
ARTHROPODA	Nototropis minikoi					1		1
ARTHROPODA	Colomastix sp.		1	5	1		5	12
ARTHROPODA	Cerapus sp. C of LeCroy, 2007	671	17	291	1	1		982
ARTHROPODA	Monocorophium acherusicum	220	101	613	15	5	4	959
ARTHROPODA	Apocorophium cf. acutum		4					4
ARTHROPODA	Laticorophium cf. baconi	1		105	6	114	148	375
ARTHROPODA	Monocorophium sp. A (of LeCroy)		3					3
ARTHROPODA	Erichthonius brasiliensis	3994	76	2684	254	600	1223	8832
ARTHROPODA	Grandidierella bonnieroides	20	21		2			43
ARTHROPODA	Elasmopus cf. rapax			335	12	601	126	1074
ARTHROPODA	Elasmopus pectenicrus			5	1	302	51	360
ARTHROPODA	Elasmopus sp. A (of EPC)			928	206	296	47	1478
ARTHROPODA	Maera sp. n		38					38
ARTHROPODA	Dulichiella appendiculata	94	1	7		6		108
ARTHROPODA	Melita elongata	37						37
ARTHROPODA	Dulichiella sp. A (LeCroy,2000)	51		7	14	128	21	221
ARTHROPODA	Photis cf. longicaudata			2		255	561	818

APPENDIX D. Continued.

PHYLUM	Taxa	Howard Frankland Spring	Howard Frankland Fall	Bahia Beach Spring	Bahia Beach Fall	Egmont Key Spring	Egmont Key Fall	Total Count
ARTHROPODA	Photis sp. C (LeCroy,2000)					1		1
ARTHROPODA	Photis pugnator			26				26
ARTHROPODA	Photis sp. F (LeCroy,2000)			21	1	87	280	390
ARTHROPODA	Photis sp. A (LeCroy,2000)			9				9
ARTHROPODA	Leucothoe spinicarpa	1	3	464	33	83	349	932
ARTHROPODA	Listriella barnardi			1	1		2	4
ARTHROPODA	Shoemakerella cubensis						4	4
ARTHROPODA	Gibberosus cf. myersi						3	3
ARTHROPODA	Hartmanodes nyei	22	1					23
ARTHROPODA	Americhelidium americanum					1		1
ARTHROPODA	Eobrolgus spinosus	2						2
ARTHROPODA	Podocerus brasiliensis	1	66	2234	8	182	43	2534
ARTHROPODA	Parametopella sp. A (of EPC)	2						2
ARTHROPODA	Stenothoe cf. georgiana	3407	314	5781	99	1297	14	10912
ARTHROPODA	Deutella incerta		34	639	2	357	90	1122
ARTHROPODA	Caprella penantis	2		235		412		649
ARTHROPODA	Caprella scaura					1		1
ARTHROPODA	Paracaprella tenuis	103	16	23				142
ARTHROPODA	Paracaprella pusilla	582	218	3100	48	91	206	4246
ARTHROPODA	Lucifer faxoni	1		2	4		30	37
ARTHROPODA	Sicyonia sp.					1		1
ARTHROPODA	Periclimenes americanus	4						4
ARTHROPODA	Periclimenes longicaudatus	12	9	2	4		1	28
ARTHROPODA	Alpheus sp. A (of EPC)		1		3			4
ARTHROPODA	Alpheus sp. B (of EPC)	2	3		2	4	14	25
ARTHROPODA	Synalpheus sp.		2					2
ARTHROPODA	Lysmata cf. wurdemanni				1			1
ARTHROPODA	Thor manningi	1	4		8			13
ARTHROPODA	Thor floridanus				1			1
ARTHROPODA	Paguristes sp.			2			4	6

APPENDIX D. Continued.

