Table 5.1. Percent of total video frames containing algae from analysis of entire transect (100 m^{-2} length).

Station	Date										
	Sep-08	Nov-08	Jan-09	Mar-09	May-09	Jul-09	Sep-09	Nov-09	Jan-10	Mar-10	Jun-10
CES11	†	†	†	95	*	†	†	8.6	81.5	93.3	†
GOM16	*	*	*	75.7	†	†	†	0	5.2	34.3	†
GOM01	0	0	0	1.4	0	2.3	†	0	3.7	3.3	2.3
GOM02	2.5	†	5.8	2.3	0	0.7	0	3	0	0	56.8
GOM03	0	64	60.1	0.9	0	†	†	42	5.8	0	0
GOM04	†	†	0	†	0	8.5	2	0	0	†	1.4
GOM05	0	0.7	†	0.8	0	0	†	0	0	0	†
GOM06	†	59.2	90	92.3	†	2.2	0	5	0	50.9	†
GOM07	0	0	†	3.1	0	0.6	†	0	1	1.3	0
GOM08	6.2	0.8	3.5	2.5	1.1	6.7	1	2.4	†	0.7	†
GOM09* (discontinued)	3	*	*	*	*	*	*	*	*	*	*
GOM10	†	†	0	0	0	4.8	0	0.5	0	†	0
GOM11	51.4	†	51.7	34.2	29.4	†	53.6	15.6	77.6	27.1	26.95
GOM12	*	*	94.2	55.3	13.2	100	95.1	88.5	20.8	†	100

* indicates underwater video was unavailable

† indicates poor visibility, therefore video was not interpreted

Table 5.2. Station information; name, whether macroalgae is prominent feature, mean depth (+ SD), depth of sediment overlying live bottom, prominent benthic feature, latitude, and longitude.

Station	Macroalgae	Mean depth (m)	Depth of overlying sediment (cm)	Prominent benthic feature	Latitude (N)	Longitude (W)
CES11	Abundant	3.7 (± 0.9)	>75*	*Diopatra cuprea*	26.4989	82.0456
GOM16	Abundant	2.0 (± 0.8)	>75*	patchy seagrass	26.4660	82.0998
GOM11	Abundant	11.3 (± 1.3)	10 (± 12)	live bottom	26.3091	82.0973
GOM12	Abundant	13.5 (± 1.6)	2 (± 3)	live bottom	26.5545	82.2860
GOM01	Rare	6.0 (± 0.9)	60 (± 33)	pen shells, urchins	26.4187	82.0179
GOM02	Rare	8.0 (± 0.5)	28 (± 17)	pen shells, urchins	26.5546	82.238
GOM03	Rare	5.7 (± 2.3)	67 (± 33)	live bottom	26.4163	82.2067
GOM03A	Not observed	6.2 (± 2.3)	>75*	pen shells, urchins	26.4160	82.1112
GOM04	Not observed	8.0 (± 0.5)	>75*	pen shells, urchins	26.4507	82.2060
GOM05	Not observed	7.6 (± 0.6)	>75*	featureless	26.3046	81.9545
GOM06	Rare	5.5 (± 0.7)	>75*	pen shells, urchins	26.3049	81.9540
GOM07	Rare	5.0 (± 1.0)	>75*	pen shells, urchins	26.3277	81.8832
GOM08	Rare	10.0 (± 0.9)	34 (± 14)	featureless	26.3628	82.1644
GOM09	(discontinued)	13.9	>75*	*Halophila decipiens*	26.2525	82.1463
GOM10	Rare	9.7 (± 0.9)	50 (± 33)	large sand waves	26.4839	82.2710

* Depth of the overlying sediment was deeper than the length of the measuring rod

Table 5.3. List of macroalgal species from this study.

