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A comparative study of the feeding ecology of Chelonia mydas (green turtle) and the incidental ingestion of prorocentrum spp

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A COMPARATIVE STUDY OF THE FEEDING ECOLOGY OF *CHELONIA MYDAS* (GREEN TURTLE) AND THE INCIDENTAL INGESTION OF *PROROCENTRUM* SPP

by

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ABSTRACT

The diets of green turtles from five dissimilar aggregations of juvenile *C. mydas* on the East Coast of Florida were analyzed. *C. mydas* were captured by tangle net from four of the study sites and a dietary sample was collected by an esophageal flushing technique. The gut content of stranded individuals was collected for the fifth site. The vegetation in these study areas differs in varying degrees of abundance and diversity. Analysis of the samples revealed the alga types preferred by green turtles from each population and provided the basis for examination of similarities and differences in their diets.

Large numbers of the juvenile *C. mydas* worldwide are infected with a disease called Fibropapillomatosis (FP). The herpes-type virus that appears to cause the disease manifests as tumors normally on the fleshy parts of the body. The placement and size of the tumors can eventually impede the green turtle's ability to swim and forage. Severe conditions of the disease lead to death either by starvation or the inability to evade predators. While the herpesvirus initiates FP, there are other environmental cofactors that may play a role in promoting the disease. Some toxic microalgae (dinoflagellates) of the genus *Prorocentrum* produce a known tumor promoter called okadaic acid. The acid has been shown to promote cutaneous tumors

in laboratory mice. These *Prorocentrum* species live primarily as epiphytes, forming a mucilaginous attachment to seagrasses and macroalgae. *Chelonia mydas* may be consuming the toxic microalgae when they forage on vegetation.

Samples of available vegetation at each study area were collected and examined to determine if *C. mydas* were potentially consuming *Prorocentrum*. *Prorocentrum* were quantified for diet items by counting the number of cells per wet weight of macroalgae. In most cases, the diet analysis and microalgae quantification results showed an association between the consumption of substrates utilized by *Prorocentrum* spp and a high prevalence of FP in that population.

ACKNOWLEDGEMENTS

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Bob Virnstein, Julie Morris and Lauren Hall from the St. Johns River Water Management District gave me transect data and answered my questions on seagrass. Dr. Clinton Dawes at the University of South Florida answered macroalgae questions. Karen Steidinger and Jan Landsberg of the Florida Marine Research Institute in St. Petersburg, Florida taught me how to identify toxic microalgae. Marie-Josee Abgrall shared many hours collecting and identifying macroalgae.

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CHAPTER ONE: A COMPARISON OF THE DIET OF FIVE EAST COAST GREEN TURTLE POPULATIONS

Introduction

For centuries sea turtles have been exploited for economic purposes. Prior knowledge about sea turtle nesting colonies and foraging grounds was obtained by observing and interviewing local fisherman and village people who have hunted and eaten sea turtles (Carr 1956; Carr 1967; Ehrhart 1983). Early on many people began to recognize that green turtle numbers were swiftly declining, in their own lifetime. Some areas, like Bermuda, sought protection as early as 1622. Today green turtles are listed in CITES (The Convention on International Trade in Endangered Species of Wild Fauna and Flora) and recognized as endangered species through the Federal Endangered Species Act of 1973 (Hirth 1997). Biologists have accumulated a great deal of knowledge about the natal/nesting beaches of sea turtles. However, there are many questions about the nature and geographical locations of developmental habitat utilized during the first ten to twenty years of the sea turtle's life.

The most comprehensive studies of the *C. mydas* foraging habits have primarily been from the examinations of stomach contents of large individuals (Hirth 1997). To date, extensive studies of juvenile green turtle diet have been limited to Hawaii (Balazs

1980a), Australia (Forbes 1994; Limpus et al. 1994), Brazil (Ferreira 1968) and Nicaragua (Mortimer 1981). In Florida, Mendonca (1983) investigated the diet of *C. mydas* of Mosquito Lagoon at Canaveral National Seashore. Redfoot (1997) analyzed the diet of juvenile *C. mydas* at the Trident Submarine Basin at Port Canaveral. Results of diet analyses reveal that the *C. mydas* diet is quite dynamic. It can vary from region to region and within region (Mortimer 1995).

As human populations increase, they place heavier burdens on earth's natural resources. One impact of human development is the runoff produced from urban and agriculture activities. Lakes, streams and coastal areas have become polluted with chemicals and nutrients that impact water quality, degrading habitats and threatening the existence of many species of plants and animals. Impacts to developmental habitats of sea turtles and impacts to the health of sea turtles have spurred conservationists and governmental agencies to enact a plan for the recovery of sea turtle populations (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991). In order for the plan to be fully implemented, it will require the continual support of state, federal and private agencies. Sea turtles mature slowly. To make sound decisions about their recovery requires many years of observation. In the future we may find that development has destroyed the developmental habitats of many unknown *C. mydas* colonies.

Habitat alterations and environmental conditions may play another role in threatening the health of *C. mydas*. There has been an increase in the potentially debilitating disease known as fibropapillomatosis (FP). The disease manifests as tumors

on the eyes and fleshy body parts of sea turtles. An infectious virus has been implicated (Herbst 1994; Herbst et al. 1999). Research and monitoring for the past 20 years seems to indicate that FP has increased among sea turtle aggregations worldwide. The disease is most prevalent among juvenile *C. mydas* populations residing in areas of low-flushing rates (i.e., near-shore embayments) (Herbst and Klein 1995). While a herpes-type virus may initiate the disease, the role of environmental cofactors, as promoters of FP, have not been ruled out (Herbst and Klein 1995; Landsberg et al. 1999; Holloway-Adkins and Ehrhart 2001).

The first part of this two-part study involves the determination and comparison of the foraging habits of five green turtle aggregations on the East Coast of Florida. A "snapshot" of approximately 60 green turtles at each study site was obtained through a process called lavage where the esophagus area is flushed out. Comparisons of diet will be made between different size-class categories, FP status categories and seasonal foraging categories. The second part of the study investigates the potential role that toxic dinoflagellates (living as epiphytes on the vegetation) may play in the promotion of tumors. Each aggregation of juvenile *C. mydas* in this study has a different prevalence of FP.

Study Sites

Five study sites on the east coast of Florida are compared: 1) Mosquito Lagoon, 2) Indian River Lagoon site at Sebastian and one at 3) Fort Pierce, 4) the coastal

Sabellariid worm rock reef site near Sebastian Inlet and 5) the Port Canaveral Trident Submarine Turning Basin. The entire area encompasses four counties and nearly 200 km of continuous bodies of water along the East Coast of Florida. Each represent critical developmental habitat for loggerheads and green turtles (Figure 1).

Mosquito Lagoon lies in the northernmost portion of the Indian River Lagoon System (IRLS) (Figure 1). This shallow, brackish estuary is basically a wind driven system with little tidal influence (Mendonca 1983). At the northern end of the Lagoon is Ponce de Leon Inlet in Volusia County. The southern end of Mosquito Lagoon is closed off; the only connection lies westward via Haulover Canal into the Indian River. The study area at Mosquito Lagoon lies between latitude 28° 39' 0" and 28° 50' 0" and longitude 80° 42' 30". Large amounts of decomposing plant detritus make the bottom of most of the Lagoon extremely soft. Depth in the lagoon averages 1 to 2 m. Visibility is normally less than 1 m (Mendonca 1983).

The Sebastian IRLS site is the central-most study area. It is located on the westside of the barrier island approximately 3 km south of Sebastian Inlet (Figure 1). Local fishermen refer to the area as South Bay (Ehrhart and Redfoot 1996). The area is moderately affected by tidal changes. The bottom is sand/silt and the area is approximately 2 to 4 m deep. Latitude and longitude of the site are 27° 25' 45" and 80° 26' 30", respectively.

The Fort Pierce Indian River Lagoon study area is located at latitude 27° 27' 0" and longitude 80° 17' 30". The site is located 100 m from the east shore of the lagoon. The study area concentrates around a large man-made dredge hole that is approximately

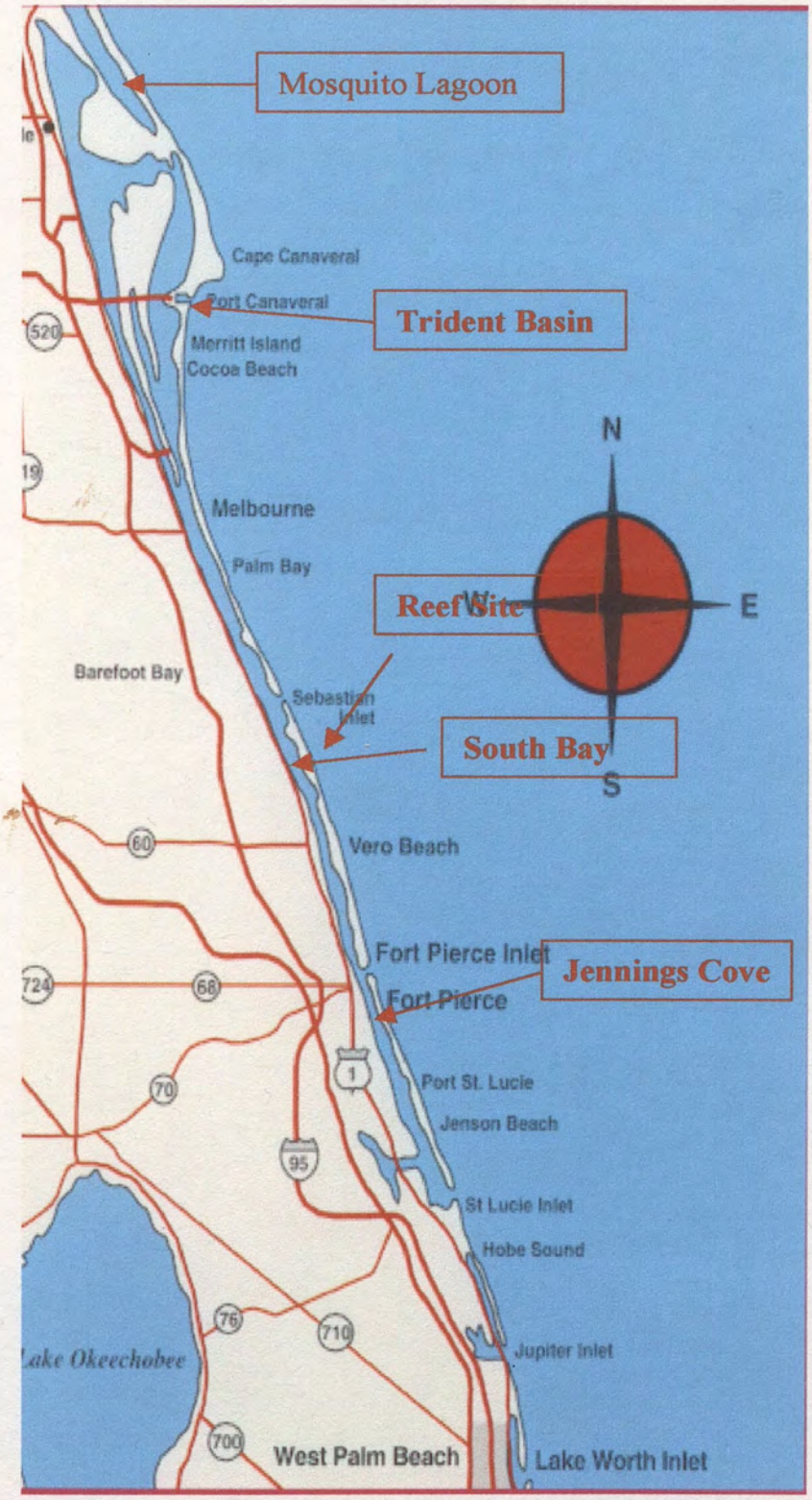


Figure 2. Study area map showing Mosquito Lagoon, Trident Basin, South Bay, Reef and Jennings Cove study area locations on the east coast of Florida.

6 m deep, 200 m wide, 300 m long. It is believed that turtles may sleep in this large hole. The location is locally referred to as Jennings Cove (Bresette et al. 2001). Tidal exchanges at the Fort Pierce Inlet, 2 km north, influence this study site more than the other locations in the IRLS.

The Sabellariid worm rock reef site is located east of the South Bay study area, separated only by a narrow stretch of barrier island (Figure 1). Colonies of the polychaete worm, *Phagmatopoma lapidosa*, form densely packed tubes made from their own mucoproteinaceous secretions and gathered sediment particles. Over time the large aggregate of worm tubes form structures referred to as "worm reef" or "worm rock". This system of reefs has been described from the vicinity of Cape Kennedy to at least as far south as Cape Florida Lighthouse, Biscayne Key, near Miami, Florida (Kirtley and Tanner 1968; Main and Nelson 1988). Latitude and longitude of the Reef study area is 27° 25' 45" and 80° 26' 30". Intermittent reefs, separated by bare sandy areas, parallel the shore (Ehrhart 1992). The area was studied in the summer months only because during most of the other seasons the coastal waters are turbid with regular wave activity. This site was referred to as the "Reef" for this study.

The Trident Submarine Turning Basin is located just inside the Port Canaveral Channel (Figure 1). This study area is heavily influenced by coastal tides (Redfoot 1997). The man-made embayment is less than 1 km^2. The location is latitude 28° 25' 0" and longitude 80° 17' 30". The basin is lined with granite boulders except on one side where there is a concrete seawall. Water depth along the boulders is normally 0.5 to 2.5

m depending upon the tide. The soft mud bottom slopes downward to a final depth of approximately 13 m (Redfoot 1997).

Methods

Lavage Technique

A non-lethal process called lavage was used to extract dietary samples from green turtles (Legler 1977; Balazs 1980b; Forbes and Limpus 1993). The process is a modified veterinary stomach pump procedure. There were two sets of two different sized tubes. The turtle's size and whether it was "pap free" (without FP) or not determined which of the four tubes would be used for the lavage. A 9 mm outside diameter (OD), 6 mm inside diameter (ID) tube was used on turtles that were around 35 cm straight carapace length (SCL) or smaller. A 13 mm OD and 8 mm ID tube was used for turtles larger than 35 cm SCL. Separate "pap free" materials were also used for any other contact equipment (i.e., pry bars). To perform the lavage, one person would hold the turtle on its back and slightly elevate the posterior end. Another person would gently grasp the turtles head to pull the neck straight out. The tube was pre-measured externally by reference to the pectoral scute anterior margin. This measurement assists in judging the distance to the lower end of the esophagus. It is unnecessary to enter the stomach area, as the esophagus contains a sufficient amount of food that has been recently consumed. The surgical tube was pre-lubricated with a spray coating of vegetable oil. A third person would begin pumping seawater from an 8 liter bucket. The

water pumping action assists the turtles in "swallowing" of the tube. The flushing process was performed for approximately 20 seconds. During this time the tube was slowly and gently moved back and forth to dislodge food particles from the papillae in the esophagus. The lavage sample was retrieved in another 8 liter bucket placed beneath the turtle's head. The tube was removed and the turtle was left inclined for approximately 30 seconds to ensure that any excess seawater was drained from the mouth and nasal area.

Contents from the receiving bucket were filtered from the seawater by use of a modified aquarium fish net (netting was replaced with 0.5 mm mesh size from a paint strainer net). The sample was placed into a Nalgene 250 ml smoke plastic jar, which helps to reduce cell destruction caused by UV radiation. A 5 % formalin/seawater mix was added to the sample. The formalin preserves the plant material and the seawater helps maintain cellular osmosis, which will be important in the identification phase.

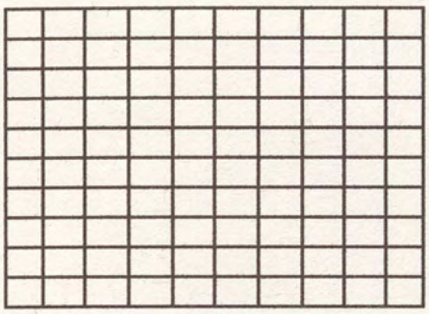
Intestinal Tracts

Intestinal tracts of turtles that died during the 1989 cold stun event in Mosquito Lagoon were preserved (Shroeder et al. 1990). Biologists that performed necropsies at the time froze the tracts for future analysis. The intestines were thawed and the contents preserved in 5% formalin/seawater mix.

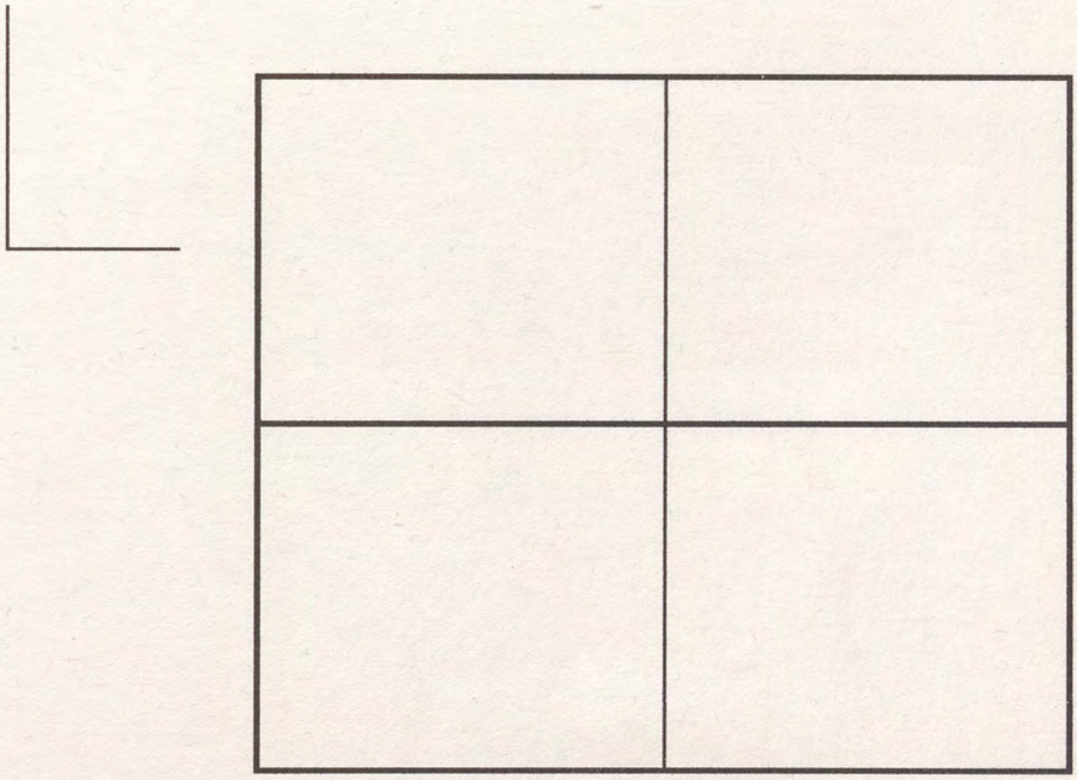
Diet Analysis

In the laboratory, samples were strained through a coffee filter (0.7 mm straining diameter) and their wet weight was obtained using a Denver Instrument Company XE series Model 400 electronic scale. Stereoscope and light microscopy were used to identify the sample contents. Food particles that are less than about 1 cm in length leave few identifying structural features. Most representatives of algae in the samples had to be cross-sectioned to utilize cell structure and size for identification. Every effort was made to identify samples to the species level. After sample contents were identified the quantification process could begin. Dr. Clinton Dawes, a phycologist at the University of South Florida assisted in the verification process whenever the exact identification was in question.

The sample was placed in a glass petri dish, the bottom of which had 16 contiguous 1.5 cm^2 sampling fields drawn on the underside. The sample was spread out to form a thin yet closely packed layer over as many of the sampling fields as possible (Redfoot 1997). A Bausch and Lomb stereoscope was fitted with a 071184 gradicule (Bunton Instrument Co., Rockville, Maryland) that was etched with a 1 cm square box subdivided into 100 numbered 1 mm square units. The scope set at 0.79 X, allows the gradicule to fit just inside one of the 1.5 cm squares (Figure 2). Food items were counted for the top left intercept of every even number on the gradicule. Most samples cover more than the 16-1.5 cm squares. In this case, a subsample was taken from a



100-count gradicule



Portion of 16-1.5 cm^2 marked petri dish (4 squares)

Figure 2. Examples of the ocular gradicule and the marked petri dish. The gradicule is placed inside of one of the 1.5 cm^2 for the quantification procedure.

thoroughly mixed initial sample. A sample covering every intercept on every square results in a total count of 800 food items.

Seagrass Transects

The St. John River Water Management District (SJRWMD) maintains a 150 m seagrass monitoring transect within less than 1 km of the South Bay netting area. There are also ongoing transects within 2 km of the Mosquito Lagoon and Jennings Cove study areas. Transect data supplied by SJRWMD for the years 1994 through 2000 were used to make comparisons of what *C. mydas* consumed with what was available. Since transect data were not available for Mosquito Lagoon in 1989, I compared average seagrass abundance for the years 1994 to 2000 to the 1978 transect analysis performed by Mendonca (1983). I used these averages for references to seagrass availability. Seagrass monitoring programs indicate no significant changes in the density or coverage of seagrass in Mosquito Lagoon during the past 18 years (J. Provancha pers. comm.; R.Virnstein pers. comm.)

Statistical Analysis

Data were entered into Microsoft Excel to determine the population percent volume (PPV) and frequency of occurrence (FO) of *C. mydas* diet items at each study site. Statistical tests were performed using the 1996 version of SAS and the 9.0 version

of SPSS. Comparisons within each population for significant differences of means between seasonal categories, size-class categories and FP status categories were made.

The General Linear Model procedure was performed for top components of study area diets. When significant levels were detected Bonferroni tests for the variable were run. The hypothesis questions tested were 1) "Are there detectable differences in the diet of green turtles with FP and those that do not have FP?", 2) "Are there detectable differences in the diet of green turtles in different size-classes?", and 3) "Are there detectable differences between the diet of green turtles among the seasons of summer, fall, winter or spring?". Size-classes were defined by a range of straight carapace lengths (SCL) and were individually assigned for each study area. The Mosquito Lagoon site had four size-class divisions: very small turtles were < 40.0 cm SCL, small was 40.0 to 50.0 cm SCL, medium was 50.1 to 60.0 cm SCL and large was > 60.0 cm SCL. At the South Bay site there were three size-class divisions: small was < 40.0 cm SCL, medium was 40.1 to 50.0 cm SCL and large was > 50.0 cm SCL. The Jennings Cove turtles were divided into three size-classes that consisted of small turtles which were < 50.0 cm SCL, medium turtles that were 50.1 to 60.0 cm SCL and large turtles that were > 60.0 cm SCL. Three size-classes were determined for the Reef turtles; small was < 40.0 cm SCL, medium was 40.1 to 50.0 cm SCL and large was > 50.0 cm SCL. There were only two size-class categories defined for the Trident Basin; < 30.0 cm and $\geq$ 30.1 cm.

Results

Mean Straight Carapace Length (SCL)

The summary statistics for the straight carapace length (SCL) of all green turtles sampled for diet are found in Appendices A through E. The mean SCL of Mosquito Lagoon turtles in this study was 51.3 cm (n=59). SCL ranged from 28.1 to 72.7 cm. South Bay lavaged turtles had a mean SCL of 45.3 cm; the range was 31.2 to 66.7 cm (n=61). Jennings Cove lavaged turtles' mean SCL was 52.8 cm and ranged from 32.7 to 72.1 cm (n=57). The Reef site SCL was 43.8 cm, with a range of 27.0 to 61.9 cm (n=59). A One-Way ANOVA test revealed a statistically significant difference between the mean SCL's. Post Hoc tests detected statistically significant differences among the SCL's of turtles from the Trident Basin and all four of the other sites. Trident Basin green turtles' mean SCL was significantly smaller than that of the other populations (Figure 3).