PHYLUM	Taxa	Howard Frankland Spring	Howard Frankland Fall	Bahia Beach Spring	Bahia Beach Fall	Egmont Key Spring	Egmont Key Fall	Total Count
ARTHROPODA	Pagurus caroliniensis					2	13	15
ARTHROPODA	Pagurus maclaughlinae	1	1				8	10
ARTHROPODA	Petrolisthes armatus	27	81	8	166		7	289
ARTHROPODA	Euceramus praelongus						1	1
ARTHROPODA	Megalobrachium soriatum						1	1
ARTHROPODA	Pelia mutica		6	1	15	2	18	42
ARTHROPODA	Mithraculus forceps						1	1
ARTHROPODA	Heterocrypta granulata						1	1
ARTHROPODA	XANTHOIDEA (juveniles and damaged)	53	214	13	128	36	161	606
ARTHROPODA	Eurypanopeus depressus	22	5	6	2			35
ARTHROPODA	Panopeus occidentalis	9	2	10		4	12	37
ARTHROPODA	Rhithropanopeus harrisii	151		34		6		191
ARTHROPODA	Menippe mercenaria	1		3	1			5
ARTHROPODA	Pilumnus floridanus			1				1
ARTHROPODA	Pilumnus sayi			1			4	5
ARTHROPODA	Pilumnus dasypodus			12	7	52	57	128
ARTHROPODA	Tumidotheres maculatus				5			5
ARTHROPODA	Pinnixa sp.						2	2
ARTHROPODA	Zaops ostreum						1	1
SIPUNCULA	Themiste alutacea			3	31	34	26	94
SIPUNCULA	Aspidosiphon muelleri						1	1
ECHIURA	Thalassema cf. philostracum					10	5	15
BRYOZOA	Ctenostomata sp.			X	X			Colonial
BRYOZOA	Alcyonidium sp.	X		X		X		Colonial
BRYOZOA	Sundanella cf. sibogae	X		X				Colonial
BRYOZOA	Amathia vidovici			X				Colonial
BRYOZOA	Bowerbankia cf. gracilis		X					Colonial
BRYOZOA	Aeverrillia cf. armata		X	X	X			Colonial
BRYOZOA	Membranipora cf. arborescens	X	X	X			X	Colonial
BRYOZOA	Biflustra denticulata			X	X	X	X	Colonial

APPENDIX D. Continued.

PHYLUM	Taxa	Howard Frankland Spring	Howard Frankland Fall	Bahia Beach Spring	Bahia Beach Fall	Egmont Key Spring	Egmont Key Fall	Total Count
BRYOZOA	Conopeum cf. reticulum	X						Colonial
BRYOZOA	Conopeum cf. seurati	X	X	X				Colonial
BRYOZOA	Akatopora cf. leucocypha	X	X		X			Colonial
BRYOZOA	Bugula neritina			X		X	X	Colonial
BRYOZOA	Bugula stolonifera			X		X		Colonial
BRYOZOA	Schizoporella pungens			X	X			Colonial
BRYOZOA	Hippoporina cf. verrilli	X	X					Colonial
BRACHIOPODA	Glottidia pyramidata						1	1
ECHINODERMATA	Hemipholis elongata			7				7
ECHINODERMATA	Ophiactis savignyi		1	6	68	7	11	93
ECHINODERMATA	Amphipholis gracillima					1		1
ECHINODERMATA	Ophiothrix angulata						6	6
ECHINODERMATA	Thyonella gemmata					1	1	2
CHAETOGNATHA	Chaetognatha sp.	6	1	20	1	30	42	100
CHORDATA	Clavelina cf. oblonga			X	X	X	X	Colonial
CHORDATA	Eudistoma cf. olivaceum				X	X	X	Colonial
CHORDATA	Eudistoma capsulatum					X		Colonial
CHORDATA	Eudistoma tarponense					X	X	Colonial
CHORDATA	Amaroucium constellatum					X	X	Colonial
CHORDATA	Amaroucium cf. stellatum					X	X	Colonial
CHORDATA	Didemnidae sp A	X	X	X	X	X	X	Colonial
CHORDATA	Didemnum sp.		X	X	X	X	X	Colonial
CHORDATA	Perophora cf. viridis	X	X	X	X	X	X	Colonial
CHORDATA	Styela plicata	71	89	11	16			187
CHORDATA	Polyandrocarpa cf. tincta				X	X	X	Colonial
CHORDATA	Molgula occidentalis	132	16	2		4	14	168