Acanthophora muscoides	*Euchema denudatum*	*Polysiphonia* spp.
Acanthophora spicifera	*Eucheuma isiforme var. denudatum*	*Polysiphonia subtilissima*
Acetabularia polyphysiodes	*Gelidiella sanctarum*	*Sargassum filipendula*
Acetabularia spp.	*Gelidiopsis variabilis*	*Sargassum fluitans*
Agardhiella ramosissima	*Gracilaria armata*	*Sargassum hystrix*
Agardhiella subulata	*Gracilaria blodgettii*	*Sargassum natans*
Botryocladia occidentalis	*Gracilaria bursa-pastoris*	*Sargassum* spp.
Caulerpa ashmeadii	*Gracilaria cervicornis*	*Sargassum vulgare*
Caulerpa brachypus	*Gracilaria cylindrica*	*Schiziothrix calciola*
Caulerpa mexicana	*Gracilaria damaecornis*	*Scinaia halliae*
Caulerpa racemosa	*Gracilaria flabelliformis*	*Sebdenia flabellata*
Caulerpa racemosa var. peltata	*Gracilaria intermedia*	*Solieria filiformis*
Caulerpa sertularioides	*Gracilaria mammillaris*	*Spyridia filamentosa*
Caulerpa sertularioides f. longiseta	*Gracilaria* spp.	*Udotea abbottiorum*
Chaetomorpha linum	*Gracilaria tikvahiae*	*Udotea looensis*
Champia parvula	*Gracilaria venezuelensis*	*Ulva flexuosa*
Chondria capillaris	*Gracilariopsis lemaneiformis*	*Ulva intestinalis*
Chondria collinsiana	*Gymnogongrous griffishsiae*	*Ulva lactuca*
Chondria leptacremon	*Halymenia floresia*	*Ulva* spp.
Chondria littoralis	*Halymenia pseudofloresia*	*Wurdemania miniata*
Chondria sedifolia	*Halymenia* spp.	
Cladosiphon occidentalis	*Heterosiphonia gibbesii*	
Codium isthmocladium	*Hincksia mitchelliae*	
Codium spp.	*Hincksia onslowensis*	
Codium taylorii	*Hydropuntia caudata*	
Dasya antillarum	*Hypnea cornuta*	
Dasya baillouviana	*Hypnea musciformis*	
Dasya collinsiana	*Hypnea spinella*	
Dasya crouaniana	*Hypnea valentiae*	
Dasya ocellata	*Jania rubens*	
Dasya ramosissima	*Laurencia chondrioides*	
Dasya rigidula	*Laurencia filiformis*	
Dasya spp.	*Laurencia intricata*	
Dictyopteris polypodioides	*Lomentaria baileyana*	
Dictyota cervicornis	*Lomentaria occidentalis*	
Dictyota cilidata	*Lyngbya majuscula*	
Dictyota pulchella	*Polysiphonia flaccidissima*	
Ectocarpus spp.	*Polysiphonia ramentacea*	

Table 5.4. List of species, collection date and collection location of macroalgae found on Lee County beaches since 2003.

Genus species	Division	Date	Collection Location	Source
Acanthophora spicifera	Rhodophyta	Jan-08	Tarpon Bay Beach	This study
Agardhiella subulata	Rhodophyta	Jul-04	Lee County Beaches	Lapointe and Bedford (2007)
		Jan-10	Tradewinds Resort	This study
		Mar-10	Lighthouse Beach	This study
		Mar-10	Tarpon Bay Beach	This study
Botryocladia occidentalis	Rhodophyta	Jul-04	Lee County Beaches	Lapointe and Bedford (2007)
Champia parvula	Rhodophyta	Mar-10	Lighthouse Beach	This study
Chondria atropurpurea	Rhodophyta	Feb-04	San Carlos Bay	Dawes (2004)
Chondria collisiana	Rhodophyta	Mar-10	Lighthouse Beach	This study
		Mar-10	Fort Myers Beach	This study
		Mar-10	Tarpon Bay Beach	This study
Ceramium spp.	Rhodophyta	Jun-06	Sanibel Island Beach	Bartleson et al. 2006
Dasya spp.	Rhodophyta	Mar-10	Tarpon Bay Beach	This study
		Mar-10	Fort Myers Beach	This study
Dictyota spp.	Phaeophyta	Feb-08	Tarpon Bay Beach	This study
Eucheuma isiforme	Rhodophyta	Jul-04	Lee County Beaches	Lapointe and Bedford (2007)
Gracilaria spp.†	Rhodophyta	Feb-04	San Carlos Bay	Dawes (2004)
	Rhodophyta	Jul-04	Lee County Beaches	Lapointe and Bedford (2007)
	Rhodophyta	Mar-10	Tarpon Bay Beach	This study
Gracilaria tikvahae	Rhodophyta	Jul-04	Lee County Beaches	Lapointe and Bedford (2007)
		Jan-08	Tarpon Bay Beach	This study
		Jan-10	Bunch Beach	This study
		Jan-10	Tradewinds Resort	This study
		Mar-10	Lighthouse Beach	This study
		Mar-10	Tarpon Bay Beach	This study
		Feb-10	Fort Myers Beach	This study
Gracilaria mammillaris	Rhodophyta	Jun-06	Sanibel Island Beach	Bartleson et al. 2006
Hypnea musciformis	Rhodophyta	Jul-04	Lee County Beaches	Lapointe and Bedford (2007)
Hypnea spinella	Rhodophyta	Dec-03	Sanibel Island Beach	Dawes (2004)
		Jan-08	Tarpon Bay Beach	This study
		Jan-10	Bunch Beach	This study
		Mar-10	Lighthouse Beach	This study
		Jan-10	Tradewinds Resort	This study

Table 5.4. (cont.) List of species, collection date and collection location of macroalgae found on Lee County beaches since 2003.