Fibropapillomatosis (FP): Prevalence

The summary statistics for the FP status of all *C. mydas* sampled for diet are found in Appendices A through E. The prevalence of FP for the turtles that were sampled from Mosquito Lagoon samples was 1.7% (1 of 59 turtles). In South Bay, the FP prevalence for *C. mydas* was 50.8% (31of the 61 turtles). Jennings Cove FP

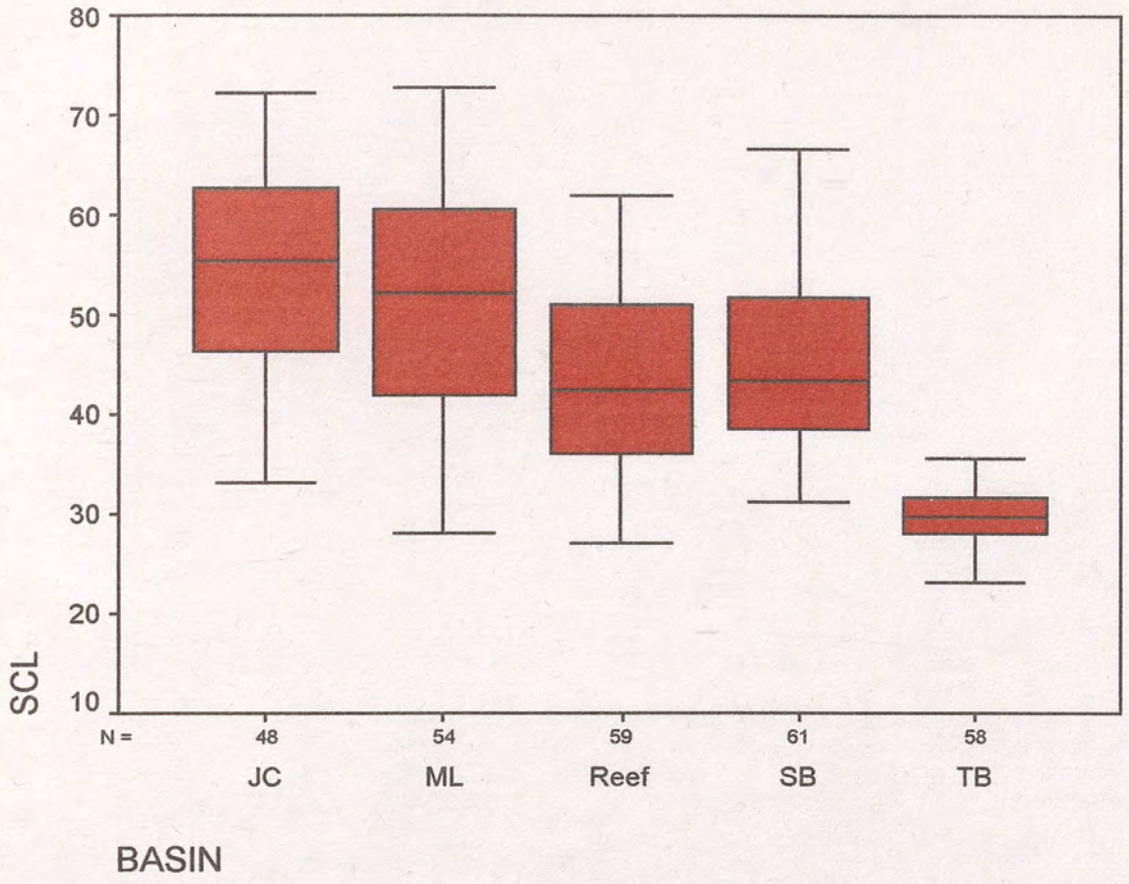


Figure 3. Box plot of straight carapace lengths (SCL). Basins are defined as: JC = Jennings Cove, ML = Mosquito Lagoon, SB = South Bay and TB = Trident Basin. Statistically significant differences exist for the average SCL of Trident Basin green turtles only, when compared to the SCL of the other four sites.

prevalence was 63.1% (36 of the 57 turtles). At the Reef site 17 of the 59 turtles had FP, a prevalence of 28.8%. The Trident Basin study area FP prevalence was 0.0%.

Composition of Lavage and Stomach Samples

Appendices F through I contain the diet information for individual green turtles at Mosquito Lagoon, South Bay, Jennings Cove and the Reef. Trident Basin individual diet information can be found in Redfoot (1997). Seagrasses were the most important food item for *C. mydas* in Mosquito Lagoon (Figure 4) (Table 1). Red algae were the most important food item at the other four study areas (Figure 4) (Table 1). Sample analysis for Mosquito Lagoon revealed that the population percent volumes (PPV's) in decreasing order were: seagrasses (74.6%), algae (23.2%), animal matter (1.2%), other plant material (0.6%) and bottom material (0.4%) (Figure 4) (Table 1 & 2). The PPV composition of South Bay samples was: algae (84.3%), seagrasses (10.1%), animal matter (2.4%), other plant material (1.8%), and bottom material (1.0%) (Figure 4) (Table 1 & 2). Jennings Cove green turtles had a PPV composition of algae at 74.7%, seagrass (18.9%), animal matter (4.1%), bottom material (1.0%) and other plant material (0.9%) (Figure 4) (Table 1 & 2). Reef turtles had a PPV of 93.6% algae, bottom material (2.8%), animal matter (0.1%), other plant material (0.1%) and a trace of seagrass (Figure 4) (Table 1 & 2). The diet composition for the Trident Basin green turtles was: algae (87.4%), other plant material (3.6%), animal matter (3.0%) and bottom material (1.0%) (Figure 4) (Table 1 & 2).

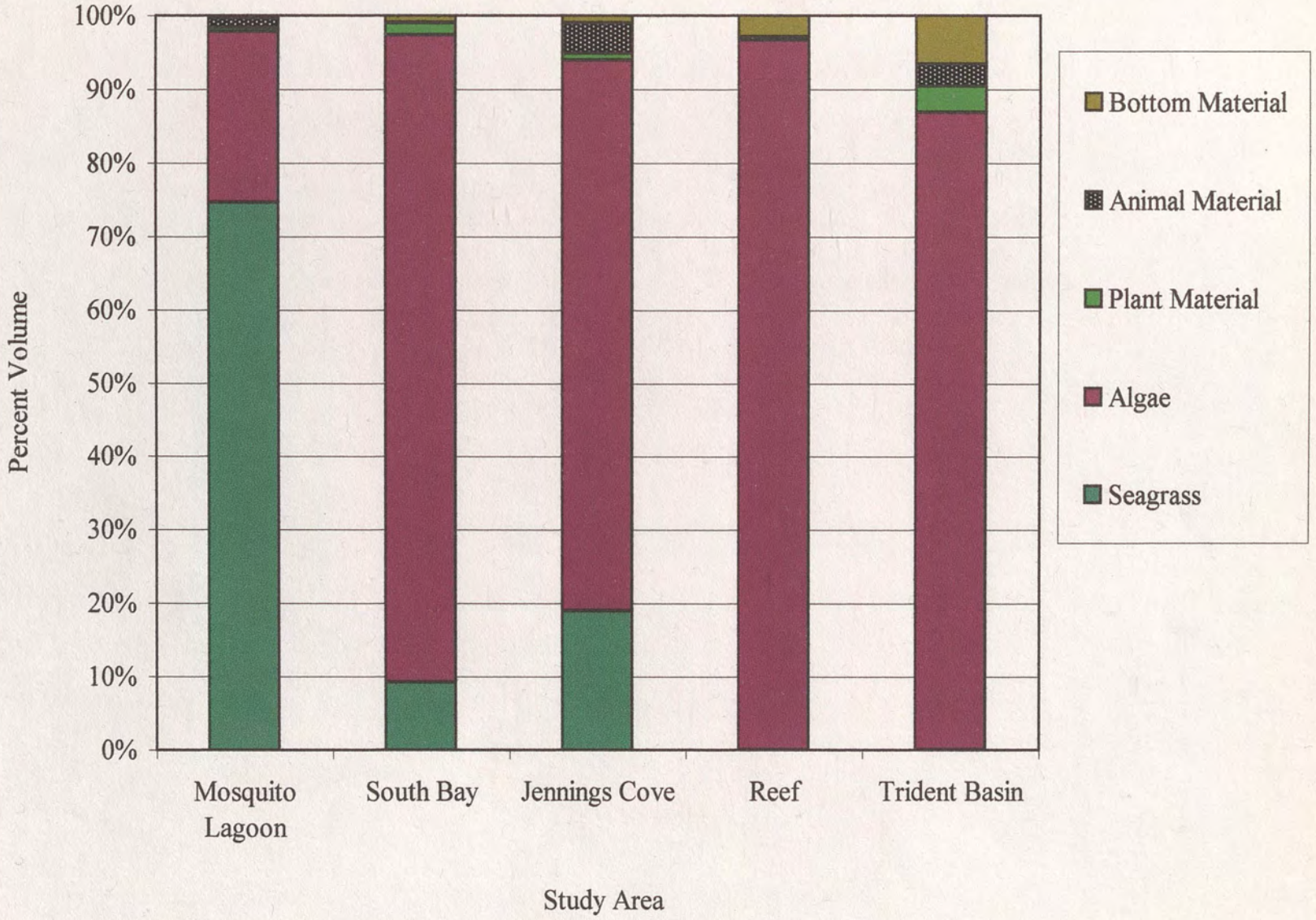


Figure 4. Population percent volume of diet by study area

Table 1. Population percent volume (PPV) of vegetation consumed by study area. In parentheses is the frequency of occurrence (FO). t = trace.

Diet Item:	Mosquito Lagoon (n=60)		Sebastian, IRL (n=61)		Jennings Cove, IRL (n=57)		Reef (n=59)		Trident * (n=135)	
Syringodium filiforme	57.8	(79.7)	1.3	(14.7)	8.8	(50.9)	-		-	
Halodule wrightii	16.4	(79.7)	2.8	(41.0)	3.5	(35.1)	t	(1.7)	-	
Halophila johnsonii	-		1.3	(3.3)	5.9	(17.5)	-		-	
Halophila decipiens	0.4	(3.4)	2.6	(13.1)	0.6	(7.0)	-		-	
Halophila englemannii	-		2.1	(1.6)	-		-		-	
Halophila spp	-		-		0.1	(5.3)	-		-	
Total Seagrasses	74.6	(98.3)	10.1	(52.4)	18.9	(82.5)	t	(1.7)	-	
Caulerpa mexicana	0.2	(1.7)	-		-		0.5	(18.6)	-	
C. prolifera	-		0.3	(11.5)	0.4	(5.3)	3.4	(57.6)	-	
C. taxifolia	-		-		-		t	(1.7)	-	
C. racemosa	-		-		-		1.9	(22.0)	-	
Cladophora catenata	-		-		-		-		1.4	(75.6)
Codium spp	-		-		-		t	(1.7)	-	
Chaetomorpha spp	-		0.2	(1.6)	0.1	(5.3)	-		-	
Enteromorpha spp	-		0.3	(3.3)	-		t	(1.7)	0.1	(7.4)
E. chaetomorphoides	-		-		t	(1.7)	-		-	
Ulva spp	0.2	(3.4)	-		-		5.2	(61.0)	3.3	(32.6)
Total Chlorophyta	0.4	(5.1)	0.8	(16.4)	0.5	(10.5)	11.0	(89.8)	4.8	(81.5)
Sargassum	-		0.1	(3.3)	-		0.2	(10.2)	0.5	(.7)
Dictyota spp	-		-		-		t	(1.7)	0.1	(.7)
Dictyopteris delicatula	-		-		-		3.8	(32.2)	-	
Padina profunda	-		-		-		t	(5.1)	-	
Total Phaeophyta	-		0.1	(3.3)	-		4.0	(33.9)	0.6	(1.5)
Acanthophora spicifera	-		1.6	(21.3)	0.3	(10.5)	0.8	(6.8)	-	
Bryothamnion seaforthii	-		35.8	(68.8)	-		11.7	(57.6)	1.6	(2.2)
Bostrichia spp	-		-		-		4.0	(15.3)	-	

Diet Item:	Mosquito Lagoon (n=59)		Sebastian, IRL (n=61)		Jennings Cove, IRL (n=57)		Reef (n=59)		Trident * (n=135)	
Botryocladia occidentalis	-		-		-		0.7	(10.2)	-	
Bryocladia cuspidata	-		-		-		0.4	(6.8)	t	(.7)
Centroceras clavulatum	-		t	(1.6)	-		-		1.8	(74.8)
Ceramium spp	-		-		-		0.1	(1.7)	-	
Chondria spp	0.1	(1.7)	t	(3.3)	0.2	(8.8)	4.6	(15.3)	-	
Gelidium americanum	-		-		-		7.1	(61.0)	51.1	(98.5)
G. pusillum	0.1	(3.4)	-		-		3.8	(30.5)	-	
Amphiroa rigida	-		-		-		-		0.2	(11.1)
Jania adhaerens	-		-		-		0.1	(6.8)	-	
Solieria spp	-		9.1	(31.1)	-		1.2	(10.2)	4.8	(27.4)
Eucheuma nudum	-		-		-		5.9	(27.1)	-	
Spyridia filamentosa	-		0.7	(8.2)	1.6	(35.1)	t	(1.7)	-	
Gracilaria spp	22.6	(49.1)	-		-		-		-	
G. armata	-		-		0.5	(1.7)	-		-	
G. blodgetti	-		-		0.6	(1.7)	-		-	
G, mammillaris	-		t	(1.6)	-		5.6	(55.9)	-	
G. tikvahiae	-		16.3	(42.6)	30.1	(63.2)	1.6	(15.3)	-	
G. verrucosa	-		14.6	(52.5)	39.9	(52.6)	0.3	(3.4)	-	
Hypnea spp	-		1.7	(1.6)	-		-		-	
H. cervicornis	-		-		-		7.7	(32.2)	15.0	(70.4)
H. cornuta	-		-		t	(1.7)	-		-	
H. musciformis	-		-		t	(1.7)	4.6	(13.6)	-	
H. spinella	-		2.0	(4.9)	0.6	(10.5)	-		-	
Polysiphonia subtilissima	-		0.2	(4.9)	0.1	(1.7)	3.7	(72.9)	7.9	(8.0)
Halymenia floresia	-		-		-		1.5	(10.2)	-	
Fauchea peltata	-		t	(1.6)	-		-		-	
Lomentaria baileyana	-		1.3	(1.6)	0.3	(1.7)	1.8	(11.9)	-	
Laurencia poitieau	-		-		-		13.9	(44.1)	-	
Dasya pedicellata	-		-		-		t	(1.7)	-	
Scinaia complanata	-		-		-		0.1	(1.7)	-	
Total Rhodophyta	22.8	(49.1)	83.3	(96.7)	74.2	(91.2)	81.2	(100.0)	82.4	(98.5)
Total Macroalgae	23.2	(49.1)	84.3	(96.7)	74.7	(91.2)	93.6	(100.0)	87.4	(99.3)

Diet Item:	Mosquito Lagoon (n=59)		Sebastian, IRL (n=61)		Jennings Cove, IRL (n=57)		Reef (n=59)		Trident (Redfoot) (n=135)	
Plant/rhizome	0.6	(30.5)	-		-		-		4.0	(28.1)
dec/plant unknown	t	(22.0)	1.7	(72.1)	0.9	(31.6)	0.1	(16.9)	-	
filamentous mass (hairy)	-		0.1	(1.6)	-		-		-	
seed	-		t	(1.6)	t	(10.5)	-		-	
angiosperm leaf/stem	-		-		-		-		3.6	(27.4)
Total other plant material	0.6	(42.3)	1.8	(72.1)	0.9	(38.6)	0.1	(16.9)	3.6	(27.4)

Table 2. Population percent volume (PPV) of non-vegetation items consumed by study area. In parentheses is the frequency of occurrence (FO). t = trace.

Diet Item:	Mosquito Lagoon (n=59)		Sebastian, IRL (n=61)		Jennings Cove, IRL (n=57)		Reef (n=59)		Trident * (n=135)	
Bryozoans	t	(1.7)	t	(3.3)	0.6	(29.8)	-		0.5	(33.3)
Porifera	-		0.1	(1.6)	t	(3.5)	-		-	
Hydroida	-		-		0.1	(3.5)	t	(3.4)	-	
Ascidian (colonial tunicate)	0.9	(8.5)	2.0	(4.9)	0.2	(1.7)	0.1	(1.7)	-	
Mnemiopsis maccadyi	-		-		1.6	(1.7)	-		-	
Crustacea (shrimp)	-		0.1	(8.2)	1.2	(21.0)	0.1	(5.1)	-	
Crustacea (barnacles)	-		t	(3.3)	0.1	(1.7)	t	(1.7)	-	
Gastropoda (*Cerithium, Lithopoma* spp)	-		0.2	(11.5)	0.3	(21.0)	0.1	(32.2)	-	
decomposed animal	-		0.1	(9.8)	t	(1.7)	-		-	
misc. animal tissue	0.3	(16.9)	-		-		0.1	(1.7)	0.8	(26.7)
Scyphozoa (jellyfish)	-		-		-		-		1.7	(4.4))
Total animal	1.2	(25.4)	2.4	(32.8)	4.1	(57.9)	0.3	(35.6)	3.0	(44.4)
plastic	-		0.1	(3.3)	0.2	(7.0)	-		1.0	(5.2)
rock	-		-		-		1.2	(32.2)	-	
sand	0.4	(18.6)	-		0.1	(7.0)	t	(3.4)	-	
shell	-		0.8	(45.9)	0.7	(33.3)	1.6	(72.9)	-	
unidentified	-		-		-		-		5.6	(92.6)
Bottom material	0.4	(18.6)	1.0	(45.9)	1.0	(33.3)	2.8	(72.9)	6.6	(94.1)

(* Redfoot 1997)

Seagrasses

At Mosquito Lagoon, *Syringodium filiforme* was the most consumed seagrass with a PPV of 57.8% (Table 1). At South Bay, *H. wrightii* was the most consumed seagrass (PPV=2.8%). Jennings Cove seagrass PPV was highest for *S. filiforme* (8.8%). A trace of *H. wrightii* was found in one Reef diet sample. Seagrasses were not consumed by *C. mydas* at the Trident Basin.

Macroalgae

Division Rhodophyta

Red algae are well represented in the diet of *C. mydas* at all five study areas (Table 1). The PPV of Mosquito Lagoon turtles was 22.8% for red algae. At South Bay, the PPV was 83.3%. Jennings Cove PPV for Rhodophyta was 74.2%. The Reef diet PPV was 81.2% for red algae and Trident Basin green turtle PPV was 82.4% for red algae. Most of the PPV for Rhodophyta paralleled the frequency of occurrence (FO). Each study site differed as to the most highly selected species of Rhodophyta. At the Mosquito Lagoon site *C. mydas* consumed the red alga *Gracilaria* the most and it represented a PPV of 22.6% of their diet. At South Bay, *Bryothamnion seaforthii* had the highest PPV of all Rhodophyta and it represented 35.8% of their diet. At Jennings Cove, *C. mydas* ate mostly *Gracilaria tikvahaie* and *G. verrucosa*. These two algae combined represented 70.0% PPV of the diet. The Reef *C. mydas* consumed the red

alga *Laurencia poiteaui* the most and it made up a PPV of 13.9% of the total diet. At the Trident Basin, *C. mydas* consumption of the red alga *Gelidium americanum* was highest with the PPV at 51.1%.

Division Chlorophyta

The division of green algae was represented at all five study sites (Table 1). At Mosquito Lagoon, only *Caulerpa mexicana* and *Ulva* spp were found among the samples with combined PPV of 0.4% of the diet. At South Bay *Caulerpa prolifera*, *Chaetomorpha* spp and *Enteromorpha* spp were consumed (combined PPV 0.8%). Jennings Cove *C. mydas* consumed *Caulerpa prolifera*, *Chaetomorpha* spp and a trace of *Enteromorpha chaetomorphoides* (combined PPV of 0.5%). Green algae in the diet of Reef *C. mydas* was 11.0% PPV combined and consisted of *Codium* spp, *Enteromopha* spp, *Ulva* spp and four species of *Caulerpa*. *C. mydas* at the Trident Basin consumed a combined PPV of 4.8%, which consisted of *Cladaphora catenata*, *Enteromorpha* spp and *Ulva* spp.

Division Phaeophyta

Brown algae are poorly represented among the diet samples (Table 1). It was completely absent from the Mosquito Lagoon and Jennings Cove diet samples. The brown alga present in the South Bay diet was *Sargassum* spp (0.1%). The Reef samples contained *Sargassum* spp, *Dictyota* spp, *Dictyopteris delicatula* and *Padina profunda*, a total PPV of brown algae of 4.0%. At the Trident Basin, Redfoot (1997) reported a PPV

of 0.6% for brown algae. Brown algae consumed by the green turtles at the Trident Basin were *Sargassum* spp and *Dictyota* spp. The combined PPV for brown algae at the Trident Basin was 0.6%.

Other Plant Material

Foraging items in the "other plant material" category are typically seeds, seagrass fragments of rhizomes or roots and angiosperm stems or leaves (Table 1). The Mosquito Lagoon diet contained seagrass rhizome material at 0.6% PPV and a trace of decomposed or unknown plant parts. At South Bay, other plant material was composed of decomposed or unknown plant material (1.8%) and trace amounts of seeds. The other plant material category of the Jennings Cove diet consisted of decomposed or unknown plant material (0.9%) and a trace amount of seeds. The other plant material category in the Reef diet consisted of decomposed or unknown plant material (0.1%). At the Trident Basin, other plant material consisted of plant root or rhizome material (4.0%) and angiosperm stems or leaves (3.6%).