APPENDIX E: ABUNDANCE SIMILARITY PERCENTAGE (SIMPER) ANALYSIS BY REEF AND SEASON

SIMPER

Similarity Percentages - species contributions

One-Way Analysis

Data worksheet
Name: Data7
Data type: Abundance
Sample selection: All
Variable selection: All

Parameters
Resemblance: S17 Bray Curtis similarity
Cut off for low contributions: 50.00%

Group HFR Spring
Average similarity: 57.54

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Polydora websteri	82.23	5.23	3.40	9.08	9.08
Anthopleura sp.	91.64	5.16	3.24	8.96	18.04
Grubeosyllis nitidula	67.34	4.64	3.88	8.06	26.10
Crepidula depressa	66.36	4.39	2.59	7.63	33.73
Erichthonius brasiliensis	90.43	3.16	1.73	5.49	39.23
Stenothoe cf. georgiana	84.40	2.99	1.82	5.20	44.43
Astyris lunata	45.48	2.65	3.49	4.60	49.02
Crassostrea virginica	36.32	2.48	3.65	4.31	53.33

Group HFR Fall
Average similarity: 45.96

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Ostrea equestris	61.42	5.57	2.99	12.13	12.13
Anthopleura sp.	79.37	5.23	2.34	11.39	23.52
Balanus spp. (juveniles and damaged)	59.12	3.14	1.23	6.82	30.34
Grubeosyllis nitidula	36.83	2.97	3.88	6.45	36.79
Crepidula depressa	32.58	2.55	1.99	5.56	42.35
Crassostrea virginica	25.35	2.20	3.52	4.80	47.14
XANTHOIDEA (juveniles and damaged)	25.09	1.63	1.23	3.55	50.69

Groups HFR Spring & HFR Fall
Average dissimilarity = 62.85

Species	Group HFR Spring Av.Abund	Group HFR Fall Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Erichthonius brasiliensis	90.43	9.06	3.45	1.24	5.50	5.50
Polydora websteri	82.23	16.23	3.16	2.11	5.03	10.53
Stenothoe cf. georgiana	84.40	22.70	2.89	1.18	4.59	15.12
Anthopleura sp.	91.64	79.37	2.60	1.43	4.13	19.25
Balanus spp. (juveniles and damaged)	11.86	59.12	2.29	1.21	3.65	22.90
Ostrea equestris	18.39	61.42	2.06	1.78	3.28	26.18
Crepidula depressa	66.36	32.58	1.83	1.35	2.90	29.08
Balanus reticulatus	2.79	41.89	1.81	0.93	2.88	31.96
Grubeosyllis nitidula	67.34	36.83	1.74	1.62	2.76	34.72
Astyris lunata	45.48	20.73	1.54	1.68	2.46	37.18
Paracaprella pusilla	31.62	14.59	1.43	1.13	2.28	39.46
Capitella jonesi	28.22	1.40	1.33	1.88	2.11	41.57
Hourstonius laguna	33.02	8.45	1.28	1.60	2.04	43.61
Syllis gracilis	11.04	28.94	1.22	0.86	1.95	45.56
Cerapus sp. C of LeCroy, 2007	27.39	4.31	1.04	0.71	1.65	47.21
Procerae cornuta	28.29	17.89	1.01	1.34	1.60	48.81
Rhithropanopeus harrisii	19.48	0.00	0.94	1.23	1.50	50.31

Group BBR Spring
Average similarity: 47.97

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Ostrea equestris	126.85	4.71	3.46	9.82	9.82
Perna virdis	156.13	3.70	1.82	7.72	17.54
Leptochelia dubia complex	82.85	2.86	1.54	5.96	23.49
Podocerus brasiliensis	77.38	2.56	2.66	5.35	28.84
Stenothoe cf. georgiana	109.11	2.39	1.23	4.99	33.82
Dipolydora socialis	48.02	2.02	2.72	4.22	38.04
Syllis gracilis	40.76	1.99	2.39	4.16	42.20
Crepidula depressa	56.71	1.94	2.32	4.05	46.25
Balanus spp. (juveniles and damaged)	63.80	1.78	1.17	3.70	49.95
Polydora websteri	38.71	1.50	2.00	3.12	53.07