Genus species	Division	Date	Collection Location	Source
Hypnea spp.	Rhodophyta	Jul-04	Lee County Beaches	Lapointe and Bedford (2007)
Lomentaria baileyana	Rhodophyta	Jan-10	Bunch Beach	This study
Sargassum sp.	Phaeophyta	Jul-04	Lee County Beaches	Lapointe and Bedford (2007)
		Feb-08	Tarpon Bay Beach	This study
		Jan-10	Bunch Beach	This study
Solieria filiformes	Rhodophyta	Dec-03	Sanibel Island Beach	Dawes (2004)
		Jan-08	Tarpon Bay Beach	This study
		Feb-10	Fort Myers Beach	This study
Spyridia filamentosa	Rhodophyta	Mar-10	Tarpon Bay Beach	This study
Ulva spp.	Chlorophyta	Feb-08	Tarpon Bay Beach	This study

† *Gracilaria caudata, Gracilaria cervicornis, Gracilaria bursa-pastoris*

Table 5.5. Total number of attached seaweed species (S) identified during the study period. Zeros indicate dates where no algae was found. GOM04 and GOM05 are not included as they did not have any algae at any date. GOM09 was discontinued in January 2009.

	CES11	GOM01	GOM02	GOM03	GOM06	GOM08	GOM09	GOM10	GOM11	GOM12	GOM16
Jun-08	3	0	1	0	0	0	0	0	14	0	0
Sep-08	0	0	0	0	0	5	2	0	0	10	0
Nov-08	0	0	0	7	0	0	3	0	7	2	0
Jan-09	12	0	0	3	0	0	0	0	0	5	0
Mar-09	16	0	1	0	4	0	0	0	0	8	1
May-09	18	0	0	0	0	0	0	0	14	13	16
Jul-09	9	1	0	0	1	13	0	1	15	38	2
Sep-09	1	0	0	12	0	1	0	11	5	21	1
Nov-09	1	0	0	10	0	0	0	0	3	23	5
Jan-10	14	0	0	0	0	0	0	0	2	0	4
Mar-10	19	0	0	0	4	0	0	0	0	8	15
Jun-10	1	0	14	0	0	0	0	15	8	38	3

Table 5.6. Species diversity as calculated using Shannon-Weiner diversity (H') during the study period. Zeros indicate dates where no algae were found. GOM04 and GOM05 are not included as they did not have any algae at any date.

	CES11	GOM01	GOM02	GOM03	GOM06	GOM08	GOM09	GOM10	GOM11	GOM12	GOM13	GOM16
Jun-08	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.95	0.00	0.00	0.00
Sep-08	0.00	0.00	0.00	0.00	0.00	1.15	0.67	0.00	0.33	1.39	0.00	0.00
Nov-08	0.00	0.00	0.00	1.47	0.00	0.00	0.15	0.00	1.35	0.43	0.00	0.00
Jan-09	1.90	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.00
Mar-09	1.53	0.00	0.00	0.00	0.54	0.00	0.00	0.00	0.00	1.55	0.00	0.00
May-09	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.61	1.53	0.00	1.90
Jul-09	0.72	0.00	0.00	0.00	0.00	2.01	0.00	0.00	1.70	2.61	0.00	0.23
Sep-09	0.00	0.00	0.00	1.79	0.00	0.00	0.00	2.01	1.40	2.21	0.00	0.00
Nov-09	0.00	0.00	0.00	2.09	0.00	0.00	0.00	0.00	1.08	2.32	0.00	1.25
Jan-10	1.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	1.74	0.00	0.32
Mar-10	2.17	0.00	0.00	0.00	0.73	0.00	0.00	0.00	0.00	1.36	0.00	2.10
Jun-10	0.00	0.00	0.37	0.00	0.00	0.00	0.00	1.50	1.48	2.63	0.00	0.01

Table 5.7. Most commonly collected seaweed species in this study. Abundant macroalgae was frequently observed at offshore, live bottom habitats (GOM11, GOM12) and inshore soft bottom habitats near the Sanibel Causeway (CES11, GOM16). Algae was rare or absent at the other 9 stations, so the most common species at all other stations may not be indicative of species composition. None of the opportunistic beach samples were included in this analysis.

Offshore, live bottom	Inshore, near Sanibel Causeway	All other stations
Botryocladia occidentalis	*Gracilaria tikvahiae*	*Botryocladia occidentalis*
Solieria filiformis	*Acanthophora spicifera*	*Solieria filiformis*
Hypnea spinella	*Spyridia filamentosa*	*Champia parvula*
Sargassum filipendula	*Lomentaria baileyana*	*Gracilaria blodgettii*
Gracilaria blodgettii	*Sargassum filipendula*	*Caulerpa mexicana*
Gracilaria mammillaris	*Dasya crouaniana*	*Agardhiella subulata*
Gracilaria tikvahiae	*Dictyota cervicornis*	*Sargassum natans*
Agardhiella subulata		*Dictyota cervicornis*
Dictyota cervicornis		*Hypnea spinella*
		Laurencia filiformis

Table 5.8. Correlation matrix of biological and physical variables for all stations, all dates. Pearson correlation coefficients are reported; asterisks denote significance ($p < 0.05$).