Animal Matter

At Mosquito Lagoon, the PPV of the diet for animal matter was 1.2% of the samples (Table 2). Several *C. mydas* consumed colonial tunicates (0.9% PPV) and a trace of bryozoans (*Bugula* spp and *Zoobotryon* spp) was found in one sample. The

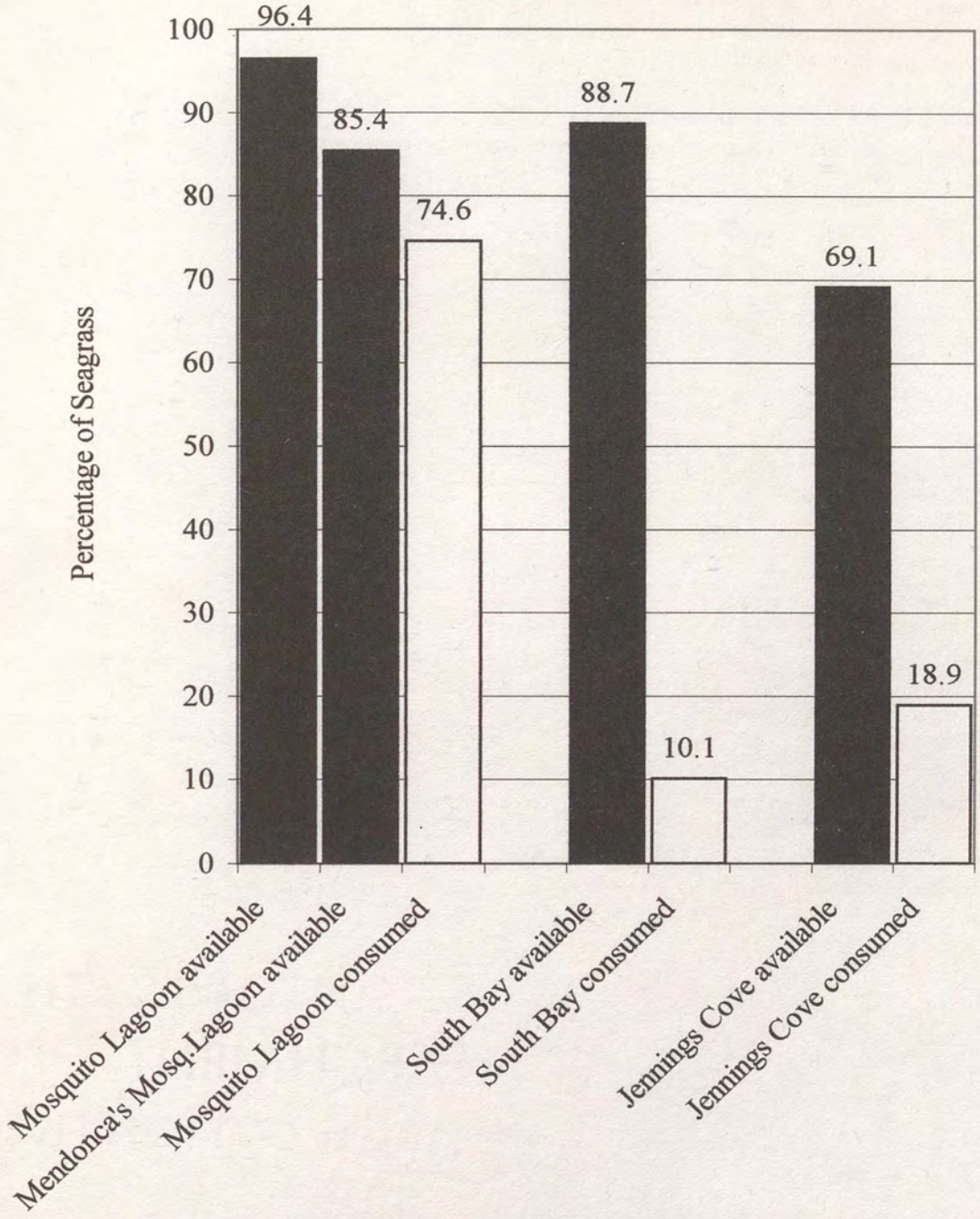
South Bay exhibited an animal matter PPV of 2.4%. Most of the organisms present were small invertebrates: tunicates (Chordata), sponges (Porifera), comb jellies (Ctenophora) and shrimp (Crustacea). The colonial tunicates had the highest PPV at 2.0% in the South Bay diet. The PPV of animal matter for the Jennings Cove turtle diet was 4.1%. This category had the greatest variety of invertebrates with the greatest PPV in comb jellies (1.6%), shrimp (1.2%) and bryozoans (0.6%). The Reef PPV for animal matter was 0.3%. It contained tunicates, crustaceans and gastropods. At the Trident Basin the animal matter PPV was 3.0%. The Trident Basin diet consisted of bryozoans (0.5% PPV), jellyfish (1.7% PPV) and miscellaneous animal tissue (PPV of 0.8%). The miscellaneous category consisted of crustaceans, fish scales, feathers, polychaetes (worm tubes) and arthropod larvae and exoskeleton.

Bottom Material

The bottom material consisted of sand, rock, shell pieces, unidentified non-organic material and plastic (Table 2). Consumption of these items occurred at every site. At Mosquito Lagoon, sand was the only item from this category found among the samples and it had a PPV of 0.4%. The South Bay site had shell pieces and plastic in the samples (total PPV 1.0%). At Jennings Cove 1.0% of the diet had plastic, sand and shell. The PPV for non-nutritional items for the Reef turtle diet was 2.8% and consisted of shell, rock and sand. At the Trident Basin, the PPV for plastic was 1.0%. Unidentified material at the Trident Basin made up 5.6% of the analysis.

Transects

SJRWMD provided transect information concerning seagrass and macroalgae abundance from 1994 to 2000. Transect information was not available for the Mosquito Lagoon cold stun event of 1989. Instead, the SJRWMD yearly averages for Mosquito Lagoon from 1994 to 2000 were used to make comparisons between what turtles ate and what was available. The average percent cover of seagrass during the 1994 to 2000 was 96.4% (Figure 5). The average percent of macroalgae was 3.6%. Mendonca (1983) performed quadrat sampling in 1978 to determine percent coverage of seagrasses and macroalgae. The results of her quadrats were 85.4% seagrass and 15.6% macroalgae cover. I compared the *C. mydas* diet from the 1989 cold stun event to the relative abundance averages calculated from SJRWMD and the diet of cold stun turtles in 1978 (Figure 5). Transects near the South Bay study area showed mean seagrass abundance at 88.8% and macroalgae abundance at 11.2%. Transects near the Jennings Cove study area showed mean seagrass abundance at 69.2% and macroalgae abundance at 30.8 %.



The amounts of available seagrass versus
the amounts *C. mydas* consumed.

Figure 5. Comparisons of available seagrass to the *C. mydas* diet in the Lagoon study areas. White columns represent the percent population volume of seagrass consumed by *C. mydas*. Black columns represent seagrass abundance.

Seasonal Comparisons

Seasonal comparisons for Mosquito Lagoon were not made since all of the intestinal tracts were collected during December 1989. Comparisons of seasonal diet differences of the South Bay turtles revealed a significantly higher PPV for the consumption of *A. spicifera* in the summer than in the winter (α= 0.0340, n= 59) (Table 3). At Jennings Cove, seasonal comparisons of the green turtle diet revealed a significantly higher PPV for *Syringodium filiforme* and bryozoans during the summer months. (α=0.013 and α= 0.0001, respectively) (n=52) (Table 4). The PPV of *Syringodium filiforme* was higher in the summer compared to the fall and winter. The PPV for bryozoans was higher in the summer than in the fall, winter or spring. The Reef data could not be obtained for all seasons since netting at the Reef site was only done during the summer months. However, a "beginning of summer" (May/June) and "end of summer" (July/August) analysis was made. The results of this analysis revealed significant differences for *Hypnea* spp (α=0.0004) and *Caulerpa* spp (α=0.0363) (Table 5). The PPV of *Hypnea* spp was higher at the beginning of the summer when compared with the end of summer. The PPV of *Caulerpa* spp was higher at the end of the summer when compared to the beginning of summer. The Trident Basin green turtle diet analysis detected a statistically significant difference in the PPV of *Hypnea*

Table 3. Comparisons of diet items based on season for green turtles at South Bay.

Diet Item	alpha
Bryothamnion seaforthii	0.048 *
Gracilaria tikvahiae	0.441
G. verrucosa	0.719
Solieria spp	0.659
Halodule wrightii	0.331
Halophila decipiens	0.374
Acanthophora spicifera	0.034 *

* indicates statistically significant difference

Season and sample size:

Winter (n=15)
Spring (n=15)
Summer (n=14)
Fall (n=15)

Table 4. Comparisons of diet items based on season for green turtles at Jennings Cove.

Diet Item	alpha
Gracilaria verrucosa	0.102
G. tikvahiae	0.655
Syringodium filiforme	0.013 *
Halophila johnsonii	0.225
Halodule wrightii	0.588
Spyridia filamentosa	0.611
Bryozoans	0.000 *
Hypnea spp	0.871
Shrimp	0.870

* indicates statistically significant difference

Season and sample sizes:
Winter (n=14)
Spring (n=28)
Summer (n=3)
Fall (n=7)

Table 5. Comparisons of diet items based on summer months for green turtles at the Reef site.

Diet Item	alpha
Laurencia poiteaui	0.060
Bryothamnion seaforthii	0.542
Gelidium spp	0.706
Hypnea cervicornis	0.000 *
Gracilaria mammalaris	0.605
Eucheuma nudum	0.860
Ulva spp	0.066
Polysiphonia subtilissima	0.548
Dictyopteris delicatula	0.083
Caulerpa spp	0.036 *

* indicates statistically significant difference

Months in Summer and sample size:
Beginning (May/June) (n=13)
End (July/August) (n=46)

cervicornis. Green turtles at the Basin consumed more *Hypnea* during the summer than the winter or the spring (Table 6).

Fibropapillomatosis (FP) Comparisons

Statistical analysis to detect differences in diet according to FP status were not performed for Mosquito Lagoon (FP = 1 turtle) or the Trident Basin (FP = 0 turtles). The analysis performed for Jennings Cove and South Bay detected no significant differences between the diet of *C. mydas* with FP and those that did not have the disease. The diet of the Reef turtles did show that *C. mydas* with FP had a significantly higher PPV for *Laurencia poiteaui* than *C. mydas* without the disease (Table 7). Also, a significant difference in the PPV for *Hypnea* spp was found among the Reef *C. mydas*, but this time the PPV consumed was higher among *C. mydas* without FP than the ones with FP disease.

Size-Class Comparisons

No significant differences were detected in the PPV's of the *C. mydas* diet at Mosquito Lagoon. There were no significant differences detected among the PPV's of the diets of the green turtles at the South Bay location. The statistical analysis revealed no significant differences between the PPV's of the diets of the different size-classes. A statistical significance for the PPV of *Laurencia poiteaui* and *Gelidium* spp was detected among size-classes (α= 0.0500 and 0.0169). The PPV for *Laurencia poiteaui*

Table 6. Comparisons of diet items based on season for green turtles at Trident Basin.

Diet Item	alpha
Gelidium americanum	0.139
Hypnea cervicornis	0.000 *
Polysiphonia subtilissima	0.140
Cladaphora clavulatum	0.519
Solieria filiformis	0.209
Ulva lactuca	0.193

* indicates statistically significant difference

sample sizes :
Winter = 23
Spring = 21
Summer = 12
Fall = 2

Table 7. Comparisons of Diet Items Based on FP Status for green turtles at the Reef site.

Diet Item	alpha
Laurencia poiteaui	0.001 *
Bryothamnion seaforthii	0.511
Gelidium spp	0.581
Hypnea cervicornis	0.014 *
Gracilaria mammalaris	0.384
Eucheuma nudum	0.431
Ulva spp	0.729
Polysiphonia subtilissima	0.443
Dictyopteris delicatula	0.437
Caulerpa spp	0.816

* indicates statistically significant difference

Status and sample size:
FP status (Yor N)
Y = 17
N = 42

was greater for the medium size-class turtles (40.1 to 50.0 cm SCL) than for the small size-class turtles (< 40.0 cm SCL) (Table 8). The PPV for *Gelidium* spp was greater in the small size-class Reef turtles than the medium size-class Reef turtles. No statistically significant differences based on size-class were detected for the diets of *C. mydas* at the Trident Basin.

Discussion

Size Structure of the Population

The Trident Submarine Basin *C. mydas* population is unusual in the absence of individuals $\geq$ 50.0 cm SCL (Redfoot 1997). Redfoot (1997) compared the population size-structures reported for other juvenile green turtle populations along the Atlantic and Gulf Coasts of the United States. What he found were similarities in the habitats and size classes of two Texas green turtle populations to that of the Trident Basin green turtles. The first *C. mydas* population is located at Brazos Santiago Pass on Padre Island, it had a mean SCL of 31.3 cm (identical to the Trident Basin *C. mydas*). The second population is located at the Mansfield Channel and has an average SCL of 34.2 cm. All three of these populations, Trident Basin, Padre Island and Mansfield Channel, utilize similar rock rip-rap habitats. According to Redfoot (1997) it appears that these habitats are not able to support the caloric needs of larger size-class juveniles and that may be the reason that most turtles captured there are normally under 50.0 cm SCL. By

Table 8. Comparisons of diet items based on size-class for green turtles at the Reef site.

Diet Item	alpha
Laurencia poiteaui	0.05 *
Bryothamnion seaforthii	0.652
Gelidium spp	0.017 *
Hypnea cervicornis	0.835
Gracilaria mammalaris	0.179
Eucheuma nudum	0.779
Ulva spp	0.810
Polysiphonia subtilissima	0.812
Dictyopteris delicatula	0.070
Caulerpa spp	0.108

* indicates statistically significant difference

Size Classes and sample size:
< 40.0 cm (n=21)
40.1 to 50.0 cm (n=21)
> 50.1 cm (n=17)

comparison, two other *C. mydas* populations in Texas, at Mexiquita Flats and South Bay, appear to be utilizing a developmental habitat that consists of large expanses of seagrass beds. The size-class range for these two sites is similar to the other four sites in this study (mean SCL: 44.6 cm) (Redfoot 1997). In South Florida, juvenile *C. mydas* captured over the nearshore habitat in Broward County (n=37) had a mean similar to green turtles captured at the Reef site and the South Bay site (43.47 cm SCL) (Wershoven and Wershoven 1992). There appears to be a distinction between the types of developmental habitat and the presence of certain size-structures of *C. mydas* populations.

Fibropapillomatosis (FP): Prevalence in the Population

Characterization of the Mosquito Lagoon green turtle populations began in the 1970's (Ehrhart and Yoder 1976; Mendonca and Ehrhart 1983) and is continuing at the present time (J. Provancha pers.comm.). The prevalence of fibropapilloma (FP) among the green turtle population at Mosquito Lagoon has ranged from 0 to as high as 77.0% (Ehrhart et al.1998). Less than 2 percent of the 243 turtles captured during the 1989 cold stun event had FP (Schroeder et al.1990). Twelve years later, FP prevalence has climbed to an average prevalence of 72.0% in Mosquito Lagoon (J. Provancha pers. comm.).

The FP prevalence in South Bay has also fluctuated from year to year. In the past 19 years, the FP prevalence has ranged from 28.0 to 72.0%. Currently, the overall prevalence is 49.4% (Ehrhart et al. 2001). At Jennings Cove the FP prevalence for the

past 3 years has ranged from 59.4 to 70.2%, with an average of 64.8% (Bresette et al. 2001). From 1989 until 1997 there were no signs of FP among the green turtles captured at the Reef site. Currently the FP prevalence for *C. mydas* at the Reef site is 14.5% of the population. FP prevalence during the past 12 years at the Reef has ranged from 0 to 21.0% (Ehrhart et al. 2001). The Trident Basin green turtles have remained FP- free since the onset of the population study in 1993 (Redfoot 1997; Holloway-Adkins and Ehrhart 2001).

Diet

Seagrasses

Syringodium filiforme and the following four other species of seagrass are commonly found in the lagoon study areas: *Halodule wrightii*, *Halophila decipiens*, *H. johnsonii* and *H. englemannii*. The shorelines of the Reef site and Trident Basin are not conducive to seagrass attachment and seagrasses are absent from these areas. The one green turtle lavage sample from the Reef that had *H. wrightii* was most likely foraged as flotsam. All three Lagoon sites have seagrass beds within a km of the netting site. According to the results of the diet analysis, *C. mydas* at Mosquito Lagoon utilize these beds extensively (Figure 5). Mendonca's previous study (1983) of Mosquito Lagoon *C. mydas* revealed this as well (Figure 5). However, *C. mydas* at South Bay and Jennings Cove appear to be selecting for macroalgae rather than seagrasses (Table 1) (Figure 5).

It has been suggested that *C. mydas* may select for vegetation (seagrass versus macroalgae) according to their gut microflora (Bjorndal 1985). *Chelonia mydas* is capable of making dietary shifts from seagrasses to macroalgae and vice versa but digestive inefficiency, which in turn is measured in energy cost to the turtle, may deter them from doing so (Bjorndal 1985). Green turtles are known to maintain grazing plots in a semi-confined bay in the Caribbean (Bjorndal 1979). *C. mydas* was observed to purposely crop a specific area that they returned to forage as the new shoots appeared and grazed the new growth (Bjorndal 1979). The new seagrass shoots provide higher levels of energy and nutrient availability and decreased lignin (Bjorndal 1979). In order to benefit from maintained graze plots, turtles would need to remain in one area over a period of time.

Chelonia mydas tend to avoid the epiphytic carbonate of the upper regions of seagrass leaves (Zieman et al. 1984). However in stressed pastures, they have been observed to consume all accessible seagrass, even shoots heavily covered with epiphytes (Williams 1988). *Chelonia mydas* in the Caribbean preferred foraging in the deeper areas of seagrass pastures (Vicente and Tallevast 1995).

In the IRLS the light requirements for seagrass can only be met down to 1.2 m (R. Virnstein pers. comm.). The chlorophyll content, suspended particles and tannin levels in the water do not allow sufficient light penetration past this depth. Due to their light requirements, seagrasses in the IRLS will currently only grow in the shallows near shorelines and spoil islands. (R. Virnstein pers.comm.). The SJRWMD's goal is to increase the depth of seagrass beds in the Lagoon to a targeted 1.7 m (Morris et al.

2000). Whether this will alter the foraging habits of lagoon green turtles remains to be seen. If seagrasses could be consumed at deeper depths then perhaps green turtles would consume them more often.

Whether *C. mydas* choose to forage on seagrass or macroalgae may be a factor that involves competition with other large herbivores. In Australia, competition for seagrass was interpreted between *Dugong dugon* and *C. mydas* (Garnett et al. 1985). Investigation into the potential for competition over foraging areas between the West Indian manatee, *Trichechus manatus*, and *C. mydas*, might explain why green turtles select macroalgae over seagrass.

Suppose, however, that sea turtles have undergone a genetic bottleneck. Green turtles have been hunted for their meat for generations (Pritchard 1971; Hirth 1997). The local people that hunted and ate green turtles preferred the "sweet" meat of turtles that foraged on seagrasses. The local people also have reported that the meat of algae-eating green turtles tasted "rank" (Pritchard 1971; Felger and Moser 1973; Hirth 1997). What if this selection process for sweet turtles placed enough pressure on seagrass-eating turtles that now what we are seeing in foraging habits among our green turtle populations has been influenced by human selective pressures on the species (P. Pritchard pers. comm.)

Macroalgae

Macroalgae were abundant in all five study areas. Worm reef and exposed Anastasia rock provide hard substrate to meet the requirements for attachment for macroalgae. At the Trident Basin, the rock rip-rap lining the basin provides sites for macroalgae attachment. Some of the port structures (pilings and camels for ship guards) also provide for substrate attachment. There are few structures in the study site areas of the IRLS that provide attachment sites for sessile macroalgae. Rock seawalls and dock constructions are some of the few locations that provide permanent attachment for algae (Dawes 1974). The Lagoon bottom is composed of soft sand. Most species of macroalgae in the Lagoon are considered to "drift". Drift algae are macroalgae that have become fragmented from the original thallus but continue to grow unattached from any substrate. *Gracilaria* spp, *Bryothamnion seaforthii*, *Acanthophora spicifera*, *Chondria* spp and *Hypnea* spp were observed in abundance as drift algae at the netting site. The Lagoon drift algae were normally covered with dark silt and epiphytic organisms. Interestingly, the macroalgae present in the lavage samples appeared free of epiphytes. Perhaps *C. mydas* did not feed at the capture site. *C. mydas* may migrate through the area, having foraged in other locations where macroalgae are attached and free of epiphytic growth. This would seem to be rare considering the limited areas of attachment in the Lagoon. Perhaps there are simply some areas where macroalgae are cleaner.

The light requirements of macroalgae are less restrictive than seagrasses (Dawes 1974). Currently, seagrass will grow at a 1.2 m depth in the Lagoon (R. Virnstein pers. comm.) Macroalgae is capable of growing at deep depths, with reduced light penetration. Between the red, brown and green algae; the red algae require the least amount of light for growth and reproduction (Dawes 1974; Schneider and Searles 1991). The brown and green algae have higher light requirements than the red; these were normally found in shallow areas where the seagrass beds were in the IRLS. The species of drift algae recorded for the Lagoon were all red algae. The green and brown algae have higher light requirements as well as substrate attachment requirements The smaller proportions of brown and green algae in *C. mydas* diet at all three Lagoon sites appears to be related to the lack of availability in the Lagoon.

Other Plant Material

Other plant material in the samples from the three Lagoon study areas may be related to the soft sand bottom. *C. mydas* grazing on new seagrass shoots near the base of the plant could pull up the roots at the same time. Ingestion of seagrass roots and rhizomes may be a function of grazing plot behavior seen in the Caribbean *C. mydas* (Bjorndal 1979).

The diet samples from the Reef site contained a small amount of unknown plant material. *C. mydas* grazing on low profile or heavily cropped macroalgae could pull up the holdfasts. Once holdfasts and parts are freed from the parent plant it makes

identification more difficult. The Trident Basin plant material consisted of angiosperm stems and leaves that Redfoot (1997) believed were present as flotsam in and around the basin.

Animal Matter

While *C. mydas* are primarily herbivorous species, they are not averse to consuming animal matter (Hirth 1997). In the early pelagic years, *C. mydas* hatchlings are opportunistic carnivores. It would seem that the smaller size-class of *C. mydas* at the Trident Basin might have a greater tendency to regress to their recently dissociated foraging habits than the "larger" juveniles in this study. Trident Basin green turtles could readily forage on the accessible fish scraps provided daily at fisherman cleaning stations at the Port. However, it was the *C. mydas* at Jennings Cove that displayed the greatest diversity and largest population percent volume (PPV) of animal matter in their diet. Small shrimp, barnacles and gastropods live among and on macroalgae and seagrass. From the condition of the samples it appears these were incidentally consumed. My results suggest that *C. mydas* select the more epiphyte-free vegetation as did the turtles in Nicaragua and the Bahamas (Bjorndal 1979; Mortimer 1981; Hirth 1997).

Bottom Material

Bottom material could easily have been consumed at the time of grazing by *C. mydas* that forage on closely cropped plants. Amounts consumed were not great enough to suggest that turtles might be utilizing rock or shell to aid in digestion like many birds do. It was not possible to determine whether the plastic consumed at South Bay, Jennings Cove or the Trident Basin was part of flotsam or was incidentally consumed when turtles foraged near the bottom. Results showed that the highest PPV of consumption of plastic ingestion was at the Trident Basin site (1.0 %) and the frequency of occurrence (FO) was 5.2% of the population. Ingestion of plastic for the other four sites ranged from 0 to 0.2%. The highest FO for plastic was 7.0% for the Jennings Cove green turtle diet (Table 2). Ingestion of plastics is not uncommon in *C. mydas* (Balazs 1985).

Mosquito Lagoon

Mendonca (1983) used radio and sonar telemetry to track the daily patterns of juvenile *C. mydas* in Mosquito Lagoon in 1978. She concluded that juvenile green turtles in Mosquito Lagoon displayed seasonal activity patterns based on water temperature changes. At water temperatures above 25 °, green turtles adopted a home range. *C. mydas* also exhibited definite bimodal activity patterns, evident mostly in summer. The feeding ecology of *C. mydas* was studied during this same period.

Mendonca (1983) also collected data from a cold stun event that occurred in 1977. The green turtles that died during the cold stun event of 1989 showed similar amounts of seagrass in their diet as the green turtles that Mendonca studied. In her study, size-class was expressed in terms of body mass. Tracked and lavaged turtles weight ranged from 11.7 -54.5 kg. By comparison the body weight of the turtles examined from the 1989 cold stun event ranged from 3.2 - 49.5 kg. When Mendonca compared the lavage samples content to the dissected stomach contents, there were no significant differences in mean percent biomass by wet weight of any of the food items. The results of her sampling indicated no seasonal significance in foraging components (Mendonca 1983). The results of this study could not be compared for seasonal differences (all sampling was from December 1989). The PPV was highest in the *C. mydas* diet for *Syringodium filiforme* during both studies.

South Bay

The *C. mydas* population of South Bay has been studied since 1982 (Ehrhart et al. 2001). High capture rates are characteristic of the winter and spring months. Low tag return and recapture rates have given little insight into the foraging and movement patterns of this population. This leads biologists there to believe that *C. mydas* may not stay in the area but instead just migrate through, spending a very limited amount of time here (Ehrhart et al. 2001). In the future, tracking *C. mydas* with radio and sonic

equipment could help locate migration corridors and duration times of *C. mydas* activities.

Jennings Cove

Jennings Cove is the first study site that has focused on marine turtles of the Southern Indian River Lagoon System (IRLS). Netting began at Jennings Cove in the fall of 1998. The preliminary results of this work have shed light on another previously unexplored developmental habitat. The study area may be unique in its support of larger size-class animals. *C. mydas* could be migrating from here into the Caribbean adult foraging grounds for their reproductive years.

Reef

Ehrhart originally began netting over the coastal nearshore reef (the Reef site) in 1989 (Ehrhart 1992). Work is performed only during the summer months due to weather conditions. The abundance of *C. mydas* captured in just a few months out of the year has reinforced the significance of this developmental habitat. Low recapture rates and significantly high catch-per-unit-effort (CPUE) earmark this area as developmental habitat (Holloway-Adkins et al. 2000). Future plans for beach nourishment may impact this nearshore habitat. It will remain important to monitor the

area for environmental changes that alter the macroalgae composition, which in turn may affect this juvenile green turtle population.