Group BBR Fall
Average similarity: 43.53

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Balanus spp. (juveniles and damaged)	99.79	5.01	1.22	11.52	11.52
Syllis gracilis	51.98	4.43	2.33	10.19	21.70
Ostrea equestris	31.04	2.22	1.64	5.11	26.81
Balanus reticulatus	36.86	2.19	1.13	5.03	31.84
Leptochelia dubia complex	29.12	2.08	2.26	4.78	36.62
Syllis (Typosyllis) corallicola	30.55	2.06	1.64	4.74	41.36
Balanus trigonus	28.27	1.84	1.40	4.23	45.59
Exogone dispar	22.37	1.55	1.02	3.57	49.15
XANTHOIDEA (juveniles and damaged)	20.09	1.50	2.62	3.44	52.59

Groups BBR Spring & BBR Fall
Average dissimilarity = 68.92

	Group BBR Spring	Group BBR Fall				
Species	Av.Abund	Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Perna virdis	156.13	12.46	4.56	1.16	6.62	6.62
Stenothoe cf. georgiana	109.11	7.63	3.29	1.36	4.78	11.40
Ostrea equestris	126.85	31.04	3.29	1.70	4.77	16.17
Balanus spp. (juveniles and damaged)	63.80	99.79	3.09	1.11	4.48	20.65
Podocerus brasiliensis	77.38	1.77	2.63	2.10	3.82	24.47
Paracaprella pusilla	75.58	7.94	2.31	0.96	3.35	27.82
Leptochelia dubia complex	82.85	29.12	2.25	1.39	3.26	31.08
Erichthonius brasiliensis	65.97	13.25	1.98	1.05	2.87	33.95
Crepidula depressa	56.71	13.47	1.58	1.56	2.30	36.25
Anthopleura sp.	47.23	17.23	1.40	1.34	2.03	38.27
Musculus lateralis	47.72	6.14	1.40	1.56	2.03	40.30
Monocorophium acherusicum	39.90	3.78	1.32	1.63	1.91	42.21
Elasmopus cf. rapax	25.00	2.17	1.30	0.79	1.88	44.09
Elasmopus sp. A (of EPC)	39.54	17.81	1.29	1.25	1.87	45.96
Deutella incerta	36.04	0.88	1.19	1.22	1.73	47.68
Dipolydora socialis	48.02	17.58	1.18	1.62	1.72	49.40
Syllis (Typosyllis) corallicola	6.11	30.55	1.13	1.16	1.63	51.03

Group EKR Spring
Average similarity: 52.73

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Anthopleura sp.	138.43	5.94	1.38	11.26	11.26
Leptochelia dubia complex	84.28	4.22	2.57	8.00	19.25
Stenothoe cf. georgiana	66.87	3.47	2.47	6.58	25.83
Erichthonius brasiliensis	45.97	2.41	3.78	4.57	30.40
Ostrea equestris	48.89	2.34	2.12	4.43	34.83
Elasmopus cf. rapax	44.98	2.24	2.36	4.25	39.09
Syllis gracilis	48.39	2.21	2.07	4.18	43.27
Polydora websteri	44.56	2.04	2.41	3.88	47.14
Balanus trigonus	38.24	1.85	1.99	3.52	50.66