	Biomass (g FW m^{-2})	Biomass (g DW m^{-2})	Percent cover	Temp.	D.O.	pH	Sal.	Turbidity	Irr.
Biomass (g FW m-2)	-								
Biomass (g DW m-2)	0.948*	-							
Percent cover	0.852*	0.879*	-						
Temperature	0.113	0.131	0.146	-					
Dissolved Oxygen	-0.062	-0.086	-0.175	-0.759*	-				
pH	0.043	0.043	0.014	0.238*	0.318*	-			
Salinity	-0.089	-0.102	-0.092	0.182*	-0.077	0.059	-		
Turbidity	-0.047	0.052	0.000	-0.143	0.064	0.066	0.066	-	
Irradiance (I_z)	0.037	0.007	0.012	0.251*	-0.183	-0.010	-0.020	-0.124	-

Table 5.9. Pearson correlation coefficient matrix for biological and habitat components; asterisks denote significance ($p < 0.05$).

	Biomass (g FW m^{-2})	Biomass (g DW m^{-2})	Percent cover	*Lytechinus variagatus*	*Arbacia punctulata*	Pinnidae	*Diapatra cuprea*	*Soft coral*	*Hard coral*
Biomass (g FW m^{-2})	-								
Biomass (g DW m^{-2})	0.948*	-							
Percent cover	0.852*	0.879*	-						
Lytechinus variagatus	-0.186*	-0.179*	-0.217*	-					
Arbacia punctulata	-0.088	-0.063	-0.094	0.372*	-				
Pinnidae	-0.154	-0.154	-0.185*	0.380*	0.261*				
Diapatra cuprea	0.069	0.080	0.103	-0.147	-0.086	-0.138	-		
Soft coral	0.122	0.106	0.069	0.033	0.282*	-0.310	-0.063	-	
Hard coral	0.164	0.141	0.126	0.081	0.393*	-0.045	-0.075	0.648*	-

Table 5.10. A list of the algal species analyzed by PAM fluorometry, the number of samples of each species analyzed, and the algal class to which each species belongs.

Algal Species	# of samples analyzed	Class
Botryocladia occidentalis	14	Rhodophyte
Solieria filiformis	12	Rhodophyte
Agardhiella ramosissima	11	Rhodophyte
Agardhiella subulata	9	Rhodophyte
Gracilaria mammillaris	9	Rhodophyte
Gracilaria tikvahiae	9	Rhodophyte
Gracilaria blodgettii	8	Rhodophyte
Gracilaria bursa-pastoris	7	Rhodophyte
Chondria littoralis	5	Rhodophyte
Sargassum filipendula	5	Phaeophyte
Acanthophora musculoides	4	Rhodophyte
Ceramium sp.	4	Rhodophyte
Dictyota divaricata	4	Phaeophyte
Hydropuntia caudata	4	Rhodophyte
Lomentaria baileyana	4	Rhodophyte
Polysiphonia sp.	4	Rhodophyte
Champia parvula	3	Rhodophyte
Gracilaria cervicornis	3	Rhodophyte
Hincksia mitchelliae	3	Phaeophyte
Spyridia filamentosa	3	Rhodophyte
Ulva rigida	3	Chlorophyte
Caulerpa mexicana	2	Chlorophyte

Caulerpa racemosa var. *peltata*	2	Chlorophyte
Cladophora albida	2	Chlorophyte
Cladophora liniformis	2	Chlorophyte
Dasya baillouviana	2	Rhodophyte
Dictyota cervicornis	2	Phaeophyte
Dictyota pulchella	2	Phaeophyte
Eucheuma isiforme	2	Rhodophyte
Gracilaria damaecornis	2	Rhodophyte
Halymenia elongata	2	Rhodophyte
Halymenia floresii	2	Rhodophyte
Hypnea spinella	2	Rhodophyte
Caulerpa sertularioides	1	Chlorophyte
Caulerpa vickersiae	1	Chlorophyte
Champia salicornioides	1	Rhodophyte
Chondria atropurea	1	Rhodophyte
Dasya mollis	1	Rhodophyte
Dasya ocellata	1	Rhodophyte
Dictyota menstrualis	1	Phaeophyte
Gracilaria cylindrica	1	Rhodophyte
Laurencia intricata	1	Rhodophyte
mixed sample	1	na
Sargassum acinarium	1	Phaeophyte
Sargassum histrix	1	Phaeophyte
Scinaia caribaea	1	Rhodophyte
Sebdenia flabellata	1	Rhodophyte

Udotea conglutinata	1	Chlorophyte
Ulva profunda	1	Chlorophyte

Table 5.11. A list of the algal genera analyzed by PAM fluorometry and the number of samples of each genera analyzed.