Conclusion

Some study areas in Hawaii, Australia and the Caribbean allow visual observations of *C. mydas* in their habitat (Hirth 1997). Fisherman have reported seeing the same green turtle under a given rock in Nicaragua (Carr 1956; Hirth 1997). SCUBA divers have been able to track turtles at their sleeping sites for consecutive seasons (Balazs et al. 1994). Unfortunately, none of the East Coast Florida study areas has consistent working visibility. Knowledge about *C. mydas* movements in the wild would help to answer questions of developmental habitat use and migration corridors. It would also give us insight into the environmental conditions impacting sea turtle health and assist in making decisions that impact the recovery of *C. mydas*.

CHAPTER TWO: TOXIC DINOFLAGELLATES

Introduction

Red tide is the term used to describe the water discoloration caused by a bloom of certain species of toxic dinoflagellates (Tester and Steidinger 1997). Extensive red tide events have been responsible for the death and stranding of fish, dolphins, manatees and sea turtles (Steidinger et al. 1973; O'Shea et al. 1991; Landsberg and Steidinger 1998). In the waters surrounding peninsular Florida the responsible dinoflagellate (or microalga) is frequently *Gymnodium breve* (Murphy et al. 1975; Roberts 1979; Tester and Steidinger 1997). These species expel noxious "gases" causing respiratory difficulties in humans and animals. They are also responsible for massive fish kills. Blooms of other toxic dinoflagellate species have caused the costly closures of oyster and clam beds and are responsible for paralytic and diarrhetic shellfish poisoning (i.e., PSP, DSP) (Tester and Steidinger 1997). Dinoflagellates causing the disease ciguatara in certain species of reef fish are responsible for human deaths and illness worldwide (Norris et al. 1985; Gillespie et al. 1985; Bagnis et al. 1985). While dinoflagellate bloom events have been recorded for centuries as natural phenomena, concerns now have focused around the impact of "unnatural" human eutrophication of coastal waters.

Environmental cofactors may effect green turtle health (Herbst and Klein 1995). The disease fibropapillomatosis (FP) appears to be strongly associated with habitat type (Herbst and Klein 1995). *Chelonia mydas* populations in low-flushing areas (marine embayments) have a higher prevalence of the disease (Herbst and Klein 1995). Large aggregations of *C. mydas* would be more readily exposed to infectious diseases in these habitats. Brackish estuaries may provide optimum environmental conditions for disease transmission and survival (Herbst and Klein 1995). Toxic dinoflagellates have been implicated in the possible promotion of FP (Landsberg et al. 1999). Okadaic acid (OA) produced by species of *Prorocentrum* has been experimentally shown to induce skin papillomas and carcinomas in mice (Amtmann et al. 1984; Suganuma et al. 1990; Fujiki and Suganuma 1993). The acid inhibits protein phosphatase types 1 and 2A. When these enzymes are inhibited protein phosphorylation increases, disrupting normal intracellular processes that include metabolism, gene transcription and cytoskeletal structure maintenance (Landsberg et al. 1999). Dinoflagellate species found to contain okadaic acid compounds are *Prorocentrum lima*, *P. concavum*, *P. hoffmanianum* and *P. belizeanum* (Murakami et al. 1982; Dickey et al.1990; Aikman et al. 1993; Morton et al. 1998). *Prorocentrum mexicana* also produces a toxin similar to that of *P. concavum* (Tindall et al.1989). All of these species form a mucilaginous attachment to their substrate (usually macroalgae and seagrasses) and live as epiphytes for most of their life cycle (Fukuyo 1981).

Preliminary evidence produced in a study conducted in the Hawaiian Islands indicated that there was an association between the distribution of FP and the

distribution of benthic *Prorocentrum* species known to produce OA (Landsberg et al. 1999). This study will focus on five study areas on the East Coast of Florida to determine whether a similar association with FP can be found.

Study Sites

Please refer to chapter one for descriptions of study sites.

Methods

Substrate Sampling

Procedures for the collection and processing of epiphytic material was provided by Florida Marine Research Institute (FMRI) in St. Petersburg, Florida. This procedure is modified from Bomber et al. 1989; Ballantine et al. 1988; and Steidinger 1979. Available foraging materials were selected seasonally at each site. Vegetation samples were taken near the netting sites at each study area. Thirty grams of macroalgae, seagrass and available bryozoans, that were morphologically similar to macroalgae, were collected. These were placed in individual Ziplock™ bags and 100 ml of packaged seawater mix was added. The bags were shaken vigorously for 20 seconds and 50 ml was decanted into a 250 ml Nalgene smoke-plastic jar. Formalin preservative was added

to obtain a 5% solution. Unidentified macroalgae were placed in labeled Ziplock™ bags in the freezer or in jars with formalin.

Identification and Enumeration of *Prorocentrum*

A World Precision Instruments Model P.I.M. III inverted microscope with phase contrast was used to identify and enumerate species of *Prorocentrum* among the preserved samples. The first phase of analysis was to determine the presence/absence of *Prorocentrum* cells. The samples were allowed to settle for 12 hours or more. One 3 ml aliquot was drawn with a standard graduated plastic pipette from the concentrated settlement at the bottom of the jar and placed into a tissue chamber slide. The samples were then visually scanned at 250X for *Prorocentrum* cells. The second phase of analysis, quantification of *Prorocentrum*, was performed for substrates that were among the five most consumed by *C. mydas* at their respective study sites. A 2 ml aliquot was extracted from the sample and delivered into a tissue slide chamber via pipette. The aliquot was allowed to settle for 12 hours and then viewed with the inverted microscope to count cells. Enumeration was performed at 250 X, species identification was made at 450 X and 600 X with phase contrast. Marine phytoplankton text and references were used for identification, as well as cultured, preserved specimens provided by Florida Marine Research Institute (Tomas 1997). Quantification of *Prorocentrum* was expressed as cells per gram of substrate (cells/gram) for the wet weight of macroalgae or seagrasses (Steidinger 1979).

Results

Forty-four species of macroalgae, 3 seagrasses and 2 bryozoans were examined for the presence of toxic cells of *Prorocentrum* (Appendix J - N). *Prorocentrum* was found on 27 of these substrates.

Presence/Absence of *Prorocentrum*

Eleven of the 17 substrates examined from Mosquito Lagoon waters exhibited *Prorocentrum*. Three of these substrates (*Syringodium filiforme*, *Halodule wrightii* and *Gracilaria* spp) are components of the *C. mydas* diet (Appendix J). Fifteen substrates were examined at the South Bay study area. Five species had *Prorocentrum*; three of these are part of the *C. mydas* diet (Appendix K). At the Jennings Cove site, 20 substrates were examined. Nine contained *Prorocentrum*; four are components of the *C. mydas* diet (Appendix L). There were 14 substrates examined for the Reef site. Three macroalgae contained *Prorocentrum* and one of those is part of the *C. mydas* diet (Appendix M). The Trident Basin study area had 4 substrates that were examined for *Prorocentrum* (3 macroalgae and one bryozoan). *Prorocentrum* were found on all four (Appendix N).

Prorocentrum Seasonal Sampling

From Mosquito Lagoon, *Syringodium filiforme*, *Halodule wrightii* and *Gracilaria* spp were selected for quantification. There were no winter samples for *S. filiforme*. These three species are in the top five PPV of the diet for *C. mydas* at Mosquito Lagoon and represent 96.8% of the diet (Figure 6).

Five of the highest PPV items that were in the South Bay *C. mydas* diet were reviewed for quantification. All five items were not available for sampling in every season. *Bryothamnion seaforthii*, *Solieria filiformis* and *Halodule wrightii* were sampled during the spring and summer seasons. *Gracilaria* spp was sampled in the fall. Together these substrates make up 78.6% of the *C. mydas* diet in the area (Figure 7).

For Jennings Cove, *Syringodium filiforme*, *Halodule wrightii* and *Gracilaria verrucosa* were selected for quantification. For *Gracilaria* a spring sample was the only one available. *Halodule wrightii* was not available for winter quantification. The three species examined constitute 42.4% of the diet and are in the top five PPV items consumed by *C. mydas* at Jennings Cove (Figure 8).

The two substrates available for quantification from the Reef site were *Bryothamnion seaforthii* and *Gelidium* spp. These two substrates are in the top five PPV of the diet and constitute 22.6% of the diverse Reef *C. mydas* diet (Figure 9). The sampling for the Reef site was done in summer only.

The Trident Basin study area was the least accessible for sampling. Security clearance and boat accesses to the area are restricted. On my last attempt at a summer

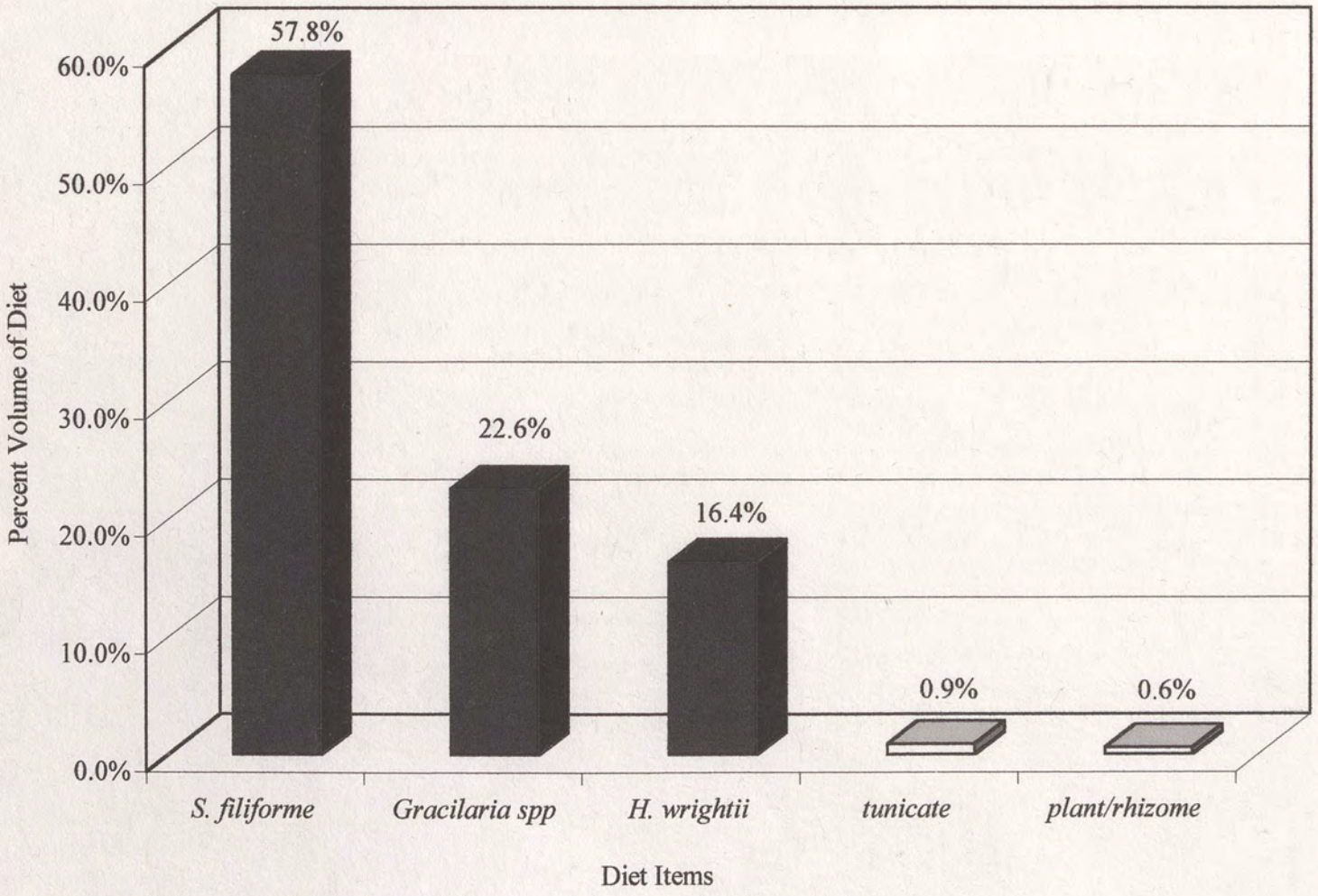


Figure 6. Mosquito Lagoon diet. Percent volume in relation to *Prorocentrum* The top population percent volume items in the diet of *C. mydas* at Mosquito Lagoon. Black columns represent diet items that are also substrates for toxic species of *Prorocentrum.*

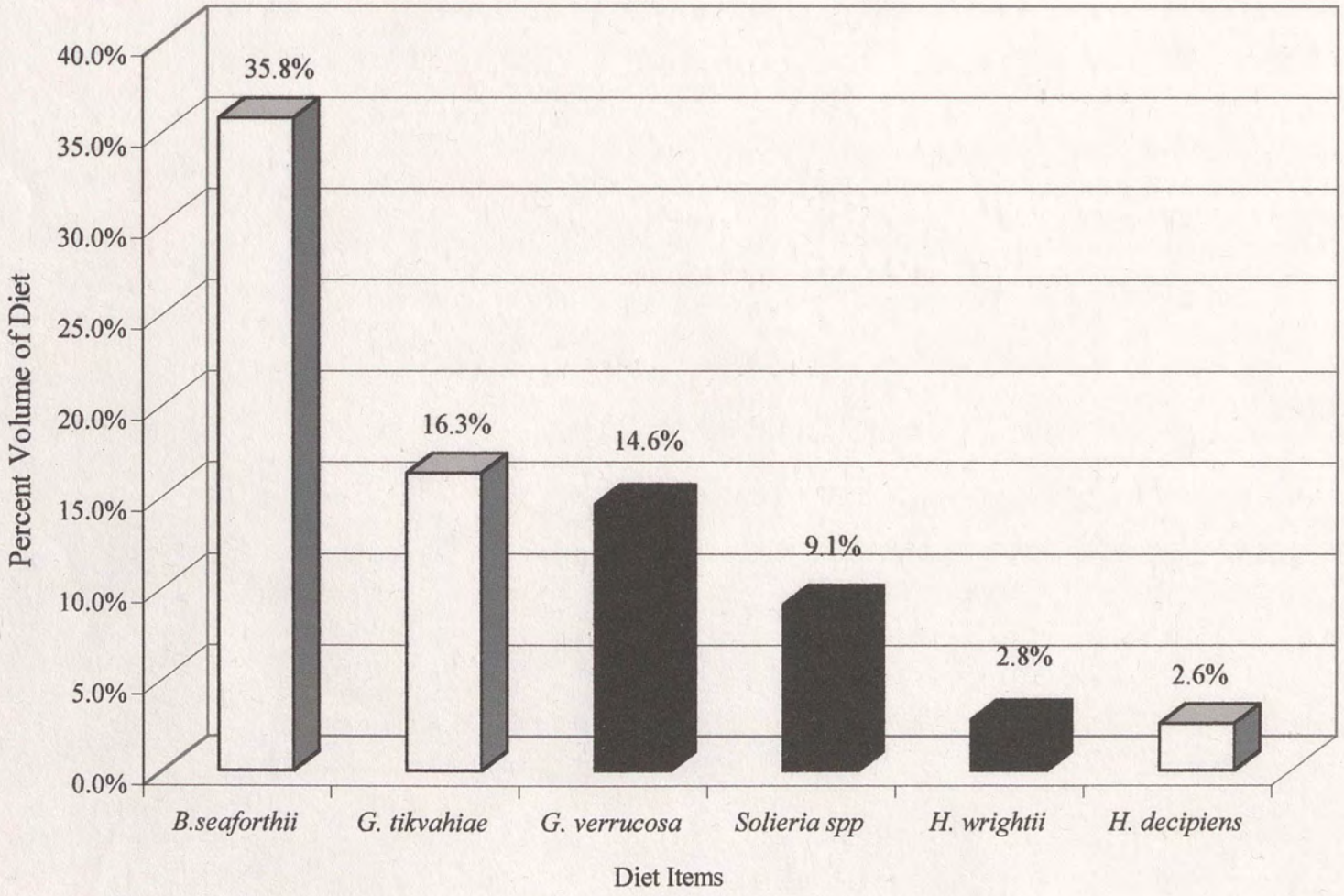


Figure 7. South Bay diet. Percent volume in relation to *Prorocentrum*. The top population percent volume items in the diet of *C. mydas* at South Bay. Black columns represent diet items that are also substrates for toxic species of *Prorocentrum.*

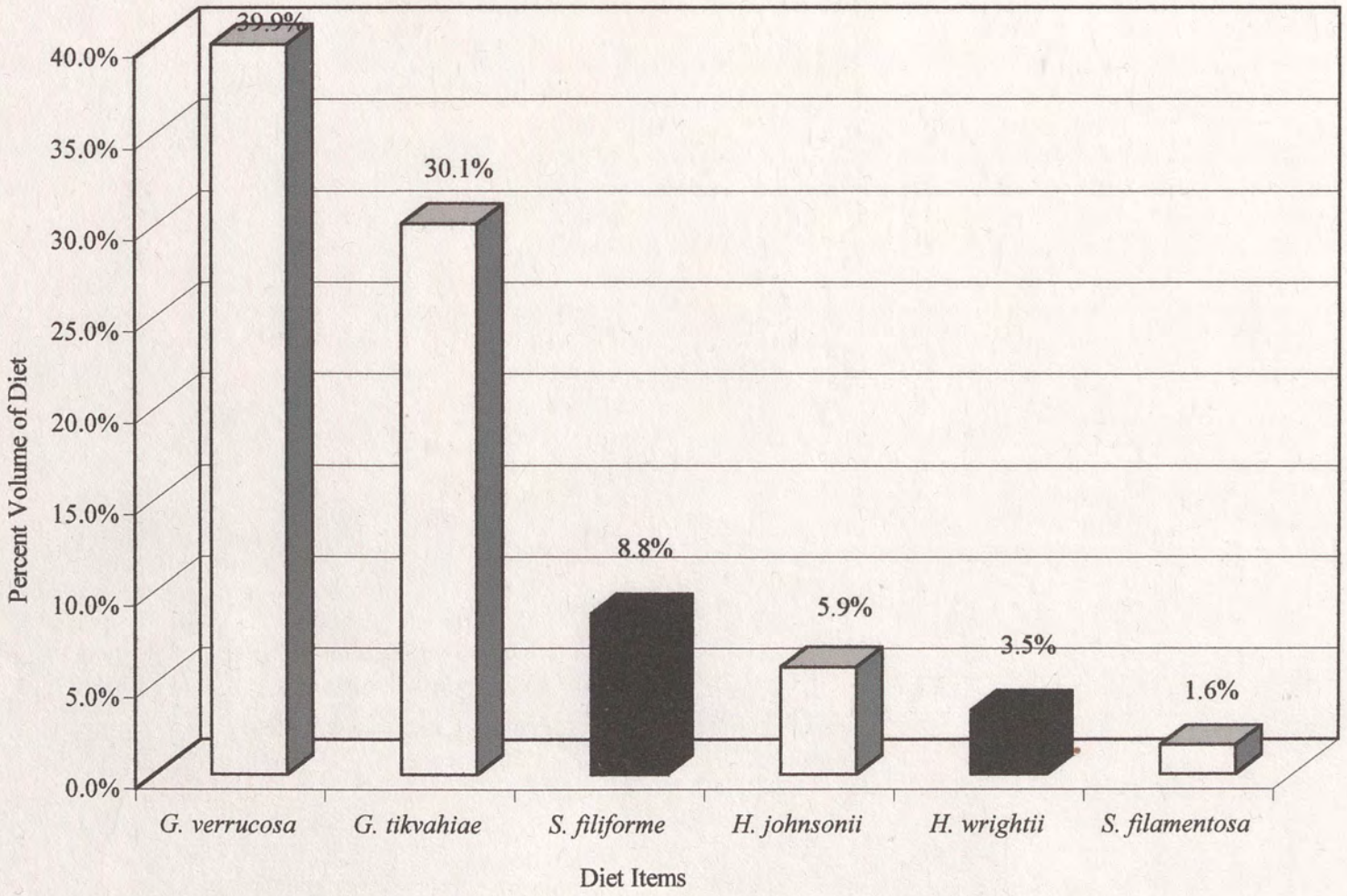


Figure 8. Jennings Cove diet. Percent volume in relation to *Prorocentrum* . The top population percent volume items in the diet of *C. mydas* at Jennings Cove. Black columns represent diet items that are also substrates for toxic species of *Prorocentrum.*

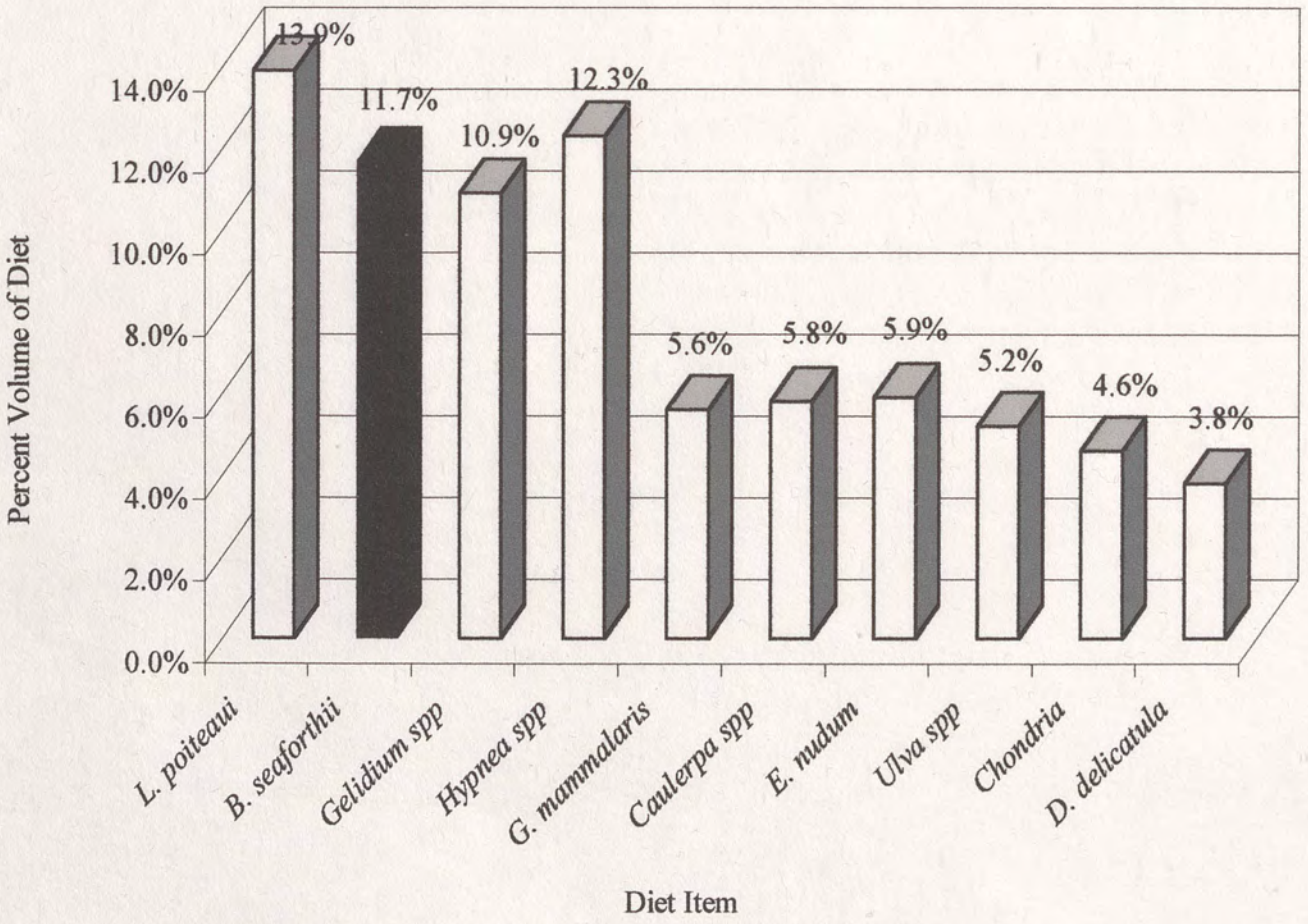


Figure 9. Reef diet. Percent volume in relation to *Prorocentrum.* The top population percent volume of items in the diet of *C. mydas* at the Reef site. Black columns represent diet items that are also substrates for toxic species of *Prorocentrum* .

sampling I found that the port work crew had scraped the macroalgae down around the wharf area when they "cleaned" the ship docking camels. The macroalgae growing on the rock rip-rap at that time were less than 10 mm high. Samples of *Gelidium* spp were available for spring and winter. *Ulva* spp was sampled in the fall, winter and spring. These two species are among the top 5 PPV of the diet and constitute 54.4% of Trident Basin *C. mydas* diet (Figure 10).