Group EKR Fall
Average similarity: 54.19

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Leptochelia dubia complex	72.26	3.95	3.08	7.29	7.29
Polydora websteri	71.55	3.52	3.23	6.50	13.79
Balanus spp. (juveniles and damaged)	70.00	3.32	2.99	6.13	19.93
Erichthonius brasiliensis	57.57	2.59	2.15	4.78	24.71
Cirriformia sp. A of Wolf, 1984	51.09	2.54	2.21	4.69	29.40
Syllis gracilis	43.79	2.21	3.17	4.08	33.48
Balanus trigonus	48.00	2.13	2.28	3.93	37.42
Dipolydora socialis	29.56	1.77	3.58	3.26	40.68
Anthopleura sp.	39.78	1.72	1.61	3.18	43.86
Syllis (Typosyllis) corallicola	33.62	1.68	3.44	3.10	46.96
Exogone dispar	31.31	1.63	2.64	3.01	49.97
Ostrea equestris	30.93	1.63	3.38	3.00	52.98

Groups EKR Spring & EKR Fall
Average dissimilarity = 55.72

Species	Group EKR Spring Av.Abund	Group EKR Fall Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Anthopleura sp.	138.43	39.78	3.71	1.56	6.67	6.67
Stenothoe cf. georgiana	66.87	5.66	2.11	2.41	3.79	10.46
Balanus spp. (juveniles and damaged)	23.81	70.00	1.66	1.37	2.97	13.43
Polydora websteri	44.56	71.55	1.30	1.23	2.33	15.76
Leptochelia dubia complex	84.28	72.26	1.24	1.31	2.23	17.99
Polydora cf. colonia	2.50	36.45	1.15	1.13	2.07	20.06
Cirriformia sp. A of Wolf, 1984	35.34	51.09	1.05	1.54	1.88	21.94
Elasmopus cf. rapax	44.98	18.26	1.02	1.52	1.82	23.77
Erichthonius brasiliensis	45.97	57.57	0.98	0.92	1.75	25.52
Photis cf. longicaudata	27.08	34.03	0.92	1.10	1.65	27.17
Balanus trigonus	38.24	48.00	0.90	1.34	1.61	28.78
Syllis (Typosyllis) corallicola	13.02	33.62	0.89	1.45	1.60	30.38
Syllis gracilis	48.39	43.79	0.87	1.30	1.55	31.94
Ostrea equestris	48.89	30.93	0.87	1.40	1.55	33.49
Exogone dispar	7.43	31.31	0.86	1.75	1.55	35.04
Deutella incerta	34.16	13.19	0.85	1.43	1.53	36.57
Caprella penantis	23.11	0.00	0.82	0.71	1.48	38.05
Carpias sp.	26.00	2.13	0.82	1.40	1.47	39.52
Elasmopus sp. A (of EPC)	25.91	10.23	0.78	1.20	1.39	40.91
Musculus lateralis	26.44	3.84	0.77	2.14	1.38	42.30
Leucothoe spinicarpa	15.48	32.85	0.74	1.62	1.32	43.62
Elasmopus pectenicrus	17.26	9.34	0.72	0.81	1.29	44.90
Paracaprella pusilla	10.41	23.05	0.71	1.20	1.28	46.18
Balanus reticulatus	23.31	8.77	0.68	1.30	1.21	47.39
Gibberula lavalleenana	7.57	21.76	0.66	1.47	1.19	48.58
Mediomastus californiensis	13.93	26.20	0.66	1.54	1.19	49.77
Ampithoe cf. ramondi	3.42	19.79	0.62	1.25	1.12	50.89

Groups BBR Spring & HFR Spring
Average dissimilarity = 67.51

Species	Group BBR Spring Av.Abund	Group HFR Spring Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Perna virdis	156.13	19.09	3.79	1.04	5.61	5.61
Ostrea equestris	126.85	18.39	3.32	2.07	4.92	10.53
Stenothoe cf. georgiana	109.11	84.40	2.87	1.36	4.25	14.78
Erichthonius brasiliensis	65.97	90.43	2.71	1.26	4.01	18.79
Leptochelia dubia complex	82.85	0.00	2.67	1.73	3.95	22.75
Podocerus brasiliensis	77.38	0.63	2.35	2.08	3.47	26.22
Paracaprella pusilla	75.58	31.62	2.02	1.00	3.00	29.22
Anthopleura sp.	47.23	91.64	1.86	1.28	2.76	31.97
Grubeosyllis nitidula	16.20	67.34	1.80	2.20	2.67	34.64
Balanus spp. (juveniles and damaged)	63.80	11.86	1.76	1.13	2.60	37.24
Polydora websteri	38.71	82.23	1.62	1.52	2.40	39.64
Crassostrea virginica	0.00	36.32	1.27	2.77	1.88	41.52
Crepidula depressa	56.71	66.36	1.24	1.30	1.84	43.36
Musculus lateralis	47.72	9.14	1.17	1.46	1.73	45.09
Syllis gracilis	40.76	11.04	1.16	1.45	1.72	46.81
Leucothoe spinicarpa	33.69	0.63	1.14	1.10	1.69	48.50
Elasmopus cf. rapax	25.00	0.00	1.11	0.81	1.64	50.14