Genus	# of samples analyzed	Genus	# of samples analyzed
Gracilaria	39	*Lomentaria*	4
Agardhiella	20	*Halymenia*	4
Botryocladia	14	*Polysiphonia*	4
Solieria	12	*Ceramium*	4
Dictyota	9	*Champia*	4
Sargassum	7	*Hincksia*	3
Caulerpa	6	*Spyridia*	3
Chondria	6	*Eucheuma*	2
Dasya	4	*Hypnea*	2
Acanthophora	4	*Laurencia*	1
Cladophora	4	*Scinaia*	1
Ulva	4	*Sebdenia*	1
Hydropuntia	4	*Udotea*	1

Table 5.12. The stations from which samples were collected, and the number of samples analyzed by PAM fluorometry from each station.

Station	# of samples analyzed
CES11	40
GOM12	37
GOM11	32
GOM3	13
GOM16	12
GOM6	7
GOM1	6
GOM2	5
GOM10	4
GOM8	3
GOM9	3
GOM13	1

Table 5.13. The number of samples analyzed each month over the course of the study.

Sampling Month	# of samples analyzed
2008_06	12
2008_09	11
2008_11	10
2009_01	14
2009_03	13
2009_05	16
2009_07	25
2009_09	12
2009_11	15
2010_01	14
2010_03	10
2010_05	12
2010_06	13

Table 5.14. ANOVA results for the six most commonly analyzed species versus location.

Species	location	N	Mean	Std. Error	Sig.
Agardhiella ramosissima	offshore	4	.3367	.04263	.428
	inshore	3	.4018	.06722	
Agardhiella subulata	offshore	4	.3796	.03132	.368
	inshore	5	.4572	.06695	
Botryocladia occidentalis	offshore	9	.4147	.02500	.628
	inshore	2	.4433	.04000	
Gracilaria mammillaris	offshore	6	.3097	.03315	.126
	inshore	3	.4556	.10489	
Gracilaria tikvahiae	offshore	3	.2200	.11082	.459
	inshore	4	.3354	.09289	
Solieria filiformis	offshore	5	.3257	.04216	.028
	inshore	5	.4853	.04218	

Table 5.15. ANOVA results for the six most commonly analyzed species versus season.

Species	season	N	Mean	Std. Error	Sig.
Agardhiella ramosissima	dry	6	.3824	.03778	.267
	wet	1	.2576	.	
Agardhiella subulata	dry	4	.4896	.04447	.143
	wet	5	.3692	.05426	
Botryocladia occidentalis	dry	5	.4362	.03696	.513
	wet	6	.4063	.02569	
Gracilaria mammillaris	dry	3	.3911	.14405	.634
	wet	6	.3419	.02014	
Gracilaria tikvahiae	dry	3	.2272	.17294	.512
	wet	4	.3300	.01447	
Solieria filiformis	dry	2	.5650	.07167	.028
	wet	8	.3656	.03298	

Table 5.16. Results of the two factor ANOVA for the four most common genera analyzed. "nd" stands for "no data", in which a standard deviation (std dev) could not be computed due to the lack of samples (n = 0 or 1). "p location" is the p-value testing for location (inshore vs. offshore) differences in QY values. "p season" is the p-value testing for seasonal (wet vs. dry) differences in QY values.

Genera	Location	Season	N	Mean	std dev	p location	p season
Agardhiella	inshore	dry	1	0.4306	nd	0.125	0.047
		wet	1	0.23	nd		
	offshore	dry	0	nd	nd		
		wet	3	0.3237	0.032		
Botryocladia	inshore	dry	0	nd	nd	0.407	0.354
		wet	2	0.4433	0.057		
	offshore	dry	5	0.4362	0.083		
		wet	4	0.3878	0.065		
Gracilaria	inshore	dry	1	0.47	nd	0.424	0.033
		wet	1	0.315	nd		
	offshore	dry	0	nd	nd		
		wet	3	0.3385	0.02		
Solieria	inshore	dry	1	0.4933	nd	0.367	0.755
		wet	1	0.4625	nd		
	offshore	dry	0	nd	nd		
		wet	3	0.3808	0.06		

Table 5.17. Results of the paired t-tests among the six most common species. Each species was compared to the other five for a total of 15 comparisons. The mean difference (Mean) between the QY values of each species in the pair is given, along with the standard deviation, mean standard error, and lower and upper bounds of the 95% confidence interval. The t statistic is provided with the degrees of freedom (df) and the significance value (two-tailed).