Prorocentrum Quantification Results

Prorocentrum abundance is expressed as cells (of *Prorocentrum*) per gram of the wet weight of the vegetation (macroalga or seagrass) and is written cells/gram. For Mosquito Lagoon, *Prorocentrum* on *Halodule wrightii* averaged 20.0 cells/gram and ranged from 6.7 to 40.0 cells/gram (Table 9). *Syringodium filiforme* averaged 53.3 cells/gram. The largest number of cells/gram was found in the summer sample for *S. filiforme*. For *Gracilaria* spp, *Prorocentrum* cells averaged 55.6 cells/gram of macroalgae (Table 9). At the South Bay study area, *Prorocentrum* was not detected on *Bryothamnion seaforthii* in the summer or spring. For *Solieria* spp, *Prorocentrum* cells ranged from 0 to 6.67cells/gram. *Halodule wrightii* had *Prorocentrum* in the spring but not in the summer sample. *Gracilaria verrucosa* had 8.0 cells/gram of *Prorocentrum* (Table 9). Substrates at Jennings Cove had the greatest number of cells/gram of *Prorocentrum* of all the sites. *Halodule wrightii* had counts of 20.0 cells/gram in the

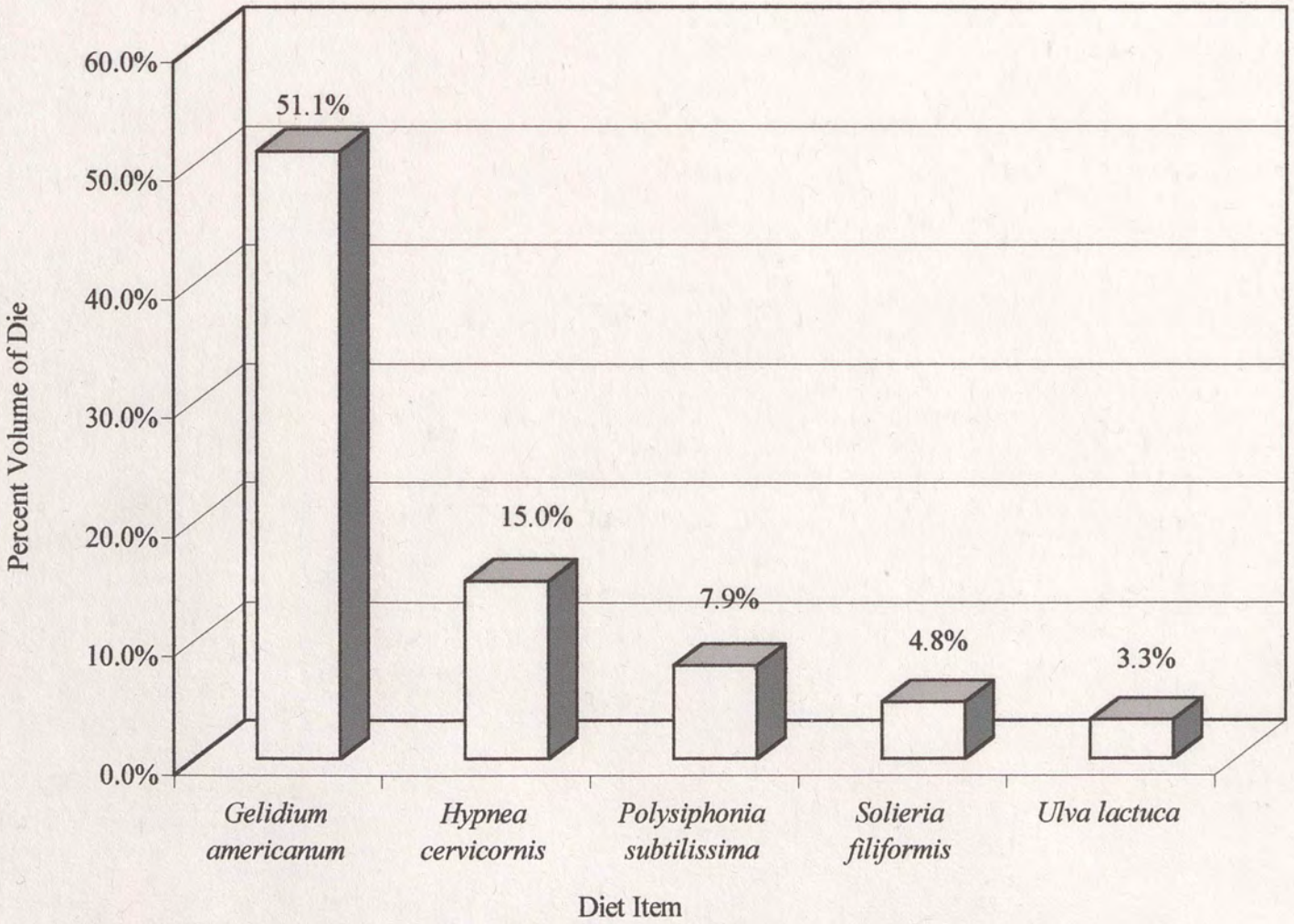


Figure 10. Trident Basin diet. Percent volume in relation to *Prorocentrum* .The top population percent volume items in the diet of *C. mydas* at the Trident Basin (there were no diet items that were also substrates for toxic species of *Prorocentrum*)

Table 9. Cell counts of *Prorocentrum* in cells/gram (macroalgae or seagrass) of diet items for Lagoon study areas. Tables are arranged by study area and seasons are represented as: U = summer, S = spring, W = winter, F = fall.

Study Area	Substrate	Season	cells/gram
Mosquito Lagoon	*H. wrightii*	W	20.00
	H. wrightii	S	40.00
	H. wrightii	U	6.67
	H. wrightii	F	13.33
	S. filiforme	S	53.33
	S. filiforme	U	106.67
	S. fiiforme	F	0.00
	G. tikvahaie	W	13.33
	G. verrucosa	W	53.33
	Gracilaria	S	140.00
	Gracilaria	U	20.00
	Gracilaria	F	6.67
South Bay	*B. seaforthii*	U	0.00
	B. seaforthii	S	0.00
	Solieria spp	S	6.67
	Solieria spp	S	0.00
	Solieria spp	U	0.00
	H. wrightii	U	0.00
	H. wrightii	S	13.33
	G. tikvahiae	F	0.00
	G. verrucosa	F	8.00
Jennings Cove	*H. wrightii*	F	20.00
	H. wrightii	U	100.00
	H. wrightii	S	370.00
	S. filiforme	F	0.00
	S. filiforme	W	104.00
	S. filiforme	U	86.67
	S. filiforme	S	253.33
	G. verrucosa	S	0.00

fall, 100.0 cells/gram in the summer and 370.0 cells/gram of *Prorocentrum* in the spring. The number of cells of *Prorocentrum* from *Syringodium filiforme* in the spring was 253.3 cells/gram. *Gracilaria* at Jennings Cove was examined in the spring and the sample did not contain any *Prorocentrum* cells (Table 9). Cell counts of *Prorocentrum* for the Reef site vegetation were very low by comparison to the three above sites. *Bryothamnion seaforthii* had 6.6 cells/gram in the samples from two separate months that were examined. No other substrates were found to support *Prorocentrum* cells (Table 10). At the Trident Basin, *Prorocentrum* cells were not detected from any of the samples of vegetation (Table 10).

Discussion

Chelonia mydas in Mosquito Lagoon and Jennings Cove are potentially exposed to okadaic acid in their diet. The large number of cells of *Prorocentrum* at these two sites supports the idea that the presence of toxic *Prorocentrum* and FP has a close association. The mean straight carapace length (SCL) of juvenile *C. mydas* from both of these study sites was greater than the other three sites. The mean SCL of *C. mydas* at Mosquito Lagoon was 52.3 cm. The mean SCL was 53.9 cm for Jennings Cove *C. mydas*. South Bay and Reef *C. mydas* had a mean SCL of 41.6 cm and 42.6 cm, respectively. *C. mydas* at the Trident Basin were significantly smaller than the four other sites (Figure 3). The mean SCL for Trident Basin *C. mydas* was 31.3 cm. *C. mydas* at Mosquito Lagoon and Jennings Cove had the highest mean prevalence of

Table 10. Cell counts of *Prorocentrum* in cells/gram (macroalgae or seagrass) of diet items for the Trident Basin and Reef sites. Tables are arranged by study area and seasons are represented as: U = summer, S = spring, W = winter, F = fall.

Study Area	Substrate	Season	cells/gram
Reef	*B. seaforthii*	S	6.6
	B.seaforthii	U	6.6
	B.seaforthii	S	0
	Gelidium spp	U	0
	Gelidium spp	S	0
	Ulva lactuca	U	0
Trident Basin	*Gelidium*	W	0
	Gelidium	S	0
	Gelidium	S	0
	Ulva spp	W	0
	Ulva spp	S	0
	Ulva spp	S	0
	Ulva & Entero	F	0

FP among the five populations; 72.0% and 63.8%, respectively. The green turtles in both of these areas would be classified as near subadult, giving them a longer exposure time over their lifespan to accumulate OA and also to be exposed to the herpesvirus.

It has been suggested that *C. mydas* in South Bay pass through in a north to south migratory movement (Ehrhart et al. 2001). Poor visibility, low recapture rates and a low number of tag returns from the area have made determination of site fidelity or migratory movement difficult to assess. Radio and sonic telemetry would be the most efficient method for further investigations into the location of *C. mydas* activities. Information regarding migration corridors and foraging grounds would give biologists more insight into potential areas of exposure to OA and FP.

The Reef site differs the most from the other study areas. Conditions favored the abundance and diversity of macroalgae over this nearshore area. In the diet analysis, *C. mydas* consumed more than twice as many types of macroalgae at the Reef site than at the other sites (Table 1). Catch per unit effort (CPUE) is calculated by the number of turtles captured for every 1,000 m of net during one hour of net soak time. Currently, the CPUE at the Reef site is unequaled by any other marine turtle netting project, in other words, nowhere are there as many turtles captured in a limited amount of time. If dense concentrations of green turtles conveys increased susceptibility to herpesvirus exposure then the Reef site would favor herpesvirus transmission (Holloway-Adkins et al. 2000). However, preliminary data indicate that oceanic conditions are not conducive for *Prorocentrum* attachment or the transmission of the herpesvirus associated with FP (Bomber et al. 1988; Herbst and Klein 1995).

Prorocentrum spp prefer to settle and attach to drift macroalgae (Bomber et al. 1988). The macroalgae provide micronutrients for *Prorocentrum* as well as transport (Bomber et al. 1989). *Prorocentrum* settlement and substrate requirements may be limiting factors, e.g., at the Trident Basin. The vegetation that grows along the rock rip-rap in the Trident Basin is usually cropped below 10 mm in length by *C. mydas* (Redfoot 1997). *Hypnea* spp and *Gelidium americanum* were difficult to identify due to the morphological distortions caused by significant cropping. When *Ulva* spp, *Enteromorpha* spp and *Zoobotryon verticillatum* (a bryozoan) were examined for the presence/absence of *Prorocentrum,* toxic cells were found in the subsample. However, the subsamples were taken directly from the bottom of settled concentrations of the original sample. When the quantification procedure was later performed according to diet, there were no toxic cells present on these same macroalgae. My interpretation of this discrepancy is that there were not significant amounts (< 1 cell/gram) of *Prorocentrum* on the dietary substrate. *Prorocentrum* cell abundance may be extremely low at the Trident Basin simply because there is not enough available substrate for attachment, growth and reproduction. The Trident Basin has regular tidal exchange similar to the nearshore reef and this may be another reason why *Prorocentrum* is uncommon in this area (Bomber et al. 1989).

There does appear to be an association between both the presence and abundance of *Prorocentrum* at the Mosquito Lagoon and Jennings Cove study areas and the fibropapilloma disease. Also, perhaps of equal significance is the absence of FP in the Trident Basin population and the failure to demonstrate *Prorocentrum* cells during

the quantification process. Full assessment of *Prorocentrum* and its production of OA as a primary tumor promoter in these locations will require further investigation. Ideally, testing *C. mydas* consumption levels of OA and cutaneous applications of OA in laboratory conditions would yield the clearest results of the okadaic acid hypothesis. However, the objective of conserving endangered species conflicts with this approach, making experimental demonstration on *C. mydas* impractical. Application of OA to alternate chelonian species may be useful. Testing the impact of okadaic acid applications on alternate reptiles will lend more insight into the potential effects of okadaic acid and it's impact on *C. mydas* in the wild (P. Klein pers.comm.).

APPENDIX A

Morphometrics and Fibropapillomatosis (FP) Status for Mosquito Lagoon Green Turtles

APPENDIX A. Morphometrics and Fibropapillomatosis (FP) Status for Mosquito Lagoon Green Turtles.

I.D. No.	SCL	Weight	FP?	I.D. No.	SCL	Weight	FP?
1	52.4	17.6		53	69	44.2	
3	53.2	22.6		55	63.3	35.8	
4	44.7	11		57	42	9.2	
5	37.2	6.3		58	53.7	21.9	
7	33.7	4.9		59	59.2	28.6	
8	28.1	3.2		60	61.8	36.7	
9	44.9			61	51	17.5	
10	38.8	8.2		62	47.9	13.2	
11	62.5			63	36	6.9	
12	61.6	32.2	Yes	65	32.1	5	
13	52.7	17.9		66	33	4.3	
14	55.7			A6540			
15	57.5	26		A6582			
16	72.7	49.5		unk			
17	71.1	47.5		unk			
18	43	13.1		XX003			
20	60.5	33.5					
21	44.2	13					
24	48.3	16.1					
25	53.1	17					
26	30.4	3.7					
28	32.7	4.7					
29	36.8	6.6					
30	60.9	31.5					
32	59.5	29					
33	50.4	19					
34	63.3	37					
36	60.3	28.5					
37	60.6	28					
38	39.9	7.3					
39	66	39.4					
40	67	45.1					
42	49.7	17.3					
43	51.9						
45	38.6	8.8					
46	60	29.6					
47	59.2	28.5					
48	65.7	38.1					
49	65	38.1					
50	47.3						
51	50.5	19					
52	50.5	19.6					

APPENDIX B

Morphometrics and Fibropapillomatosis (FP) Status
for South Bay Green Turtles

APPENDIX B. Morphometrics and Fibropapillomatosis (FP) Status for South Bay Green Turtles.

Tag No.	SCL	Weight	FP?	Tag No.	SCL	Weight	FP?
BP5591, X6097	53	28	Yes	X8191, X8192	57.7	25.3	
BP3291, X6024	36.3	6.7	Yes	X8275, X8276	51.7	19	Yes
BP5573, X6089	42.6	9.4		BP8243, X6812	43.5	10.7	
BP5525, X6059	37.7	6.7		BP8177, X6527	44.9	12.5	Yes
BP5583, x6093	41.6	10.4	Yes	X6810, X6811	43.2	15.4	Yes
BP8240, X6806	38.2	8.7		BP8253, X6822	42.2	10	
X7905, X7906	58.2	33.5		X6851	38.6	7.7	Yes
BP7279, X6442	39.8	17.6	Yes	BP8251, X6820	39.7	8.3	Yes
X8113, X8114	56.8	33.5		BP7209, X6489	38.5	7.5	Yes
BP8263, X6789	38.3	7.4		BP7206, X6485	43.5	12	
X7903, X7904	51.7	22.2		BP7278, X6439	39.6	7.7	Yes
X7907, X7908	49.2	22.6	Yes	BP7186, P2656	41.5	10.2	
BP8172, X6650	35	5.4	Yes	BP7163, P2654	33.7	4.9	Yes
X8067, X8068	61.3	35.3		BP7147, X6376	37.1	6.8	
X8048, X8047	53.5	29.9	Yes	BP7141, X6321	31.5	4.4	Yes
X8037, X8038	48.9	65.4		BP7270, X6431	50	15	
X8049, X6797	45.7	18.1	Yes	BP7272, X6433	42.9	10.3	
BP8159, X6698	50.2	19		BP4546, X4746	31.2	3.8	
BP8205, X6731	51.8	23.5		BP4543, X4743	37.6	7.4	Yes
BP8165, X6691	46	12.6					
X8211, X8212	63.5	40.8					
X8226, X8227	63.2	34.4					
BP8174, X6802	34.3	5	Yes				
X8138, X8140	49.4	28.1					
X8005, X8006	44	11.2	Yes				
X8007, X8009	48.5	24.4	Yes				
BP8204, X6730	34.1	5.5	Yes				
BP7179, P2673	43.7	11	Yes				
X8003, X8004	35.6	6.3	Yes				
BP8134, X6637	44.6	11.2	Yes				
BP7181, X6476	45.1	11	Yes				
X8069, X4739	54.5	28					
BP8281, X8062	41.1	9.7					
BP8145, X6646	51.6	16	Yes				
BP8133, X6636	37.6	6.4	Yes				
BP8242, X6811	43.2	15.4	Yes				
BP8315, X6859	66.7	48.9					
BP8282, X6835	59.5	32.6					
BP7169, X6397	38.5	7.2	Yes				
X8146, X8147	44.8	11.8					
X8144, X8145	55.1	26.2					
X8010, X8011	39.7	8.1	Yes				

APPENDIX C

Morphometrics and Fibropapillomatosis (FP) Status for Jennings Cove Green Turtles

APPENDIX C. Morphometrics and Fibropapillomatosis (FP) Status for Jennings Cove Green Turtles.

Tag No.	SCL	Weight	FP?	Tag No.	SCL	Weight	FP?
XXC011,XXC0	51		Yes	XXH651,XXH6:	42.3	10.9	Yes
XXE809,XXE8	42.8		Yes	XXH655,XXH6:	51.3	19.5	Yes
XXE811,XXE8	59.8	29.5	Yes	XXH628, XXH6	33.1	5.4	
XXE821, XXE8	55.9	25.4		XXH633, XXH6	57.1	21.8	Yes
XXE815, XXE8	71	49.9		XXE883, XXE8:	49.2	15.9	Yes
XXE819, XXE8	57.8			baby food jar			
XXE823, XXE8	52.0	21.80	Yes	label			
XXE826, XXE8	59.4	31.8	Yes	XXE846, XXE8·	41.1	9.5	Yes
XXE828, XXE8	57.5	23.6	Yes	XXE838, XXE8:	72.1	49.9	
XXE842, XXE8	64	37.2	Yes	XXH650,XXH6:	48.6	15.4	Yes
XXE830, XXE8	65.2	37.2		XXH648, XXH6	59	25.4	
XXE836, XXE8	67.6	41.7		XXH658, XXH6	32.7	5	
XXE832, XXE8	51.2	22.2	Yes	XXD752,XXD7:	44.9		
XXE834, XXE8	65.8	36.2	Yes	XXH660, XXH6	48.7	15.4	Yes
Pit # 50325A18·	42	9.1	Yes	XXH663	50.1	17.2	Yes
XXE859,XXE8(	56.5			unk			
XXE866, XXE8	57.1	23.6	Yes				
XXE868, XXE8	61.7	29	Yes				
XXE863, XXE8	61.4	29.9	Yes				
XXE862, XXE8	63.5	31.3					
XXE869, XXE8	37.5	6.4	Yes				
XXE877	34.4	5.9	Yes				
XXE833, XXE8	51.9	22.7	Yes				
XXE894, XXE8	63.6	31.8	Yes				
XXE899, XXE9	56	32.7					
X6856, X6855	40.5	10.9	Yes				
XXE892, XXE8	66.8	41.7	Yes				
XXE896, XXE8	46.1	13.6	Yes				
XXH608, XXH(	49	15.9	Yes				
XXH613, XXH(	54.3	22.7	Yes				
Pit #502F60134·	47.9	18.1	Yes				
XXH616, XXH(	46.7	15	Yes				
XXE877 (recap)	35.2	6.4	Yes				
XXH603, XXH(	66.9	38.1					
XXH618, XXH(	44.6	13.6					
XXH610, XXH(	49.1	19.1	Yes				
XXH605, XXH(	57.4	29.5					
XXH622, XXH(	67.9	41.7	Yes				
XXH626,XXH6	55	22.7					
XXH624,XXH6	65.1	37.2					
XXH653,XXH6	42.8	10.9	Yes				

APPENDIX D

Morphometrics and Fibropapillomatosis (FP) Status
for Reef Site Green Turtles

APPENDIX D. Morphometrics and Fibropapillomatosis (FP) Status for Reef Site Green Turtles.

Tag No.	SCL	Weight	FP?	Tag No.	SCL	Weight	FP?
BP8373, P6783	40.7	9.9		BP8308, P6608	50.8	24.4	
P5109, P5107	28.5	3		BP8323, P6618	36.7	6.9	
BP8364, P6776	54.1	28		BP8372, P6782	46.5	12.8	
BP8363, P6646	30	3.7		BP8326, P6620	42.9	10.1	
BP8376, P6788	59.2	35.3		BP8334, P6628	53.4	28.1	Yes
BP8383, P6793	44.8	11.1		BP8336, P6630	57.4	34.4	
BP8379, P6791	39.4	9.9		BP8297, P5122	44.2	10.3	
BP8270, P5114	42.6	10.2		BP7095, N9022	53.3	25	
BP8374, P6784	57.5	29.9	Yes	BP7115, P2618	36.4	6.4	
BP8268, P5112	33.4	5.5		BP7102, P2602	50.9	23	Yes
BP8398, P6885	45.5	11.1	Yes	BP7108, P2611	33.7	5	
BP7300, P2692	41.7	10.2	Yes	P6866, P6867	54.7	27.1	
BP8272, P5115	60.2	33.9		P6852, P6833	41.7	9.1	
BP8362, P6650	34.6	4.8		P6872, P6873	33.5	4.6	
BP8366, P6647	38.2	6.9		P6828, P6829	45.4	11.9	Yes
BP8378, P6789	32.9	4.5	Yes	P6870, P6871	33.3	4.3	
BP8335, P6629	27	2.7		P6874, P6875	42.5	10.2	
BP8271, P5108	31.9			P6830, P6831	60.6	37.1	Yes
BP8267, P5106	34.6	5.9	Yes				
BP8381, P6792	35.3	5.8					
BP8370, P6780	48.4	14.7	Yes				
BP8369, P6779	41	8.8					
BP8365, P6648	47	13.3	Yes				
BP8367, P6777	46.5	13.3	Yes				
BP8319, P6614	61.9	36.7	Yes				
BP8269, 5111	36	6	Yes				
BP8396, P6883	40.9	8.7	Yes				
BP8273, P5116	55.5	31.7					
BP8325, X6185	39.4	8.3					
BP8320, P6616	32	4.6					
BP8274, P5113	51.2	20.8					
BP8371, P6781	39.3	7.4					
BP8338, P6633	40.4	9					
BP8328, P6622	40.5	9.5					
BP8318, P6615	45.7	12.6	Yes				
BP8322, N9024	33	4.8					
BP8382, P6787	40.1	8.6					
BP8316, P6612	58.1	33.7	Yes				
BP8356, P6641	53.5	26.3					
BP8375, P6786	57.8	31.7					
BP8324, P6619	49.5	21.7					

APPENDIX E

Morphometrics and Fibropapillomatosis (FP) Status for Trident Basin Green Turtles

APPENDIX E. Morphometrics and Fibropapillomatosis (FP) Status for Trident Basin Green Turtles.