Groups EKR Spring & HFR Spring
Average dissimilarity = 72.79

Species	Group EKR Spring Av.Abund	Group HFR Spring Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Anthopleura sp.	138.43	91.64	3.17	1.47	4.35	4.35
Leptochelia dubia complex	84.28	0.00	3.09	2.42	4.24	8.59
Grubeosyllis nitidula	5.00	67.34	2.25	4.13	3.10	11.68
Crepidula depressa	7.43	66.36	2.15	2.74	2.96	14.64
Stenothoe cf. georgiana	66.87	84.40	1.92	1.27	2.64	17.28
Erichthonius brasiliensis	45.97	90.43	1.92	0.96	2.63	19.92
Elasmopus cf. rapax	44.98	0.00	1.65	2.40	2.27	22.18
Polydora websteri	44.56	82.23	1.55	1.87	2.13	24.31
Syllis gracilis	48.39	11.04	1.46	1.55	2.01	26.32
Astyris lunata	5.15	45.48	1.41	2.34	1.93	28.25
Balanus trigonus	38.24	0.00	1.40	2.25	1.92	30.17
Cirriformia sp. A of Wolf, 1984	35.34	0.00	1.32	1.33	1.82	31.99
Crassostrea virginica	0.00	36.32	1.32	4.22	1.81	33.80
Deutella incerta	34.16	0.00	1.26	2.11	1.73	35.53
Ostrea equestris	48.89	18.39	1.16	1.50	1.60	37.13

Hourstonius laguna	2.96	33.02	1.09	2.25	1.50	38.63
Paracaprella pusilla	10.41	31.62	1.00	1.12	1.37	40.00
Photis cf. longicaudata	27.08	0.00	1.00	1.56	1.37	41.37
Capitella jonesi	1.25	28.22	0.99	2.17	1.36	42.73
Carpias sp.	26.00	0.00	0.96	1.50	1.31	44.04
Elasmopus sp. A (of EPC)	25.91	0.00	0.95	1.12	1.30	45.34
Caprella penantis	23.11	0.88	0.87	0.70	1.20	46.54
Cerapus sp. C of LeCroy, 2007	0.63	27.39	0.81	0.66	1.11	47.65
Balanus reticulatus	23.31	2.79	0.80	1.21	1.11	48.75
Nereis succinea (Frey & Leukert,1847)	2.13	24.11	0.79	2.44	1.09	49.84
Monocorophium acherusicum	2.33	24.51	0.75	1.56	1.03	50.87