Pair	Comparison	Mean	Std. Dev.	Std. Err.	Lower	Upper	t	df	Sig.
Pair 1	*Agardhiella ramosissima* - *Agardhiella subulata*	-.176	.055	.028	-.264	-.088	-6.40	3	.008
Pair 2	*Agardhiella ramosissima* - *Botryocladia occidentalis*	-.084	.105	.053	-.251	.084	-1.59	3	.210
Pair 3	*Agardhiella ramosissima* - *Gracilaria mammillaris*	-.063	.063	.036	-.220	.093	-1.74	2	.224
Pair 5	*Agardhiella ramosissima* - *Solieria filiformis*	-.104	.050	.035	-.554	.347	-2.93	1	.210
Pair 6	*Agardhiella subulata* - *Botryocladia occidentalis*	-.048	.089	.051	-.269	.172	-.940	2	.446
Pair 7	*Agardhiella subulata* - *Gracilaria mammillaris*	.014	.091	.041	-.100	.128	.342	4	.749
Pair 8	*Agardhiella subulata* - *Gracilaria tikvahiae*	-.033	.040	.023	-.132	.067	-1.42	2	.292
Pair 9	*Agardhiella subulata* - *Solieria filiformis*	-.045	.129	.058	-.206	.115	-.784	4	.477
Pair 10	*Botryocladia occidentalis* - *Gracilaria mammillaris*	.114	.074	.030	.036	.192	3.76	5	.013
Pair 11	*Botryocladia occidentalis* - *Gracilaria tikvahiae*	.204	.114	.066	-.078	.487	3.11	2	.090
Pair 12	*Botryocladia occidentalis* - *Solieria filiformis*	.070	.065	.027	.002	.139	2.66	5	.045

Pair 13	*Gracilaria mammillaris* - *Gracilaria tikvahiae*	.073	.070	.035	-.039	.184	2.07	3	.130
Pair 14	*Gracilaria mammillaris* - *Solieria filiformis*	-.038	.064	.026	-.105	.029	-1.46	5	.205
Pair 15	*Gracilaria tikvahiae* - *Solieria filiformis*	-.084	.071	.036	-.198	.029	-2.37	3	.099

Table 5.18. Results of the paired t-tests among the three classes of algae analyzed. Each class was compared to the other two for a total of three comparisons. The mean difference (Mean) between the QY values of each class in the pair is given, along with the standard deviation, mean standard error, and lower and upper bounds of the 95% confidence interval. The t statistic is provided with the degrees of freedom (df) and the significance value (two-tailed).

Pair	Comparison	Mean	Std. Dev.	Std. Err.	Lower	Upper	t	df	Sig.
Pair 1	Chlorophyte - Phaeophyte	-.029	.106	.043	-.140	.082	-.68	5	.526
Pair 2	Chlorophyte - Rhodophyte	.231	.124	.041	.136	.327	5.60	8	.001
Pair 3	Phaeophyte - Rhodophyte	.197	.137	.037	.118	.276	5.37	13	.000

Table 5.19. Results of the three way ANOVA processed through the Generalized Linear Model algorithm in SPSS. The Source refers to each parameter in the model, including interaction effects and error terms. The Type III sum of squares represents the variability in the model caused by the associated variable. Degrees of freedom (df), Mean Square values, and the F statistics are also provided. The significance of each variable (Sig.) is the p-value, and indicates the role of each variable in predicting QY values.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.318	13	.024	1.885	.047
Intercept	7.866	1	7.866	605.303	.000
IO2	.100	1	.100	7.680	.007
Season	.041	1	.041	3.154	.080
Genus	.098	3	.033	2.519	.065
IO2 * Season	.009	1	.009	.672	.415
IO2 * Genus	.008	3	.003	.203	.894
Season * Genus	.018	3	.006	.460	.711
IO2 * Season * Genus	.011	1	.011	.868	.355
Error	.884	68	.013		
Total	13.292	82			
Corrected Total	1.202	81			

Table 5.20. The formulas for the three simulation equations for QY, I_z, and temperature and the pertinent regression data from comparisons with actual, monthly-averaged data.

Parameter	Simulation equation	R^2 value	slope	significance
temperature	24.023*(1-0.27*COS(6.2832/365*(day-5)))	0.88	0.73	<0.0001
I_z	62*(1-0.8375*COS(6.2832/365*(day+70)))	0.81	0.88	0.006
quantum yield	0.4478*(1-0.22*COS(6.2832/365*(day+110)))	0.64	0.82	0.002

Table 5.21. The top five algal species, stations, and sampling events (Date) for which samples were processed for stable isotope analysis.

Species	# analyzed	Station	# analyzed	Date	# analyzed
Solieria filiformis	43	GOM12	86	2009_09	37
Gracilaria mammillaris	32	CES11	37	2010_03	31
Gracilaria tikvahiae	23	GOM3	33	2010_01	29
Botryocladia occidentalis	18	GOM11	21	2009_11	28
Gracilaria intermedia	11	GOM16	12	2010_04	26

Table 5.22. ANOVA results of algal tissue nutrient data including carbon to nitrogen ratios (C:N), $\delta^{15}N$, and total tissue phosphate (TTP) versus location (inshore versus offshore) and season (dry versus wet). The mean values for each parameter are given with the standard errors. The p-values correspond to the location comparison (inshore versus offshore), seasonal differences (dry versus wet), and any interaction between location and season.