Tag No.	SCL	FP?	Tag No.	SCL	FP?
BP3144	23.2		BP3185	31.1	
BP5511	24.2		BP5578	31.1	
BP2635	24.5		BP3230	31.6	
BP3252	25.7		BP5564	31.6	
BP3189	26.5		BP5563	31.8	
BP5516	26.5		BP3231	32.0	
BP5560	26.5		BP3187	32.3	
BP3239	26.9		BP5616	32.8	
BP3222	27.1		BBC920	33.5	
BP3191	27.2		BP3257	33.8	
BP5515	27.2		BP5580	35.7	
BP3243	27.5		BP3229	37.4	
BP3241	27.7		BP5584	37.5	
BP3241	27.7		BP3145	37.7	
BP5596	28.1		BP2629	37.8	
BP5512	28.4		BP3228	37.8	
BP5612	28.4		BP3273	41.4	
BP3276	28.5				
BP3219	28.6				
BP3255	28.8				
BP3256	28.8				
BP3240	28.9				
BP3232	29.0				
BBE206	29.1				
BP3245	29.1				
BP3248	29.4				
BP3110	29.5				
BP3141	29.5				
BP3246	29.6				
BP5509	29.7				
BP3224	29.9				
BP3271	29.9				
BP3238	30.1				
BP3237	30.5				
BP3242	30.5				
BP5526	30.5				
BP3227	30.6				
BP3281	30.6				
BP3225	30.7				
BP3221	30.8				
BP5521	31.0				

APPENDIX F

Components of Individual Diet of Mosquito Lagoon Green Turtles

APPENDIX F. Components of Individual Diet of Mosquito Lagoon Green Turtles. 1989 cold stun at Mosquito Lagoon, Volusia County, Florida.

Date	27 Dec. 89	27 Dec. 89	26 Dec. 89	27 Dec. 89	26 Dec. 89
Tag or ID Number	62	61	1	58	17
Food Items					
Syringodium filiforme	96.40%	98.90%	85.16%	80.14%	94.56%
Halodule wrightii			13.98%	0.72%	3.54%
Halophila decipiens					
Gracilaria spp				19.14%	
Chondria spp					
Gelidium pusillum					
Ulva lactuca					
Caulerpa mexicana					
plant/rhizome					
shell,sand,grit					1.90%
tunicate					
bryozoa					
animal matter	3.60%	1.10%	0.86%		
decomposed matter					
Total	100.00%	100.00%	100.00%	100.00%	100.00%
sample weight	78.83	45.08	13.22	70.72	23.58

Date	26 Dec. 89	27 Dec. 89	27 Dec. 89	27 Dec. 89	26 Dec. 89
Tag or ID Number	16	40	36	39	25
Food Items					
Syringodium filiforme	65.64%	36.62%			1.45%
Halodule wrightii	33.01%	1.80%	0.45%	13.22%	98.55%
Halophila decipiens					
Gracilaria spp	0.77%	49.10%	95.17%	84.39%	
Chondria spp					
Gelidium pusillum			2.11%	1.11%	
Ulva lactuca		8.74%			
Caulerpa mexicana					
plant/rhizome	0.58%		0.75%	1.27%	
shell,sand,grit		1.11%			
tunicate		2.36%	1.51%		
bryozoa					
animal matter		0.28%			
decomposed matter					
Total	100.00%	100.00%	100.00%	100.00%	100.00%
sample weight	3.51	10.9	18	36.48	35.9

Date	27 Dec. 89	25 Dec. 89	26 Dec. 89	27 Dec. 89	27 Dec. 89
Tag or ID Number	37	38	20	52	53
Food Items					
Syringodium filiforme		48.86%	40.61%	92.99%	
Halodule wrightii	100.00%	24.43%	14.68%	3.96%	91.30%
Halophila decipiens					
Gracilaria spp		24.81%			4.27%
Chondria spp					
Gelidium pusillum					
Ulva lactuca					
Caulerpa mexicana					
plant/rhizome					2.14%
shell,sand,grit		0.19%			
tunicate					
bryozoa					
animal matter		1.70%	44.71%		
decomposed matter				3.05%	2.29%
Total	100.00%	100.00%	100.00%	100.00%	100.00%
sample weight	68.77	43.16	8.83	15.12	33.2

Date	27 Dec. 89	27 Dec. 89	27 Dec. 89	26 Dec. 89	26 Dec. 89
Tag or ID Number	46	33	30	18	15
Food Items					
Syringodium filiforme	97.73%	34.16%	32.10%	90.38%	62.72%
Halodule wrightii	2.27%	46.29%	67.16%		36.79%
Halophila decipiens					
Gracilaria spp		0.45%		9.62%	
Chondria spp					
Gelidium pusillum					
Ulva lactuca					
Caulerpa mexicana					
plant/rhizome		1.80%	0.74%		0.49%
shell,sand,grit					
tunicate					
bryozoa					
animal matter					
decomposed matter		17.30%			
Total	100.00%	100.00%	100.00%	100.00%	100.00%
sample weight	34.9	4.21	111	41.84	26.64

Date	26 Dec. 89	26 Dec. 89	26 Dec. 89	27 Dec. 89	27 Dec. 89
Tag or ID Number	14	13	12	50	59
Food Items					
Syringodium filiforme	66.36%	100.00%	25.67%	95.86%	93.14%
Halodule wrightii	33.64%		10.16%	4.14%	
Halophila decipiens					
Gracilaria spp					6.86%
Chondria spp					
Gelidium pusillum					
Ulva lactuca					
Caulerpa mexicana					
plant/rhizome					
shell,sand,grit					
tunicate					
bryozoa					
animal matter					
decomposed matter			64.17%		
Total	100.00%	100.00%	100.00%	100.00%	100.00%
sample weight	48.86	3.25	3.4	73.32	169.92

Date	27 Dec. 89	27 Dec. 89	27 Dec. 89	27 Dec. 89	27 Dec. 89
Tag or ID Number	57	49	48	51	63
Food Items					
Syringodium filiforme		90.42%	69.50%	87.39%	81.83%
Halodule wrightii	11.97%	8.23%		0.91%	4.50%
Halophila decipiens		1.20%			
Gracilaria spp	8.69%		27.00%	11.70%	5.59%
Chondria spp					
Gelidium pusillum					
Ulva lactuca					
Caulerpa mexicana					
plant/rhizome					0.16%
shell,sand,grit					
tunicate	23.61%				
bryozoa					
animal matter					
decomposed matter	55.74%	0.15%	3.50%		7.92%
Total	100.00%	100.00%	100.00%	100.00%	100.00%
sample weight	93.27	46.12	59.28	56.5	150

Date	27 Dec. 89	27 Dec. 89	27 Dec. 89	26 Dec. 89	26 Dec. 89
Tag or ID Number	54	34	32	26	9
Food Items					
Syringodium filiforme	6.86%			79.71%	27.57%
Halodule wrightii	4.02%	36.74%	56.09%	20.29%	72.13%
Halophila decipiens					
Gracilaria spp	87.18%	63.26%	43.91%		
Chondria spp					
Gelidium pusillum					
Ulva lactuca					
Caulerpa mexicana					
plant/rhizome	1.04%				0.30%
shell,sand,grit					
tunicate					
bryozoa					
animal matter	0.89%				
decomposed matter					
Total	100.00%	100.00%	100.00%	100.00%	100.00%
sample weight	80.13	6.73	53.16	96.97	113.9

Date	26-Dec-89	26 Dec. 89	unk	unk	unk
Tag or ID Number	7	24	A6540	unk	A6582
Food Items					
Syringodium filiforme	64.04%	94.63%	39.97%	96.41%	22.38%
Halodule wrightii	15.62%	1.55%	60.03%	3.59%	76.08%
Halophila decipiens					
Gracilaria spp	1.74%	3.81%			
Chondria spp					
Gelidium pusillum					
Ulva lactuca					
Caulerpa mexicana					
plant/rhizome					1.55%
shell,sand,grit					
tunicate	16.09%				
bryozoa					
animal matter					
decomposed matter	2.52%				
Total	100.00%	100.00%	100.00%	100.00%	100.00%
sample weight	10.68	180	22.35	45.14	71.6

Date	unk	27-Dec-89	26-Dec-89	26-Dec-89	26-Dec-89
Tag or ID Number	XX003	28	11	21	3
Food Items					
Syringodium filiforme		27.27%	0.81%		
Halodule wrightii	2.22%		95.70%		16.26%
Halophila decipiens					
Gracilaria spp	96.73%	13.64%		99.22%	74.56%
Chondria spp					
Gelidium pusillum					
Ulva lactuca					
Caulerpa mexicana					
plant/rhizome	0.13%		3.49%		7.09%
shell,sand,grit		59.09%			1.77%
tunicate					
bryozoa					0.32%
animal matter				0.78%	
decomposed matter	0.92%				
Total	100.00%	100.00%	100.00%	100.00%	100.00%
sample weight	119.73	0.05	6.75	0.45	3.65

Date	28-Dec-89	27-Dec-89	27-Dec-89	27-Dec-89	27-Dec-89
Tag or ID Number	65	60	47	38	42
Food Items					
Syringodium filiforme	100.00%	59.43%	87.22%	90.85%	
Halodule wrightii			1.42%	6.56%	
Halophila decipiens		29.25%			
Gracilaria spp		6.84%			48.47%
Chondria spp					11.07%
Gelidium pusillum					
Ulva lactuca					20.99%
Caulerpa mexicana					
plant/rhizome		3.30%			16.79%
shell,sand,grit		0.24%	8.92%		2.67%
tunicate			2.43%		
bryozoa					
animal matter		0.94%		2.59%	
decomposed matter					
Total	100.00%	100.00%	100.00%	100.00%	100.00%
sample weight	2.65	1.32	1.65	1.9	1.11

Date	28-Dec-89	27-Dec-89	27-Dec-89	26-Dec-89	27-Dec-89
Tag or ID Number	66	55	43	8	29
Food Items					
Syringodium filiforme	20.16%	4.11%		96.58%	84.48%
Halodule wrightii	2.42%	0.61%	0.30%	3.42%	
Halophila decipiens					
Gracilaria spp	15.32%	92.54%	94.07%		
Chondria spp					
Gelidium pusillum					
Ulva lactuca					
Caulerpa mexicana	60.48%				
plant/rhizome	1.61%		0.44%		
shell,sand,grit		2.13%	5.19%		1.72%
tunicate					
bryozoa					
animal matter					
decomposed matter		0.61%			13.79%
Total	100.00%	100.00%	100.00%	100.00%	100.00%
sample weight	0.07	7.64	18.35	2.6	0.53

Date	26-Dec-89	26-Dec-89	27-Dec-89	26-Dec-89
Tag or ID Number	5	4	45	10
Food Items				
Syringodium filiforme	97.69%	94.18%	93.51%	0.63%
Halodule wrightii	2.31%	5.82%	1.27%	1.41%
Halophila decipiens				
Gracilaria spp				97.97%
Chondria spp				
Gelidium pusillum				
Ulva lactuca				
Caulerpa mexicana				
plant/rhizome				
shell,sand,grit				
tunicate				
bryozoa				
animal matter				
decomposed matter			5.22%	
Total	100.00%	100.00%	100.00%	100.00%
sample weight	3.55	12.12	3.5	6.02

APPENDIX G

Components of Individual Diet of South Bay Green Turtles

APPENDIX G. Components of Individual Diet of South Bay Green Turtles.

Date	22-Sep-95	6-Jun-95	31-Jul-95	29-Jun-95	15-Aug-95
Tag number	BP5591 X6097	BP3291 X6024	BP5573 X6089	BP5525 X6059	BP5583 X6093
Food Items					
Syringodium filiforme					
Halodule johnsonii					
Halophila decipiens					
Halodule wrightii	0.60%	0.67%	0.14%		
Halophila englemannii		99.20%			
Bryothamnion seaforthii	1.51%		63.93%		94.17%
Gracilaria verrucosa					
Gracilaria tikvahiae	25.90%	0.13%	30.08%		4.69%
Gracilaria mammillaris					
Solieria spp	71.99%				
Acanthophora spicifera					
Spyridia filamentosa					
Polysiphonia subtilissima					
Centroceros clavulatum					
Hypnea spinella					
Hypnea spp					
Chondria spp					
Lomentaria baileyana					
Enteromorpha spp spp					
E. chaetomorphoides					
Chaetomorpha spp					
Caulerpa prolifera					
Sargassum spp					
Fauchea peltata					
shell					0.43%
gastropod					
barnacle					
sponge			3.90%		
tunicate				100.00%	
bryozoa					0.71%
shrimp					
decomp					
seed					
hairy mass					
plastic					
unknown			1.95%		
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	22.31	0.29	31.12	7.23	7.7

Date	11-May-99	4-Aug-99	5-Aug-99	13-Aug-99	21-May-99
Tag number	BP8240 X6806	X7905 X7906	BP7279 X6442	X8113 X8114	BP8263 X6789
Food Items					
Syringodium filiforme					
Halodule johnsonii					
Halophila decipiens			0.16%	2.65%	
Halodule wrightii					32.47%
Halophila englemanniii					
Bryothamnion seaforthii	85.47%		76.96%	11.92%	65.54%
Gracilaria verrucosa	10.47%		7.03%	41.72%	
Gracilaria tikvahiae		21.64%			0.92%
Gracilaria mammillaris					
Solieria spp					
Acanthophora spicifera			10.29%	40.40%	
Spyridia filamentosa					
Polysiphonia subtilissima					
Centroceros clavulatum					
Hypnea spinella					
Hypnea spp					
Chondria spp					
Lomentaria baileyana		64.08%			
Enteromorpha spp					
E. chaetomorphoides					
Chaetomorpha spp					
Caulerpa prolifera					
Sargassum spp					
Fauchea peltata					
shell	2.88%	4.99%	4.25%	2.65%	
gastropod		9.29%	0.98%		
barnacle					
sponge					
tunicate					
bryozoa					
shrimp				0.66%	
decomp					
seed					
hairy mass					
plastic					
unknown	1.18%		0.33%		1.07%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	2.43	5.33	0.76	0.22	4.78

Date	4-Aug-99	4-Aug-99	18-Jan-99	15-Dec-99	23-Nov-99
Tag number	X7903	X7907	BP8172	X8067	X8048
	X7904	X7908	X6650	X8068	X8047
Food Items					
Syringodium filiforme					
Halodule johnsonii					
Halophila decipiens					
Halodule wrightii	0.32%				
Halophila englemanniii					
Bryothamnion seaforthii	0.16%	30.37%	85.75%	91.23%	93.10%
Gracilaria verrucosa			12.54%		1.47%
Gracilaria tikvahiae	96.60%				
Gracilaria mammillaris					
Solieria spp					
Acanthophora spicifera	2.76%				
Spyridia filamentosa					
Polysiphonia subtilissima					
Centroceros clavulatum					
Hypnea spinella					
Hypnea spp					
Chondria spp					
Lomentaria baileyana					
Enteromorpha spp					
E. chaetomorphoides					
Chaetomorpha spp					
Caulerpa prolifera					
Sargassum spp					
Fauchea peltata					
shell			0.28%	6.91%	
gastropod	0.16%		0.14%		
barnacle					
sponge					
tunicate		65.89%			
bryozoa					
shrimp					
decomp					
seed					
hairy mass					
plastic					
unknown		3.74%	1.28%	1.85%	5.43%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	9.76	18.81	3.68	3.8	6.34

Date	13-Nov-99	23-Nov-99	18-Jan-99	15-Mar-99	18-Jan-99
Tag number	X8037	X8049	BP8159	BP8205	BP8165
	X8038	X6797	X6698	X6731	X6691
Food Items					
Syringodium filiforme					
Halodule johnsonii					
Halophila decipiens					
Halodule wrightii		79.90%		0.50%	
Halophila englemanniii					
Bryothamnion seaforthii	77.45%		70.83%		1.85%
Gracilaria verrucosa	12.94%		27.67%	2.99%	42.14%
Gracilaria tikvahiae		16.47%		96.52%	54.34%
Gracilaria mammillaris					
Solieria spp		3.62%			
Acanthophora spicifera					
Spyridia filamentosa					
Polysiphonia subtilissima					
Centroceros clavulatum					
Hypnea spinella					
Hypnea spp					
Chondria spp					
Lomentaria baileyana					
Enteromorpha spp	2.40%				
E. chaetomorphoides					
Chaetomorpha spp					
Caulerpa prolifera					1.29%
Sargassum spp					
Fauchea peltata					
shell					
gastropod					
barnacle			0.33%		
sponge					
tunicate					
bryozoa					
shrimp					
decomp					
seed					
hairy mass					
plastic					
unknown	7.21%		1.17%		0.37%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	3.37	0.28	1.13	1.9	4.91

Date	13-Mar-00	14-Mar-00	18-Jan-99	26-Oct-99	26-Oct-99
Tag number	X8211	X8226	BP8174	X8138	X8005
	X8212	X8227	X6802	X8140	X8006
Food Items					
Syringodium filiforme					0.89%
Halodule johnsonii					
Halophila decipiens					
Halodule wrightii				0.90%	5.65%
Halophila englemanniii					
Bryothamnion seaforthii			95.75%	67.32%	80.21%
Gracilaria verrucosa	6.32%			28.79%	
Gracilaria tikvahiae					11.01%
Gracilaria mammillaris			1.89%		
Solieria spp					
Acanthophora spicifera					
Spyridia filamentosa	8.25%				
Polysiphonia subtilissima	5.44%	5.88%			
Centroceros clavulatum	2.46%				
Hypnea spinella	74.74%	86.07%			
Hypnea spp					
Chondria spp	1.58%				
Lomentaria baileyana					
Enteromorpha spp					
E. chaetomorphoides					
Chaetomorpha spp					
Caulerpa prolifera					
Sargassum spp					
Fauchea peltata					
shell		1.55%			
gastropod					
barnacle					
sponge					
tunicate					
bryozoa					
shrimp	1.23%				2.08%
decomp				0.90%	
seed					
hairy mass		6.50%			
plastic					
unknown			2.36%	2.10%	0.15%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	5.71	2.01	4.64	2.95	8.38

Date	26-Oct-99	15-Mar-99	28-Nov-97	26-Oct-99	8-Jul-99
Tag number	X8007	BP8204	BP7179	X8003	BP8134
	X8009	X6730	P2673	X8004	X6637
Food Items					
Syringodium filiforme		2.81%		0.64%	3.14%
Halodule johnsonii					
Halophila decipiens					6.90%
Halodule wrightii				4.81%	2.72%
Halophila englemanniii					
Bryothamnion seaforthii	74.70%	96.91%	36.75%	57.37%	
Gracilaria verrucosa	21.73%		18.10%	34.29%	23.64%
Gracilaria tikvahiae	0.51%				29.29%
Gracilaria mammillaris					
Solieria spp			24.13%		3.14%
Acanthophora spicifera			14.63%		3.14%
Spyridia filamentosa	0.34%				4.60%
Polysiphonia subtilissima					
Centroceros clavulatum					
Hypnea spinella					
Hypnea spp					
Chondria spp					
Lomentaria baileyana					
Enteromorpha spp					
E. chaetomorphoides					
Chaetomorpha spp					
Caulerpa prolifera				1.60%	13.60%
Sargassum spp					
Fauchea peltata					
shell	1.02%				0.42%
gastropod					0.42%
barnacle					
sponge					
tunicate					
bryozoa					
shrimp					
decomp	0.34%		2.19%		
seed					
hairy mass					
plastic					8.16%
unknown	1.36%	0.28%	4.20%	1.28%	0.84%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	1.87	0.17	0.75	3.24	1.12

Date	19-Jan-98	15-Dec-99	15-Dec-99	15-Dec-98	17-Mar-99
Tag number	BP7181	X8069	BP8281	BP8145	BP8133
	X6476	X4739	X8062	X6646	X6636
Food Items					
Syringodium filiforme				4.79%	
Halodule johnsonii					
Halophila decipiens	0.15%				
Halodule wrightii			1.10%		
Halophila englemanniii					
Bryothamnion seaforthii	19.13%	83.50%	90.81%	1.37%	7.13%
Gracilaria verrucosa	27.56%	2.61%	5.88%	32.14%	92.01%
Gracilaria tikvahiae				58.97%	
Gracilaria mammillaris					
Solieria spp	47.29%				
Acanthophora spicifera					
Spyridia filamentosa					
Polysiphonia subtilissima					
Centroceros clavulatum					
Hypnea spinella					
Hypnea spp					
Chondria spp	0.45%				
Lomentaria baileyana					
Enteromorpha spp					
E. chaetomorphoides					
Chaetomorpha spp					
Caulerpa prolifera	1.20%				0.29%
Sargassum spp					
Fauchea peltata					
shell		3.27%	2.21%	0.34%	
gastropod		0.98%			
barnacle					
sponge					
tunicate					
bryozoa				0.51%	
shrimp					
decomp	0.15%	0.82%			
seed					
hairy mass					
plastic					
unknown	4.07%	8.82%		1.88%	0.57%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	3.21	1.05	0.5	1.42	23.05

Date	13-May-99	8-Jul-99	10-Jun-99	26-Nov-97	26-Oct-99
Tag number	BP8242	BP8315	BP8282	BP7169	X8146
	X6811	X6859	X6835	X6397	X8147
Food Items					
Syringodium filiforme				1.13%	1.03%
Halodule johnsonii			0.80%		
Halophila decipiens					
Halodule wrightii	2.19%				3.34%
Halophila englemanniii					
Bryothamnion seaforthii		55.45%		50.21%	55.78%
Gracilaria verrucosa				46.69%	7.20%
Gracilaria tikvahiae		38.28%	25.60%		
Gracilaria mammillaris					
Solieria spp		1.65%	21.60%		23.14%
Acanthophora spicifera	7.38%	4.13%	36.00%		
Spyridia filamentosa					
Polysiphonia subtilissima					
Centroceros clavulatum					
Hypnea spinella					
Hypnea spp	82.92%				
Chondria spp					
Lomentaria baileyana					
Enteromorpha spp					
E. chaetomorphoides					
Chaetomorpha spp					
Caulerpa prolifera	3.01%				
Sargassum spp	3.28%		4.80%		
Fauchea peltata	1.23%				
shell		0.17%	11.00%		
gastropod			0.20%		
barnacle					
sponge					
tunicate					
bryozoa					
shrimp				0.56%	
decomp					
seed					
hairy mass					
plastic					
unknown		0.33%		1.41%	9.51%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	8.53	4.6	5.36	7.84	0.57

Date	26-Oct-99	26-Oct-99	19-Feb-00	17-May-00	19-Feb-00
Tag number	X8144	X8010	X8191	X8275, X8276	BP8243
	X8145	X8011	X8192	X8276	X6812
Food Items					
Syringodium filiforme	0.97%				
Halodule johnsonii				94.07%	
Halophila decipiens				0.82%	
Halodule wrightii	0.16%	1.88%			
Halophila englemanniii					
Bryothamnion seaforthii	82.07%	80.55%	28.91%		2.33%
Gracilaria verrucosa	11.47%	13.65%	1.68%	4.50%	
Gracilaria tikvahiae	4.20%	2.56%			
Gracilaria mammillaris					
Solieria spp			48.24%		82.43%
Acanthophora spicifera					
Spyridia filamentosa					
Polysiphonia subtilissima					
Centroceros clavulatum					
Hypnea spinella					
Hypnea spp					
Chondria spp					
Lomentaria baileyana					
Enteromorpha spp			15.80%		
E. chaetomorphoides					
Chaetomorpha spp					13.95%
Caulerpa prolifera				0.61%	
Sargassum spp					
Fauchea peltata					
shell	0.16%	0.17%			0.52%
gastropod					
barnacle					
sponge					
tunicate					
bryozoa					
shrimp					
decomp					
seed					
hairy mass					
plastic					
unknown	0.97%	1.19%	5.38%		0.78%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	1.45	2.03	73.81	0.74	0.89