Groups BBR Spring & EKR Spring
Average dissimilarity = 62.37

	Group BBR Spring	Group EKR Spring				
Species	Av.Abund	Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Perna virdis	156.13	9.56	3.84	1.14	6.15	6.15
Anthopleura sp.	47.23	138.43	3.43	1.38	5.50	11.65
Stenothoe cf. georgiana	109.11	66.87	2.38	1.67	3.81	15.46
Ostrea equestris	126.85	48.89	2.19	1.36	3.51	18.97
Paracaprella pusilla	75.58	10.41	1.89	0.95	3.04	22.01
Erichthonius brasiliensis	65.97	45.97	1.71	1.53	2.73	24.74
Podocerus brasiliensis	77.38	20.52	1.64	1.47	2.63	27.37
Leptochelia dubia complex	82.85	84.28	1.57	1.26	2.52	29.89
Balanus spp. (juveniles and damaged)	63.80	23.81	1.45	1.09	2.33	32.22
Crepidula depressa	56.71	7.43	1.38	1.74	2.21	34.43
Balanus trigonus	2.76	38.24	1.14	1.88	1.83	36.27
Elasmopus sp. A (of EPC)	39.54	25.91	1.09	1.36	1.75	38.02
Monocorophium acherusicum	39.90	2.33	1.09	1.77	1.75	39.77
Elasmopus cf. rapax	25.00	44.98	0.98	1.62	1.56	41.34
Caprella penantis	16.78	23.11	0.90	0.80	1.44	42.78
Lembos cf. hypacanthus	30.84	3.38	0.88	1.32	1.41	44.19
Cirriformia sp. A of Wolf, 1984	11.83	35.34	0.85	0.98	1.37	45.55
Musculus lateralis	47.72	26.44	0.85	1.22	1.37	46.92
Deutella incerta	36.04	34.16	0.85	1.22	1.37	48.29
Photis cf. longicaudata	1.25	27.08	0.84	1.47	1.34	49.63
Carpias sp.	0.00	26.00	0.83	1.43	1.34	50.97

Groups BBR Fall & HFR Fall
Average dissimilarity = 67.50

	Group BBR Fall	Group HFR Fall				
Species	Av.Abund	Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Balanus spp. (juveniles and damaged)	99.79	59.12	4.53	1.18	6.71	6.71

Anthopleura sp.	17.23	79.37	3.48	1.32	5.16	11.87
Balanus reticulatus	36.86	41.89	2.42	1.32	3.59	15.46
Syllis gracilis	51.98	28.94	2.28	1.43	3.38	18.84
Ostrea equestris	31.04	61.42	2.03	1.42	3.01	21.85
Grubeosyllis nitidula	5.55	36.83	1.80	1.68	2.66	24.51
Balanus trigonus	28.27	0.88	1.64	1.27	2.42	26.94
Leptochelia dubia complex	29.12	1.51	1.55	1.74	2.29	29.23
Crassostrea virginica	0.00	25.35	1.45	2.98	2.14	31.37
Crepidula depressa	13.47	32.58	1.40	1.36	2.08	33.45
Syllis (Typosyllis) corallicola	30.55	14.35	1.37	1.13	2.04	35.48
Stenothoe cf. georgiana	7.63	22.70	1.23	1.03	1.82	37.30
Astyris lunata	15.05	20.73	1.19	1.17	1.77	39.07
Balanus cf. amphitrite	21.03	10.86	1.17	1.13	1.74	40.81
Balanus eburneus	17.48	21.27	1.16	1.28	1.72	42.53
Boonea impressa	1.77	20.10	1.14	1.18	1.69	44.22
Exogone dispar	22.37	11.71	1.00	1.25	1.48	45.70
Cirriformia sp. A of Wolf, 1984	16.31	0.00	0.97	0.86	1.44	47.14
XANTHOIDEA (juveniles and damaged)	20.09	25.09	0.94	1.43	1.39	48.53
Procerae cornuta	8.15	17.89	0.90	1.24	1.34	49.87
Paracaprella pusilla	7.94	14.59	0.89	0.72	1.32	51.19