Parameter	Group	Location	Season	Mean	Std. Err.	Comparison	p-value
C:N	all algae	inshore	dry	15.61	0.86	Location	0.003
			wet	14.51	0.99	Season	0.741
		offshore	dry	17.43	0.86	Interaction	0.359
			wet	17.94	0.79		
	Gracilaria mammillaris	inshore	dry	23.98	7.81	Location	0.989
			wet	13.23	3.49	Season	0.192
		offshore	dry	19.41	2.09	Interaction	0.32
			wet	17.93	2.47		
	rhodophytes	inshore	dry	18.77	1.26	Location	0.739
			wet	14.12	1.21	Season	0.031
		offshore	dry	17.00	1.08	Interaction	0.063
			wet	16.65	1.02		
	Solieria filiformis	inshore	dry	19.74	2.25	Location	0.996
			wet	13.50	1.59	Season	0.017
		offshore	dry	17.79	1.52	Interaction	0.266
			wet	15.44	1.39		
d15N	all algae	inshore	dry	6.04	0.22	Location	0.108
			wet	4.66	0.26	Season	<0.0001
		offshore	dry	5.14	0.22	Interaction	0.019
			wet	4.83	0.20		
	Gracilaria mammillaris	inshore	dry	4.52	1.19	Location	.516
			wet	5.14	0.53	Season	.805

		offshore	dry	4.51	0.32	Interaction	.521
			wet	4.23	0.38		
	rhodophytes	inshore	dry	6.43	0.27	Location	0.001
			wet	4.87	0.26	Season	<0.0001
		offshore	dry	4.92	0.23	Interaction	0.011
			wet	4.62	0.22		
	Solieria filiformis	inshore	dry	6.92	0.47	Location	.019
			wet	4.38	0.33	Season	.000
		offshore	dry	5.08	0.32	Interaction	.011
			wet	4.46	0.29		
TTP	all algae	inshore	dry	1181.21	396.63	Location	0.87
			wet	851.19	275.22	Season	<0.0001
		offshore	dry	1286.83	384.60	Interaction	0.275
			wet	708.51	314.05		
	all *Gracilaria*	inshore	dry	1285.08	404.56	Location	0.676
			wet	881.45	310.58	Season	<0.0001
		offshore	dry	1691.45	.	Interaction	0.058
			wet	618.09	231.70		

Table 5.23. Regression analysis results of salinity (independent variable) against the algal tissue nutrient (dependent) variables, where C:N refers to the tissue carbon to nitrogen atomic ratio and TTS refers to total tissue phosphate content. The p-value indicates the significance of the regression between the independent and dependent variables, the corresponding slope (when the relationship is significant) and the goodness of fit (r square value).

independent variable	dependent variable	p-value	slope	r square
salinity	$\delta^{13}C$	0.73	0	0.02
salinity	$\delta^{15}N$	0.03	-0.38	0.5
salinity	C:N	0.62	0	0.04
salinity	TTP	0.52	0	0.08
salinity	N:P	0.19	0	0.09

Table 5.24. Attached Macroalgae taxa collected from artificial and natural reefs with species codes used for statistical analysis, plots, and graphs.

Order	Genus	Species	Species Code	Frequency of Occurrence (n=240)	
Rhodophyta	*Agardhiella*	*ramosissima*	AGARAM	1	0.4%
	Agardhiella	*subulata*	AGASUB	35	14.6%
	Botryocladia	*occidentalis*	BOTOCC	105	43.8%
	Champia	*parvula*	CHAPAR	5	2.1%
	Chondria	*floridana*	CHOFLO	3	1.3%
	Chondria	sp.	CHONDRIASP.	31	12.9%
	Ceramium	sp.	CERAMIUMSP.	2	0.8%
	Dasya	*ramosissima*	DASRAM	6	2.5%
	Dasya	sp.	DASYASP.	33	13.8%
	Eucheuma	*isiforme den.*	EUCISI	47	19.6%
	Gracilaria	sp.	GRACILARIASP.	12	5.0%
	Gracilaria	*blodgettii*	GRABLO	38	15.8%
	Gracilaria	*bursa-pastoris*	GRABUR	1	0.4%
	Gracilaria	*caudata*	GRACAU	4	1.7%
	Gracilaria	*cervicornis*	GRACER	11	4.6%
	Gracilaria	*cylindrica*	GRACYL	1	0.4%
	Gracilaria	*damaecornis*	GRADAM	1	0.4%
	Gracilaria	*mammillaris*	GRAMAM	89	37.1%
	Gracilaria	*tikvihiae*	GRATIK	57	23.8%
	Halymenia	*floresii*	HALFLO	13	5.4%
	Halymenia	sp.	HALYMENIASP.	5	2.1%
	Hydropuntia	*caudata*	HYDCAU	1	0.4%
	Hypnea	*spinella*	HYPSPI	1	0.4%
	Laurencia	*chondrioides*	LAUCHO	1	0.4%
	Laurencia	*filiformis*	LAUFIL	6	2.5%
	Laurencia	*intricata*	LAUINT	8	3.3%
	Laurencia	sp. *(poiteaui)*	LAURENCIASP.	41	17.1%
	Sebania	*flabellata*	SEBFLA	5	2.1%
	Solieria	*filiformis*	SOLFIL	25	10.4%
	Wurdemannia	*miniata*	WURMIN	4	1.7%
Phaeophyta	*Dictyota*	*cervicornis*	DICCER	1	0.4%
	Dictyota	*pulchella*	DICPUL	3	1.3%
	Dictyota	sp.	DICTYOTASP.	31	12.9%
	Dictyopteris	*delicatula*	DICDEL	2	0.8%