Date	2-Feb-99	13-May-99	20-May-99	6-Jul-99	20-May-99
Tag number	BP8177	X6810	BP8253	X6851	BP8251
	X6527	X6811	X6822		X6820
Food Items					
Syringodium filiforme					
Halodule johnsonii					
Halophila decipiens					
Halodule wrightii			5.08%		
Halophila englemanniii					
Bryothamnion seaforthii	99.55%	32.90%	45.76%	6.56%	
Gracilaria verrucosa		12.99%		17.73%	16.14%
Gracilaria tikvahiae		20.78%		70.34%	
Gracilaria mammillaris					
Solieria spp		31.60%	32.20%	2.53%	83.07%
Acanthophora spicifera					
Spyridia filamentosa					
Polysiphonia subtilissima					
Centroceros clavulatum					
Hypnea spinella		1.52%			
Hypnea spp					
Chondria spp					
Lomentaria baileyana					
Enteromorpha spp					
E. chaetomorphoides					
Chaetomorpha spp					
Caulerpa prolifera					
Sargassum spp					
Fauchea peltata					
shell		0.22%			
gastropod					
barnacle					
sponge					
tunicate					
bryozoa					
shrimp					
decomp					
seed					
hairy mass					
plastic					
unknown	0.45%		16.95%	2.83%	0.79%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	1.64	1.26	0.8	9.65	0.35

Date	19-Jan-98	19-Jan-98	16-Dec-01	28-Nov-97	26-Nov-97
Tag number	BP7209	BP7206	BP7278	BP7186	BP7163
	X6489	X6485	X6439	P2656	P2654
Food Items					
Syringodium filiforme				65.73%	
Halodule johnsonii					
Halophila decipiens					
Halodule wrightii	1.45%		1.26%	7.03%	0.60%
Halophila englemanniii					
Bryothamnion seaforthii	7.40%				53.93%
Gracilaria verrucosa			91.32%		
Gracilaria tikvahiae	89.70%	66.44%			38.81%
Gracilaria mammillaris					
Solieria spp		31.39%		25.31%	
Acanthophora spicifera		1.49%	0.93%	1.41%	1.45%
Spyridia filamentosa					
Polysiphonia subtilissima			1.01%		
Centroceros clavulatum					
Hypnea spinella					
Hypnea spp					
Chondria spp					
Lomentaria baileyana					
Enteromorpha spp					
E. chaetomorphoides					
Chaetomorpha spp					
Caulerpa prolifera					
Sargassum spp					
Fauchea peltata					
shell	0.15%		3.12%	0.18%	
gastropod					
barnacle					
sponge					
tunicate					
bryozoa					
shrimp				0.35%	
decomp			0.08%		
seed			1.43%		
hairy mass					
plastic			0.25%		
unknown	1.31%	0.68%	0.59%		5.20%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	2.92	2.93	1.16	8.65	1.69

Date	11-Aug-97	5-Aug-97	20-May-98	20-May-98	15-Mar-96
Tag number	BP7147	BP7141	BP7270	BP7272	BP4546
	X6376	X6321	X6431	X6433	X4746
Food Items					
Syringodium filiforme					
Halodule johnsonii					
Halophila decipiens		94.50%	17.55%	30.00%	
Halodule wrightii		4.83%	2.93%		0.36%
Halophila englemanniii					
Bryothamnion seaforthii					1.08%
Gracilaria verrucosa	14.37%				94.42%
Gracilaria tikvahiae	9.89%			31.61%	
Gracilaria mammillaris					
Solieria spp	46.37%		31.65%	33.23%	
Acanthophora spicifera	1.39%				
Spyridia filamentosa			46.01%	4.19%	
Polysiphonia subtilissima					
Centroceros clavulatum					
Hypnea spinella					
Hypnea spp					
Chondria spp					
Lomentaria baileyana					
Enteromorpha spp					
E. chaetomorphoides					
Chaetomorpha spp					
Caulerpa prolifera					
Sargassum spp					
Fauchea peltata					
shell	0.62%	0.13%	0.80%	0.32%	0.36%
gastropod					
barnacle					0.36%
sponge					
tunicate	26.89%				
bryozoa					
shrimp					
decomp					
seed					
hairy mass					
plastic					
unknown	0.46%	0.54%	1.06%	0.65%	3.42%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	8.63	7.29	1.7	1.48	6.3

Date	14-Mar-96
Tag number	BP4543
	X4743
Food Items	
Syringodium filiforme	
Halodule johnsonii	
Halophila decipiens	
Halodule wrightii	1.07%
Halophila englemanniii	
Bryothamnion seaforthii	2.01%
Gracilaria verrucosa	
Gracilaria tikvahiae	93.25%
Gracilaria mammillaris	
Solieria spp	
Acanthophora spicifera	
Spyridia filamentosa	
Polysiphonia subtilissima	
Centroceros clavulatum	
Hypnea spinella	
Hypnea spp	
Chondria spp	
Lomentaria baileyana	
Enteromorpha spp	
E. chaetomorphoides	
Chaetomorpha spp	
Caulerpa prolifera	
Sargassum spp	
Fauchea peltata	
shell	0.12%
gastropod	
barnacle	
sponge	
tunicate	
bryozoa	
shrimp	0.95%
decomp	
seed	
hairy mass	
plastic	
unknown	2.60%
total	100.00%
Weight in grams	5.72

APPENDIX H

Components of Individual Diet of Jennings Cove Green Turtles

APPENDIX H. Components of Individual Diet of Jennings Cove Green Turtles.

Date	18-Mar-99	18-Mar-99	11-Aug-99	27-Aug-99	7-Nov-99
Tag Numbers	unkown	XXC011	XXE809	XXE811	XXE821
		XXC012	XXE810	XXE812	XXE822
Food Items					
Syringodium filiforme		65.87%	100.00%		38.73%
Halodule wrightii					
Halophila johnsonii					
Halophila decipiens	3.16%				
Halophila spp					
Gracilaria verrucosa	75.26%			96.27%	29.30%
Graciliaria tikvahiae	14.74%	29.37%			28.48%
Graciliaria armata					
Graciliaria blodgetti					
Acanthophora spicifera					
Spyridia filamentosa					
Poylsiphonia subtilissima					
Hypnea spinella					
Hypnea cornuta					
Hypnea musciformis					
Chondria spp					0.82%
Lomentaria baileyana					
Enteromorpha chaetomorphoides					
Caulerpa prolifera					
Chaetomorpha spp					
comb jelly					
shrimp					
barnacle					
shell					1.23%
gastropod					1.43%
sponge					
tunicate					
bryozoa				3.73%	
hydroid					
seed					
sand					
decomposed mater					
plastic					
unknown	6.84%	4.76%			
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	0.31	0.02	2.92	0.17	3.05

Date	7-Nov-99	7-Nov-99	7-Nov-99	7-Nov-99	22-Nov-99
Tag Numbers	XXE815	XXE819	XXE823	XXE826	XXE828
	XXE816	XXE820	XXE825	XXE827	XXE829
Food Items					
Syringodium filiforme	2.35%		0.94%		
Halodule wrightii	1.25%				
Halophila johnsonii					
Halophila decipiens					
Halophila spp					
Gracilaria verrucosa	75.39%		62.17%	76.47%	
Graciliaria tikvahiae	20.22%	94.17%	35.32%	17.18%	90.58%
Graciliaria armata					
Graciliaria blodgetti					
Acanthophora spicifera			0.47%		8.86%
Spyridia filamentosa					
Poylsiphonia subtilissima					
Hypnea spinella				4.18%	
Hypnea cornuta				0.77%	
Hypnea musciformis		0.19%			
Chondria spp					
Lomentaria baileyana					
Enteromorpha chaetomorphoides					
Caulerpa prolifera					
Chaetomorpha spp					
comb jelly					
shrimp	0.47%				
barnacle					
shell		0.38%			
gastropod	0.31%	5.26%	0.63%	0.77%	
sponge					
tunicate					
bryozoa			0.16%	0.62%	
hydroid			0.31%		
seed					
sand					
decomposed mater					
plastic					
unknown					0.55%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	3.72	2.44	8.64	3.42	0.48

Date	4-Dec-99	4-Dec-99	4-Dec-99	4-Dec-99	4-Dec-99
Tag Numbers	XXE842	XXE830	XXE836	XXE832	XXE834
	XXE843	XXE831	XXE837	XXE833	XXE835
Food Items					
Syringodium filiforme				4.13%	0.81%
Halodule wrightii	2.60%		1.12%		
Halophila johnsonii					
Halophila decipiens					
Halophila spp					
Gracilaria verrucosa	60.06%	95.20%	19.52%	93.43%	93.31%
Graciliaria tikvahiae	7.79%		76.77%		
Graciliaria armata					
Graciliaria blodgetti					
Acanthophora spicifera	4.22%		0.56%		
Spyridia filamentosa			1.67%		4.87%
Poylsiphonia subtilissima					
Hypnea spinella		4.80%			
Hypnea cornuta					
Hypnea musciformis					
Chondria spp					
Lomentaria baileyana					
Enteromorpha chaetomorphoides					
Caulerpa prolifera					
Chaetomorpha spp					
comb jelly					
shrimp				2.29%	
barnacle					
shell	0.32%				0.20%
gastropod			0.37%		
sponge					
tunicate					
bryozoa	0.65%			0.15%	0.81%
hydroid					
seed					
sand					
decomposed mater					
plastic	0.97%				
unknown	23.38%				
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	0.7	3.32	3.41	2.72	0.46

Date	17-Jan-00	17-Jan-00	17-Jan-00	17-Jan-00	17-Jan-00
Tag Numbers	Pit tag 50325A1842	XXE859 XXE860	XXE866 XXE865	XXE868 XXE867	XXE863 XXE864
Food Items					
Syringodium filiforme	1.26%	2.70%	2.43%	0.74%	
Halodule wrightii		0.54%		2.58%	0.91%
Halophila johnsonii				1.11%	
Halophila decipiens					
Halophila spp	0.42%				
Gracilaria verrucosa	95.82%		77.33%	61.62%	83.56%
Graciliaria tikvahiae		92.43%			5.78%
Graciliaria armata					
Graciliaria blodgetti					
Acanthophora spicifera					
Spyridia filamentosa		3.78%		6.64%	6.70%
Poylsiphonia subtilissima					
Hypnea spinella					
Hypnea cornuta					
Hypnea musciformis					
Chondria spp					
Lomentaria baileyana					
Enteromorpha chaetomorphoides					
Caulerpa prolifera					
Chaetomorpha spp					
comb jelly					
shrimp					
barnacle					
shell			2.02%	7.01%	0.61%
gastropod			2.83%		0.91%
sponge			0.40%		
tunicate					
bryozoa	2.09%	0.54%	3.64%	1.85%	1.52%
hydroid					
seed					
sand			2.43%	5.17%	
decomposed mater					
plastic			1.62%	9.59%	
unknown	0.42%		7.29%	3.69%	
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	0.22	0.13	0.32	0.27	6.73

Date	17-Jan-00	6-Feb-00	11-Mar-00	17-Mar-00	7-Apr-00
Tag Numbers	XXE862	XXE869	XXE877	XXE833	XXE894
	XXE861	XXE870		XXE832	XXE895
Food Items					
Syringodium filiforme	6.49%				
Halodule wrightii			100.00%	1.98%	
Halophila johnsonii					
Halophila decipiens		50.00%			
Halophila spp					
Gracilaria verrucosa					72.98%
Graciliaria tikvahiae	87.79%	50.00%		67.91%	
Graciliaria armata				24.18%	
Graciliaria blodgetti					
Acanthophora spicifera					
Spyridia filamentosa	0.76%			1.54%	
Poylsiphonia subtilissima					
Hypnea spinella				2.20%	
Hypnea cornuta					
Hypnea musciformis					
Chondria spp	0.76%				
Lomentaria baileyana					14.00%
Enteromorpha chaetomorphoides					
Caulerpa prolifera					5.52%
Chaetomorpha spp					
comb jelly					
shrimp	0.38%				
barnacle					
shell	0.19%				1.78%
gastropod					
sponge					
tunicate					
bryozoa	0.76%			2.20%	
hydroid	2.67%				
seed					
sand	0.19%				
decomposed mater					
plastic					
unknown					5.72%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	1.84	0.03	0.21	3.47	1.26

Date	7-Apr-00	7-Apr-00	7-Apr-00	7-Apr-00	27-Apr-00
Tag Numbers	XXE899	X6856	XXE892	XXE896	XXH608
	XXE900	X6855	XXE893	XXE897	XXH609
Food Items					
Syringodium filiforme	46.40%		5.77%	24.08%	
Halodule wrightii		5.15%		5.76%	67.44%
Halophila johnsonii					5.04%
Halophila decipiens					
Halophila spp					
Gracilaria verrucosa					25.97%
Graciliaria tikvahiae	50.90%	90.72%	8.46%	68.06%	
Graciliaria armata					
Graciliaria blodgetti					
Acanthophora spicifera					
Spyridia filamentosa		2.84%	1.54%	0.52%	
Poylsiphonia subtilissima					
Hypnea spinella					
Hypnea cornuta					
Hypnea musciformis					
Chondria spp					
Lomentaria baileyana					
Enteromorpha chaetomorphoides					
Caulerpa prolifera		0.52%			
Chaetomorpha spp					
comb jelly					
shrimp			83.85%		
barnacle					
shell	0.90%				0.78%
gastropod		0.52%			
sponge					0.78%
tunicate					
bryozoa					
hydroid					
seed	0.90%	0.26%	0.38%	1.57%	
sand					
decomposed mater					
plastic					
unknown	0.90%				
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	0.16	0.67	0.18	0.18	0.08

Date	27-Apr-00	27-Apr-00	27-Apr-00	27-Apr-00	27-Apr-00
Tag Numbers	XXH613 XXH614	Pit tag 502F60134C	XXH616 XXH617	XXE877 (RECAP)	XXH603 XXH604
Food Items					
Syringodium filiforme			1.29%		4.58%
Halodule wrightii	3.12%		1.29%		
Halophila johnsonii	9.36%	44.80%	45.06%	97.53%	
Halophila decipiens					
Halophila spp					
Gracilaria verrucosa					
Graciliaria tikvahiae	79.20%	22.85%	50.21%		95.08%
Graciliaria armata					
Graciliaria blodgetti					
Acanthophora spicifera					
Spyridia filamentosa		24.66%	2.15%		
Poylsiphonia subtilissima					
Hypnea spinella					
Hypnea cornuta					
Hypnea musciformis					
Chondria spp					
Lomentaria baileyana					
Enteromorpha chaetomorpho	1.04%				
Caulerpa prolifera					
Chaetomorpha spp					
comb jelly					
shrimp		1.36%			0.17%
barnacle		6.33%			
shell					
gastropod					0.17%
sponge					
tunicate	6.39%				
bryozoa	0.89%				
hydroid					
seed				2.47%	
sand					
decomposed mater					
plastic					
unknown					
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	2.7	1.5	0.25	0.08	2.59

Date	27-Apr-00	27-Apr-00	27-Apr-00	27-Apr-00	18-May-00
Tag Numbers	XXH618	XXH610	XXH605	XXH622	XXH626
	XXH619	XXH611	XXH606	XXH623	XXH627
Food Items					
Syringodium filiforme	19.15%				56.74%
Halodule wrightii					
Halophila johnsonii	34.04%	78.93%	53.26%		
Halophila decipiens					
Halophila spp					1.16%
Gracilaria verrucosa					
Graciliaria tikvahiae	36.17%	17.06%	27.99%	16.36%	35.12%
Graciliaria armata					
Graciliaria blodgetti				20.37%	
Acanthophora spicifera				0.67%	
Spyridia filamentosa	4.26%				
Poylsiphonia subtilissima		3.68%			
Hypnea spinella			7.34%	2.84%	
Hypnea cornuta					
Hypnea musciformis					
Chondria spp					
Lomentaria baileyana					
Enteromorpha chaetomorphoides					
Caulerpa prolifera					
Chaetomorpha spp					
comb jelly				58.43%	
shrimp			0.82%		
barnacle					
shell		0.33%	8.70%		5.58%
gastropod				0.83%	
sponge					
tunicate					
bryozoa					
hydroid					
seed				0.17%	
sand			1.90%		
decomposed mater					
plastic					
unknown	6.38%			0.33%	1.40%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	0.04	4.22	0.49	6.74	1.04

Date	18-May-00	24-May-00	24-May-00	24-May-00	3-Jun-00
Tag Numbers	XXH624	XXH653	XXH651	XXH655	XXH628
	XXH625	XXH654	XXH652	XXH656	XXH629
Food Items					
Syringodium filiforme	100.00%		31.79%	43.09%	45.53%
Halodule wrightii				47.87%	0.21%
Halophila johnsonii					
Halophila decipiens			20.89%		
Halophila spp		34.15%			
Gracilaria verrucosa					
Graciliaria tikvahiae			46.95%	2.66%	37.02%
Graciliaria armata					
Graciliaria blodgetti					
Acanthophora spicifera					
Spyridia filamentosa			0.37%	1.06%	
Poylsiphonia subtilissima					
Hypnea spinella					
Hypnea cornuta					
Hypnea musciformis					
Chondria spp					
Lomentaria baileyana					
Enteromorpha chaetomorphoides					
Caulerpa prolifera					10.43%
Chaetomorpha spp					
comb jelly					
shrimp					
barnacle					
shell		65.85%		5.32%	
gastropod					
sponge					
tunicate					
bryozoa					6.81%
hydroid					
seed					
sand					
decomposed mater					
plastic					
unknown					
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	0.06	0.03	1.76	0.25	5.41

Date	12-Sep-00	17-Mar-00			4-Dec-99
Tag Numbers	XXH633 XXH634	XXE883 XXE882	unknown	unknown	XXE846 XXE847
Food Items					
Syringodium filiforme					0.33%
Halodule wrightii	57.78%				
Halophila johnsonii	33.06%				
Halophila decipiens	1.94%				
Halophila spp					
Gracilaria verrucosa	0.83%	69.42%	11.95%	97.14%	88.25%
Graciliaria tikvahiae		29.18%	87.39%		4.30%
Graciliaria armata					
Graciliaria blodgetti					
Acanthophora spicifera					0.50%
Spyridia filamentosa	1.39%				
Poylsiphonia subtilissima					
Hypnea spinella					4.30%
Hypnea cornuta					
Hypnea musciformis					
Chondria spp			0.44%	2.86%	
Lomentaria baileyana					
Enteromorpha chaetomorphoides					
Caulerpa prolifera					
Chaetomorpha spp					
comb jelly					
shrimp	1.11%	0.80%			
barnacle					
shell					0.17%
gastropod					
sponge					
tunicate					
bryozoa					1.49%
hydroid					
seed					
sand					
decomposed mater					
plastic	0.83%				
unknown	3.06%	0.60%	0.22%		0.66%
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	0.19	1.31	1.49	0.09	1.22

Date	4-Dec-99	8-Mar-01	8-Mar-01	8-Mar-01	8-Mar-01
Tag Numbers	XXE838	XXH650	XXH648	XXH658	XXD752
	XXE839	XXH657	XXH649	XXH659	XXD753
Food Items					
Syringodium filiforme		5.37%		1.32%	2.40%
Halodule wrightii	1.71%				0.80%
Halophila johnsonii					
Halophila decipiens					
Halophila spp					
Gracilaria verrucosa	77.95%	87.48%	58.82%	89.45%	96.00%
Graciliaria tikvahiae	17.44%			3.74%	
Graciliaria armata					
Graciliaria blodgetti					
Acanthophora spicifera					
Spyridia filamentosa		6.16%	20.59%	4.84%	
Poylsiphonia subtilissima					
Hypnea spinella					
Hypnea cornuta					
Hypnea musciformis					
Chondria spp					
Lomentaria baileyana					
Enteromorpha chaetomorphoides					
Caulerpa prolifera					
Chaetomorpha spp		0.99%	2.94%		
comb jelly					
shrimp	0.34%		8.82%		0.80%
barnacle					
shell	1.20%				
gastropod	0.85%				
sponge					
tunicate					
bryozoa				0.66%	
hydroid					
seed					
sand					
decomposed mater			8.82%		
plastic					
unknown	0.51%				
total	100.00%	100.00%	100.00%	100.00%	100.00%
Weight in grams	0.88	1.31	0	0.71	0.25

Date	8-Mar-01	8-Mar-01
Tag Numbers	XXH660 XXH661	XXH663
Food Items		
Syringodium filiforme	52.98%	16.97%
Halodule wrightii	6.57%	4.50%
Halophila johnsonii		
Halophila decipiens		
Halophila spp		
Gracilaria verrucosa	32.44%	63.80%
Graciliaria tikvahiae		
Graciliaria armata		
Graciliaria blodgetti		
Acanthophora spicifera		
Spyridia filamentosa		6.75%
Poylsiphonia subtilissima		
Hypnea spinella		
Hypnea cornuta		
Hypnea musciformis		
Chondria spp	6.78%	
Lomentaria baileyana		
Enteromorpha chaetomorphoides		
Caulerpa prolifera		
Chaetomorpha spp		4.70%
comb jelly		
shrimp		
barnacle		
shell	1.23%	
gastropod		
sponge		
tunicate		
bryozoa		
hydroid		
seed		
sand		
decomposed mater		
plastic		
unknown		3.27%
total	100.00%	100.00%
Weight in grams	0.88	0.88

APPENDIX I

Components of Individual Diet of Reef Site Green Turtles

APPENDIX I. Components of Individual Diet of Reef Site Green Turtles.