Groups EKR Fall & HFR Fall
Average dissimilarity = 73.89

Species	Group EKR Fall Av.Abund	Group HFR Fall Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Leptochelia dubia complex	72.26	1.51	3.05	3.22	4.13	4.13
Polydora websteri	71.55	16.23	2.47	1.51	3.35	7.48
Erichthonius brasiliensis	57.57	9.06	2.25	1.30	3.05	10.53
Cirriformia sp. A of Wolf, 1984	51.09	0.00	2.24	2.39	3.02	13.55
Anthopleura sp.	39.78	79.37	2.21	1.15	3.00	16.55
Balanus spp. (juveniles and damaged)	70.00	59.12	2.21	1.42	2.99	19.54
Balanus trigonus	48.00	0.88	2.04	1.81	2.76	22.30
Balanus reticulatus	8.77	41.89	1.66	1.05	2.24	24.55
Polydora cf. colonia	36.45	0.00	1.52	1.11	2.05	26.60
Photis cf. longicaudata	34.03	0.00	1.44	1.06	1.95	28.55
Syllis gracilis	43.79	28.94	1.44	1.36	1.95	30.50
Ostrea equestris	30.93	61.42	1.43	1.38	1.94	32.44
Grubeosyllis nitidula	3.42	36.83	1.43	1.84	1.94	34.38
Leucothoe spinicarpa	32.85	1.08	1.38	1.90	1.86	36.24
Crepidula depressa	6.49	32.58	1.15	1.56	1.56	37.80
Photis sp. F (LeCroy,2000)	26.02	0.00	1.11	1.25	1.50	39.31
Crassostrea virginica	0.00	25.35	1.09	2.98	1.48	40.79

Syllis (Typosyllis) corallicola	33.62	14.35	1.08	1.30	1.46	42.25
Mediomastus californiensis	26.20	2.54	1.07	1.77	1.45	43.70
Paracaprella pusilla	23.05	14.59	1.06	1.09	1.43	45.13
Gibberula lavalleenana	21.76	0.00	0.97	1.53	1.32	46.45
Terebella nr. rubra	22.40	1.25	0.93	2.20	1.26	47.71
Exogone dispar	31.31	11.71	0.92	1.38	1.25	48.95
Lumbriclymeniae sp. A of EPC	20.62	0.00	0.92	1.35	1.24	50.20

Groups BBR Fall & EKR Fall
Average dissimilarity = 63.36

Species	Group BBR Fall Av.Abund	Group EKR Fall Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Balanus spp. (juveniles and damaged)	99.79	70.00	3.05	1.14	4.81	4.81
Polydora websteri	15.14	71.55	2.43	1.62	3.84	8.65
Erichthonius brasiliensis	13.25	57.57	2.34	1.44	3.69	12.34
Leptochelia dubia complex	29.12	72.26	1.99	1.83	3.15	15.49
Cirriformia sp. A of Wolf, 1984	16.31	51.09	1.64	1.65	2.59	18.07
Polydora cf. colonia	0.00	36.45	1.49	1.12	2.36	20.43
Photis cf. longicaudata	0.00	34.03	1.42	1.07	2.24	22.67
Anthopleura sp.	17.23	39.78	1.39	1.06	2.19	24.87
Balanus reticulatus	36.86	8.77	1.32	1.47	2.08	26.94
Balanus trigonus	28.27	48.00	1.29	1.24	2.04	28.99
Leucothoe spinicarpa	9.50	32.85	1.08	1.67	1.71	30.70
Photis sp. F (LeCroy,2000)	0.63	26.02	1.08	1.24	1.70	32.39
Syllis gracilis	51.98	43.79	1.06	1.31	1.67	34.06
Gibberula lavalleenana	0.00	21.76	0.96	1.54	1.51	35.57
Syllis (Typosyllis) corallicola	30.55	33.62	0.91	1.06	1.44	37.01
Lumbriclymeniae sp. A of EPC	0.00	20.62	0.90	1.37	1.43	38.44
Paracaprella pusilla	7.94	23.05	0.88	1.13	1.39	39.82
Ampithoe cf. ramondi	0.00	19.79	0.82	1.19	1.30	41.12
Balanus cf. amphitrite	21.03	2.13	0.80	1.06	1.27	42.39
Mediomastus californiensis	10.52	26.20	0.80	1.45	1.26	43.65
Laticorophium cf. baconi	2.02	19.04	0.76	1.30	1.20	44.85
Ostrea equestris	31.04	30.93	0.75	1.35	1.19	46.04
Exogone dispar	22.37	31.31	0.75	1.26	1.19	47.22
Elasmopus cf. rapax	2.17	18.26	0.75	1.48	1.19	48.41
Elasmopus sp. A (of EPC)	17.81	10.23	0.74	1.19	1.17	49.58
Syllis alternata	10.93	14.49	0.73	1.00	1.15	50.73