	Sargassum	*filipendula*	SARFIL	14	5.8%
	Sargassum	*hystrix*	SARHYS	9	3.8%
	Sargassum	*vulgare*	SARVUL	2	0.8%
	Sargassum	sp.	SARGASSUMSP.	53	22.1%
Chlorophyta	*Acetabularia*	sp.	ACETABULARIASP.	1	0.4%
	Caulerpa	*ashmeadii*	CAUASH	1	0.4%
	Caulerpa	*mexicana*	CAUMEX	10	4.2%
	Caulerpa	*racemosa peltata*	CAURAC	34	14.2%
	Caulerpa	*sertularioides*	CAUSER	0	0.0%
	Caulerpa	sp.	CAULERPASP.	12	5.0%
	Codium	*isthmocladum*	CODIST	3	1.3%
	Codium	*decorticatum*	CODDEC	1	0.4%
	Codium	sp.	CODIUMSP.	15	6.3%
	Halimeda	sp.	HALIMEDASP.	4	1.7%
	Halimeda	*incrassata*	HALINC	5	2.1%
	Rhipocephalus	*phoenix group*	RHIPHO	9	3.8%
	Udotea	sp.	UDOTEASP.	86	35.8%
	Ulva	sp.	ULVASP.	2	0.8%

Table 5.25. Univariate Diversity Indices for Wet Season Reef Samples: Based on Frequency of Occurrence (bold indicates highest value for that index where S=species, N=total abundance, d=Margalef richness, J'=Pielous's evenness, H'=Shannon's diversity, and 1- Lambda'= Simpson's index).

Sample	S	N	d	J'	H'(loge)	1-Lambda'
35 ledge 8/8/09	**22**	**71**	**4.926**	0.9168	**2.834**	**0.9445**
Shermans 8/8/09	14	47	3.376	**0.9181**	2.423	0.9214
Edison 8/29/09	15	29	4.158	0.921	2.494	0.931
GH1 8/29/09	9	42	2.14	0.9563	2.101	0.8885
60 ft Ledge 9/19/09	8	31	2.038	0.8931	1.857	0.8538
53 Ledge 9/19/09	19	67	4.281	0.8786	2.587	0.9186
Sherman's 10/10/09	4	6	1.674	0.8962	1.242	0.80
35 Ledge 10/10/09	14	72	3.04	0.9228	2.435	0.9155
60 Ledge 10/24/09	11	36	2.791	0.8762	2.101	0.8698
Ledge 53 10/24/09	16	63	3.62	0.8943	2.479	0.9135
GH Barge 10/31/09	8	14	2.652	0.9475	1.97	0.9121
Edison 10/31/09	8	15	2.585	1.934	0.8952	0.93

Table 5.26. Univariate Diversity Indices for Dry Season Reef Samples: Based on Frequency of Occurrence (bold font indicates highest value for that index where S=species, N=total abundance, d=Margalef richness, J'=Pielous's evenness, H'=Shannon's diversity, and 1-Lambda'= Simpson's index).

Sample	S	N	d	J'	H'(loge)	1-Lambda'
Edison 5/2/09 total	8	22	2.265	0.8857	1.842	0.8485
Sherman's 5/23/09	**19**	51	**4.578**	0.9075	**2.672**	**0.9341**
53 Ledge 5/9/09	14	40	3.524	0.9291	2.452	0.9244
35 Ledge 5/9/09	6	14	1.895	0.8577	1.537	0.7912
60 Ledge 5/23/09	17	45	4.203	0.9134	2.588	0.9303
GH Barge 5/8/10	6	11	2.085	**0.9335**	1.673	0.8727
Sherman's 5/20/10	12	27	3.338	0.9388	2.333	0.9259
60 Ledge 5/20/10	11	33	2.86	0.8755	2.099	0.8788
35 Ledge 5/22/10	17	**58**	3.94	0.9315	2.639	**0.9341**
53 Ledge 5/22/10	12	50	2.812	0.9226	2.293	0.9037
Edison 5/29/10	16	46	3.918	0.9234	2.56	0.9295