Date	26-Jul-99	26-May-99	23-Jul-99	23-Jul-99	26-Jul-99
Tag number	BP8373 P6783	P5109 P5107	BP8364 P6776	BP8363 P6646	BP8376 P6788
Food Items					
Bryothamnion seaforthii			17.53%	78.29%	13.58%
Eucheuma nudum			5.96%		
Gracilaria spp	1.20%	17.02%			
G. mammillaris	0.53%	2.71%	2.75%	0.78%	
Gelidium pusillum	9.87%				
G. americanum		0.39%			0.79%
Acanthophora spicifera					
Solieria spp			5.27%		
Bryocladia cuspidata				17.05%	
Bostrichia spp					23.23%
Spyridia filamentosa					
Polysiphonia subtilissima	0.13%	12.57%			0.20%
Hypnea cervicornis					
Hypnea musciformis	49.20%	62.86%			
Chondria spp					
Ceramium spp					
Laurencia poiteaui	17.20%		8.59%		13.19%
Lomentaria baileyana			28.18%		
Halymenia spp					
Scinaia complanata					
Jania adhaerens			0.11%		
Botryocladia occidentalis					
Dictyopteris delicatula	13.87%				49.02%
Dictyota spp					
Padina profunda					
Sargassum spp					
Enteromorpha spp					
Ulva spp	0.93%		1.15%	3.68%	
Codium spp					
Caulerpa prolifera	6.27%	4.06%			
C. racemosa					
C. mexicana/taxifolia					
Halodule wrightii					
tunicate					
shrimp					
barnacle					
gastropod			0.11%		
shell	0.67%	0.39%		0.19%	
rock/sand	0.13%		30.36%		
unknown (plant)					
total	100.00%	100.00%	100.00%	100.00%	100.00%
weight in grams	20.12	1.24	3.68	0.68	22.19

Date	26-Jul-99	26-Jul-99	26-May-99	26-Jul-99	26-May-99
Tag number	BP8383 P6793	BP8379 P6791	BP8270 P5114	BP8374 P6784	BP8268 P5112
Food Items					
Bryothamnion seaforthii	13.12%		0.57%	9.83%	
Eucheuma nudum			5.88%	20.73%	
Gracilaria spp	8.13%				3.81%
G. mammillaris	5.91%			10.50%	
Gelidium pusillum				0.54%	1.76%
G. americanum	15.34%	36.80%	5.31%		
Acanthophora spicifera		4.00%			
Solieria spp		42.40%			
Bryocladia cuspidata			4.45%		
Bostrichia spp					
Spyridia filamentosa					
Polysiphonia subtilissima	4.81%		7.17%	6.06%	1.61%
Hypnea cervicornis			64.71%		85.34%
Hypnea musciformis					
Chondria spp					
Ceramium spp					
Laurencia poiteaui	34.01%	12.00%		36.47%	
Lomentaria baileyana					
Halymenia spp					6.16%
Scinaia complanata					
Jania adhaerens					
Botryocladia occidentalis					
Dictyopteris delicatula	1.66%			3.10%	
Dictyota spp	1.29%				
Padina profunda					0.59%
Sargassum spp	1.29%				
Enteromorpha spp					
Ulva spp	0.92%				0.73%
Codium spp					
Caulerpa prolifera	13.49%	4.80%		2.83%	
C. racemosa			10.90%	3.90%	
C. mexicana/taxifolia				5.11%	
Halodule wrightii					
tunicate					
shrimp					
barnacle					
gastropod					
shell			0.43%	0.81%	
rock/sand			0.57%	0.13%	
unknown (plant)					
total	100.00%	100.00%	100.00%	100.00%	100.00%
weight in grams	32.22	0.36	5.34	3.36	0.91

Date	27-Jul-99	12-Jun-98	26-May-99	23-Jul-99	23-Jul-99
Tag number	BP8398 P6885	BP7300 P2692	BP8272 P5115	BP8362 P6650	BP8366 P6647
Food Items					
Bryothamnion seaforthii			1.13%	0.74%	
Eucheuma nudum					
Gracilaria spp					
G. mammillaris	3.40%			34.42%	
Gelidium pusillum					0.72%
G. americanum				15.66%	
Acanthophora spicifera					
Solieria spp					
Bryocladia cuspidata					
Bostrichia spp		95.56%	29.10%		
Spyridia filamentosa					
Polysiphonia subtilissima		1.75%	0.85%	1.48%	14.80%
Hypnea cervicornis					35.34%
Hypnea musciformis			65.82%		
Chondria spp					
Ceramium spp					
Laurencia poiteaui	60.96%			6.35%	39.51%
Lomentaria baileyana					
Halymenia spp				24.82%	
Scinaia complanata				3.25%	
Jania adhaerens					
Botryocladia occidentalis					
Dictyopteris delicatula	20.37%			3.55%	5.60%
Dictyota spp					
Padina profunda				0.30%	0.43%
Sargassum spp					
Enteromorpha spp					
Ulva spp			2.54%	8.12%	2.59%
Codium spp					
Caulerpa prolifera	14.51%			0.74%	0.86%
C. racemosa				0.59%	
C. mexicana/taxifolia					
Halodule wrightii					
tunicate					
shrimp			0.28%		
barnacle					
gastropod	0.15%	0.40%	0.28%		0.14%
shell	0.62%	2.02%			
rock/sand					
unknown (plant)		0.27%			
total	100.00%	100.00%	100.00%	100.00%	100.00%
weight in grams	2.79	2.15	1.18	6.82	4.31

Date	26-Jul-99	13-Jan-99	26-May-99	26-May-99	26-Jul-99
Tag number	BP8378 P6789	BP8335 P6629	BP8271 P5108	BP8267 P5106	BP8381 P6792
Food Items					
Bryothamnion seaforthii					
Eucheuma nudum		20.88%	5.16%		12.83%
Gracilaria spp					
G. mammillaris					5.59%
Gelidium pusillum					22.04%
G. americanum	55.78%	3.03%	59.71%		3.13%
Acanthophora spicifera					
Solieria spp					
Bryocladia cuspidata					
Bostrichia spp		27.78%	0.98%	75.78%	2.80%
Spyridia filamentosa			0.25%		
Polysiphonia subtilissima	1.99%	1.01%	15.48%	2.34%	
Hypnea cervicornis			8.85%		
Hypnea musciformis					
Chondria spp					
Ceramium spp					
Laurencia poiteaui		43.43%			
Lomentaria baileyana					
Halymenia spp			1.23%	4.30%	
Scinaia complanata					
Jania adhaerens					
Botryocladia occidentalis	17.93%				
Dictyopteris delicatula					
Dictyota spp					
Padina profunda					
Sargassum spp			0.25%		3.78%
Enteromorpha spp					
Ulva spp	5.58%		3.44%	1.17%	24.01%
Codium spp					
Caulerpa prolifera	18.73%	2.69%			25.49%
C. racemosa					
C. mexicana/taxifolia					
Halodule wrightii					
tunicate					
shrimp					
barnacle					
gastropod				0.39%	
shell		1.18%	2.70%	7.42%	0.33%
rock/sand			1.97%	8.59%	
unknown (plant)					
total	100.00%	100.00%	100.00%	100.00%	100.00%
weight in grams	0.32	2.49	0.58	0.36	4.99

Date	26-Jul-99	26-Jul-99	23-Jul-99	23-Jul-99	12-Jul-99
Tag number	BP8370 P6780	BP8369 P6779	BP8365 P6648	BP8367 P6777	BP8319 P6614
Food Items					
Bryothamnion seaforthii	0.28%	3.23%			22.90%
Eucheuma nudum					
Gracilaria spp					
G. mammillaris		8.36%	18.84%	1.32%	
Gelidium pusillum		3.52%	3.77%		60.46%
G. americanum			0.94%		0.14%
Acanthophora spicifera	27.85%	10.85%			
Solieria spp					
Bryocladia cuspidata					
Bostrichia spp			6.33%		
Spyridia filamentosa					
Polysiphonia subtilissima	0.28%	0.15%		1.61%	4.27%
Hypnea cervicornis		19.94%			6.26%
Hypnea musciformis	5.34%				
Chondria spp		0.73%			
Ceramium spp					
Laurencia poiteaui	29.54%	14.08%	47.51%	59.00%	
Lomentaria baileyana				13.32%	
Halymenia spp					
Scinaia complanata					
Jania adhaerens					
Botryocladia occidentalis					
Dictyopteris delicatula	13.78%		6.73%		
Dictyota spp					
Padina profunda					
Sargassum spp			2.02%		
Enteromorpha spp					
Ulva spp	9.28%	19.50%	6.73%	14.79%	0.14%
Codium spp					
Caulerpa prolifera	1.83%	3.96%	6.86%		2.99%
C. racemosa		15.25%		7.17%	
C. mexicana/taxifolia					0.57%
Halodule wrightii					
tunicate					
shrimp	0.14%				
barnacle					
gastropod	0.28%	0.15%		0.29%	
shell	6.75%	0.29%	0.27%	0.15%	2.28%
rock/sand	4.64%			2.20%	
unknown (plant)				0.15%	
total	100.00%	100.00%	100.00%	100.00%	100.00%
weight in grams	3.76	3.18	4.18	1.96	1.81

Date	26-May-99	27-Jul-99	26-May-99	12-Jul-99	12-Jul-99
Tag number	BP8269 P5111	BP8396 P6883	BP8273 P5116	BP8325 X6185	BP8320 P6616
Food Items					
Bryothamnion seaforthii	1.46%				2.73%
Eucheuma nudum	9.96%			73.66%	
Gracilaria spp					
G. mammillaris	2.66%	4.04%			10.11%
Gelidium pusillum	61.09%	2.96%		2.67%	3.14%
G. americanum	2.26%	1.35%	2.93%	2.81%	12.43%
Acanthophora spicifera					
Solieria spp	1.99%				
Bryocladia cuspidata					
Bostrichia spp					7.10%
Spyridia filamentosa					
Polysiphonia subtilissima	2.12%	2.29%		4.81%	1.64%
Hypnea cervicornis	5.31%	2.42%	76.33%		
Hypnea musciformis					44.40%
Chondria spp					
Ceramium spp					
Laurencia poiteaui		72.27%	5.05%		
Lomentaria baileyana					
Halymenia spp				8.16%	
Scinaia complanata					
Jania adhaerens			0.66%		
Botryocladia occidentalis					
Dictyopteris delicatula		5.52%			
Dictyota spp					
Padina profunda					
Sargassum spp	0.13%				
Enteromorpha spp					
Ulva spp	7.57%	3.23%		3.48%	4.78%
Codium spp					
Caulerpa prolifera	2.66%	4.04%		3.07%	1.23%
C. racemosa	0.27%				11.89%
C. mexicana/taxifolia	1.46%		1.06%		0.41%
Halodule wrightii					
tunicate					
shrimp					
barnacle					
gastropod			1.06%		
shell	1.06%	1.88%	12.90%	1.07%	0.14%
rock/sand					
unknown (plant)				0.27%	
total	100.00%	100.00%	100.00%	100.00%	100.00%
weight in grams	2.4	7.34	6.07	4.01	5.21

Date	26-May-99	26-Jul-99	14-Jul-99	13-Jul-99	12-Jul-99
Tag number	BP8274 P5113	BP8371 P6781	BP8338 P6633	BP8328 P6622	BP8318 P6615
Food Items					
Bryothamnion seaforthii	8.39%	23.28%	4.70%	22.67%	
Eucheuma nudum	23.39%			15.53%	11.19%
Gracilaria spp	15.54%				7.54%
G. mammillaris	15.54%	22.66%		4.19%	22.87%
Gelidium pusillum		5.41%	0.75%	0.78%	
G. americanum	1.07%			11.02%	1.46%
Acanthophora spicifera				0.93%	
Solieria spp	0.54%		29.70%		
Bryocladia cuspidata					
Bostrichia spp					
Spyridia filamentosa					
Polysiphonia subtilissima	14.11%		21.80%	11.34%	19.95%
Hypnea cervicornis	19.82%				
Hypnea musciformis			27.63%	9.01%	
Chondria spp					9.73%
Ceramium spp					
Laurencia poiteaui					
Lomentaria baileyana				7.61%	6.33%
Halymenia spp					
Scinaia complanata					
Jania adhaerens					7.30%
Botryocladia occidentalis	1.25%	30.77%			
Dictyopteris delicatula		11.43%			
Dictyota spp					
Padina profunda					
Sargassum spp					
Enteromorpha spp					
Ulva spp			7.71%	15.06%	3.16%
Codium spp					
Caulerpa prolifera		2.29%	4.14%	0.47%	
C. racemosa		3.95%	3.01%	1.40%	
C. mexicana/taxifolia	0.36%				3.89%
Halodule wrightii					
tunicate					
shrimp					
barnacle					
gastropod			0.19%		1.22%
shell			0.38%		3.65%
rock/sand					1.70%
unknown (plant)		0.21%			
total	100.00%	100.00%	100.00%	100.00%	100.00%
weight in grams	3.8	2.36	532	1.49	1.83

Date	12-Jul-99	26-Jul-99	12-Jul-99	26-Jul-99	26-Jul-99
Tag number	BP8322 N9024	BP8382 P6787	BP8316 P6612	BP8356 P6641	BP8375 P6786
Food Items					
Bryothamnion seaforthii	20.58%		24.41%	1.77%	19.80%
Eucheuma nudum			18.84%		
Gracilaria spp					
G. mammillaris	2.53%	7.06%	5.35%		
Gelidium pusillum				1.38%	
G. americanum	3.61%				
Acanthophora spicifera					
Solieria spp					
Bryocladia cuspidata					
Bostrichia spp					
Spyridia filamentosa					
Polysiphonia subtilissima			0.64%		
Hypnea cervicornis		8.41%	1.71%	9.43%	10.78%
Hypnea musciformis	31.41%				
Chondria spp					5.01%
Ceramium spp					
Laurencia poiteaui		25.64%	26.12%	6.09%	24.06%
Lomentaria baileyana					
Halymenia spp		30.94%			
Scinaia complanata					
Jania adhaerens					
Botryocladia occidentalis	3.61%			5.30%	
Dictyopteris delicatula		3.12%			5.76%
Dictyota spp					
Padina profunda					
Sargassum spp		2.71%			
Enteromorpha spp					
Ulva spp	15.16%	6.78%	7.07%	55.80%	23.06%
Codium spp					
Caulerpa prolifera		9.23%	12.85%		
C. racemosa	14.44%	4.61%			
C. mexicana/taxifolia	6.50%			9.82%	2.01%
Halodule wrightii					
tunicate				5.30%	
shrimp					2.51%
barnacle					
gastropod		0.27%		0.20%	0.25%
shell		0.95%	0.43%	1.18%	3.01%
rock/sand	0.36%	0.27%	2.57%	1.18%	3.01%
unknown (plant)	1.81%			2.55%	0.75%
total	100.00%	100.00%	100.00%	100.00%	100.00%
weight in grams	0.58	2.43	6.36	1	1.07

Date	12-Jul-99	23-Jul-99	12-Jul-99	26-Jul-99	13-Jul-99
Tag number	BP8324 P6619	BP8308 P6608	BP8323 P6618	BP8372 P6782	BP8326 P6620
Food Items					
Bryothamnion seaforthii	80.48%	8.61%	1.77%	26.32%	32.81%
Eucheuma nudum		23.37%	16.11%		35.56%
Gracilaria spp					
G. mammillaris				32.46%	25.34%
Gelidium pusillum	3.30%				
G. americanum	2.10%		9.63%	0.88%	
Acanthophora spicifera					
Solieria spp					
Bryocladia cuspidata			3.34%		
Bostrichia spp					
Spyridia filamentosa					
Polysiphonia subtilissima	0.15%		0.39%	5.26%	
Hypnea cervicornis	3.15%	24.96%	12.18%	14.04%	
Hypnea musciformis					
Chondria spp					
Ceramium spp					
Laurencia poiteaui	3.15%	36.20%			
Lomentaria baileyana					
Halymenia spp					
Scinaia complanata					
Jania adhaerens	1.05%				
Botryocladia occidentalis	1.95%				
Dictyopteris delicatula		4.57%			
Dictyota spp					
Padina profunda					
Sargassum spp					
Enteromorpha spp					
Ulva spp	0.75%		17.29%		
Codium spp				0.88%	
Caulerpa prolifera					0.98%
C. racemosa			38.90%		
C. mexicana/taxifolia					
Halodule wrightii					
tunicate					
shrimp					
barnacle					
gastropod					0.79%
shell	3.45%	2.11%	0.39%	6.14%	1.57%
rock/sand	0.45%			1.75%	2.75%
unknown (plant)		0.18%			0.20%
total	100.00%	100.00%	100.00%	100.00%	100.00%
weight in grams	6.58	12.27	8.36	0.16	3.94

Date	13-Jul-99	13-Jul-99	13-Jul-99	20-Jun-97	11-Jul-97
Tag number	BP8334 P6628	BP8336 P6630	BP8297 P5122	BP7095 N9022	BP7115 P2618
Food Items					
Bryothamnion seaforthii		4.30%		13.47%	37.77%
Eucheuma nudum		11.75%	16.75%		
Gracilaria spp					
G. mammillaris	14.31%	12.42%	20.07%	34.54%	7.32%
Gelidium pusillum	0.34%				
G. americanum	8.92%		17.98%	33.02%	11.42%
Acanthophora spicifera					
Solieria spp			11.69%		
Bryocladia cuspidata		0.17%			
Bostrichia spp					
Spyridia filamentosa					
Polysiphonia subtilissima	1.01%	25.33%	12.57%	0.76%	7.61%
Hypnea cervicornis					
Hypnea musciformis					
Chondria spp	37.71%	42.38%		5.88%	32.65%
Ceramium spp					
Laurencia poiteaui					
Lomentaria baileyana					
Halymenia spp					
Scinaia complanata					
Jania adhaerens					
Botryocladia occidentalis					
Dictyopteris delicatula	7.58%		4.19%		
Dictyota spp					
Padina profunda					
Sargassum spp					
Enteromorpha spp					
Ulva spp	21.04%	0.50%	7.50%		
Codium spp					
Caulerpa prolifera	9.09%	3.15%	8.20%	2.66%	
C. racemosa					
C. mexicana/taxifolia			35.00%		
Halodule wrightii					
tunicate					
shrimp					
barnacle					
gastropod					0.88%
shell			0.70%	1.52%	2.34%
rock/sand					
unknown (plant)					
total	100.00%	100.00%	100.00%	100.00%	100.00%
weight in grams	5.2	3.22	18.01	14.88	2.26

Date	20-Jun-97	18-Jul-97	30-Jul-99	28-Jul-99	30-Jul-99
Tag number	BP7102 P2602	BP7108 P2611	P6866 P6867	P6852 P6833	P6872 P6873
Food Items					
Bryothamnion seaforthii	81.83%			87.96%	
Eucheuma nudum					
Gracilaria spp		2.92%	12.47%		
G. mammillaris	5.37%			1.93%	
Gelidium pusillum					
G. americanum	2.56%	51.09%	17.27%	5.46%	65.45%
Acanthophora spicifera					
Solieria spp					
Bryocladia cuspidata					
Bostrichia spp					
Spyridia filamentosa					
Polysiphonia subtilissima	1.46%	0.58%	0.96%	1.93%	5.95%
Hypnea cervicornis	0.37%				
Hypnea musciformis					
Chondria spp		34.45%			
Ceramium spp					
Laurencia poiteaui			31.65%		
Lomentaria baileyana					17.62%
Halymenia spp					
Scinaia complanata					
Jania adhaerens					
Botryocladia occidentalis					
Dictyopteris delicatula			27.34%	1.61%	
Dictyota spp					
Padina profunda					
Sargassum spp					
Enteromorpha spp					0.92%
Ulva spp		7.15%			3.66%
Codium spp					
Caulerpa prolifera		2.77%	2.88%	0.48%	1.60%
C. racemosa					
C. mexicana/taxifolia				0.32%	
Halodule wrightii	0.49%				
tunicate					
shrimp					
barnacle			0.24%		
gastropod	0.49%				
shell	7.32%	1.02%	6.71%	0.32%	4.81%
rock/sand			0.24%		
unknown (plant)					
total	100.00%	100.00%	100.00%	100.00%	100.00%
weight in grams	2.06	8.25	1.29	3.5	0.27

Date	30-Jul-99	30-Jul-99	30-Jul-99	30-Jul-99
Tag number	P6828	P6870	P6874	P6830
	P6829	P6871	P6875	P6831
Food Items				
Bryothamnion seaforthii	1.69%		5.13%	2.74%
Eucheuma nudum				
Gracilaria spp			67.81%	
G. mammillaris	1.69%		3.13%	
Gelidium pusillum				
G. americanum	25.66%		8.26%	4.53%
Acanthophora spicifera				
Solieria spp				
Bryocladia cuspidata				
Bostrichia spp				
Spyridia filamentosa				
Polysiphonia subtilissima	3.00%	1.09%		
Hypnea cervicornis				
Hypnea musciformis				
Chondria spp		84.87%		
Ceramium spp		5.30%		
Laurencia poiteaui	36.33%		0.85%	54.60%
Lomentaria baileyana	15.54%			6.72%
Halymenia spp				
Scinaia complanata				
Jania adhaerens				
Botryocladia occidentalis				
Dictyopteris delicatula				29.77%
Dictyota spp				
Padina profunda				
Sargassum spp				
Enteromorpha spp				
Ulva spp				
Codium spp				
Caulerpa prolifera	13.48%	8.74%	13.68%	
C. racemosa				
C. mexicana/taxifolia				
Halodule wrightii				
tunicate				
shrimp				
barnacle				
gastropod			0.28%	
shell	2.25%		0.85%	0.96%
rock/sand	0.37%			0.41%
unknown (plant)				0.27%
total	100.00%	100.00%	100.00%	100.00%
weight in grams	3.21	0.82	1.12	49.57

APPENDIX J

Substrates Examined for *Prorocentrum* By Season at Mosquito Lagoon

APPENDIX J. Substrates Examined for *Prorocentrum* by Season at Mosquito Lagoon.
(+ indicates presence, * indicates component of green turtle diet).

Season	Winter	Spring	Summer	Fall	Total	Diet Item
Substrate						
Halodule wrightii	+	-			1	*
Gracilaria armata	+	-			1	*
G. verrucosa		-		-		*
G. tikvahiae	+	+			2	*
Lomentaria baileyana				+	1	
Hypnea spinella		-		+	1	
Solieria filiformis	-	-				
S. tenera	-					
Dasya baillouviana	-					
Chondria littoralis	+				1	
Acanthophora spicifera	+				1	
Centroceros clavulatum				+	1	
Champia parvula				+	1	
Codium decorticatum	-	+			1	
Enteromorpha compressa		-				
E. intestinalis				+	1	
Sargassum spp	-	-				
Total					11 Species	

APPENDIX K

Substrates Examined for *Prorocentrum* By Season at South Bay

APPENDIX K. Substrates Examined for *Prorocentrum* by Season at South Bay.
(+ indicates presence, * indicates component of green turtle diet).

Season	Winter	Spring	Summer	Fall	Total	Diet Items
Substrate						
Syringodium filiforme				+	1	*
Halodule wrightii			-			*
Halophila decipiens			-			*
Bryothamnion seaforthii		+			1	*
Gracilaria verrucosa	-					*
Gracilaria tikvahiae				-		*
Solieria spp		+	-	-	1	*
Cladaphora frascatii				+	1	
Enteromorpha spp						
E. intestinalis				-		*
E. compressa				-		*
Caulerpa prolifera		-				
C. mexicana			-			
Sargassum spp						
Amathia alternata		+			1	
total					5 species	

APPENDIX L

Substrates Examined for *Prorocentrum* By Season at Jennings Cove

APPENDIX L. Substrates Examined for *Prorocentrum* by Season at Jennings Cove. (+ indicates presence, * indicates component of green turtle diet).

Season	Winter	Spring	Summer	Fall	Total	Diet Item
Substrate						
Syringodium filiforme	+	+	+		3	*
Halodule wrightii	-	+	+		2	*
Gracilaria spp		+			1	*
Gracilaria verrucosa		-				*
Acanthophora spicifera	-			-		*
Spyridia filamentosa	-					*
Spyridia clavata		+			1	
Hypnea spp		-				*
Chondria floridana	+				1	
Lomentaria baileyana		-				*
Solieria filiformis	-	-		-		
S. tenera	-					
Centroceros clavulatum	-					
Digenia simplex	-					
Enteromorpha spp		-				*
E. intestinalis	+				1	*
Ulva rotundata		+			1	
Caulerpa mexicana	+				1	
Fauchea hassleri			+		1	
Zoobotryon verticellum	-					*
total					9 species	

APPENDIX M

Substrates Examined for *Prorocentrum* in Summer Months
at the Reef Site

APPENDIX M. Substrates Examined for *Prorocentrum* in Summer Months at the Reef Site.
(+ indicates presence, * indicates component of green turtle diet).

Summer Month	May	June	July	August	Total	Diet item
Substrate						
Bryothamnion seaforthii			+	-	1	*
Gelidium pusillum			-	-		*
Solieria tenera		-	-			*
Halymenia floresia				-		*
Botryocladia occidentalis			-	-		*
Colpomenia sinuousa				-	1	
Dictyopteris delicatula			-			*
Dictyota spp			-	-		*
Padina vickersiae		-	-	+	1	
Sargassum hystrix				-		*
Ulva spp			-			*
Halimeda tuna				-		
Caulerpa prolifera		-				*
C. racemosa		-	-			*
total					3 species	

APPENDIX N

Substrates Examined for *Prorocentrum* By Season at Trident Basin

APPENDIX N. Substrates Examined for *Prorocentrum* by Season at Trident Basin (+ indicates presence, * indicates component of green turtle diet).

Season	Winter	Spring	Summer	Fall	Total	Diet Item
Substrate						
Ulva lactuca	-	+		+	2	*
Enteromorpha compressa				+	1	*
E. intestinalis/flexuosa	+	-			1	*
Cladaphora catenata				-		*
Sargassum spp	-	-				*
Gelidium americanum	-	-				*
Centroceros clavulatum		-				*
Zoobotryon verticillatum	+	-		+	2	*
total					4 species	

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