

SECTION 5: ALGAE

BENTHIC MARINE PLANTS OF BAHIA LAULAU AND TANK BEACH, SAIPAN

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Little information is available on the marine flora of Bahia Laulau. The Military Geology of Saipan (Cloud, 1956) briefly mentions some of the marine plants. Pacific Basin Development Consultants, Inc. prepared a report discussing the biological and physical characteristics of Bahia Laulau for the Office of Coastal Zone Management in Saipan in 1984. No information was available for Tank Beach.

METHODS

Marine plants and substrate coverage were quantified by a point quadrat method along a total of 57 50-m transects within Bahia Laulau and along Tank Beach. Six sets of three transects each were run along the middle section of the reef flat, along the 3-5 m contour of the surge and groove area and along the submarine terrace at approximately 8-10 m. Due to rough surf conditions, only three 50-m transects were run along the middle section of the reef flat at Tank Beach. Since areas covered by algal turf, crustose coralline algae and other encrusting organisms are difficult to measure by dimensions, it is more appropriate to survey such organisms by the point-quadrat method.

The 1/16 m (25x25 cm) quadrat frame consisted of 25 squares with 16 cross-points. Organisms under the points of intersection of string tied across the quadrat were tallied. Whatever occurred under each point was recorded. In the event the point fell on two layers of algae, the base alga was recorded and the overlying alga was noted as present. The quadrat was tossed randomly four times at 10-m intervals along the length of the transect. Data was therefore collected from a total of 320 points along each transect. When identification to species was impossible in the field, the alga was collected, pressed and identified in the laboratory (Wilkins, 1989).

Percent cover of each transect was calculated by taking the number of points occupied by a particular category divided by the total number of points per transect multiplied by one hundred. The mean, standard deviation and standard error for the different categories were calculated for the transects within the different zones.

RESULTS

Results of the quantitative transect survey of the benthic marine plants are presented in Tables 1 through 7. A summary of species found in algal turf and/or surrounding areas is given in Table 8. A total of 95 species, representing four divisions, were recorded from the study area. One species of seagrass, Enhalus acoroides, was found patchily distributed in the middle section of the reef flat at site C. Boergesenia forbesii and Turbinaria

ornata were abundant along the reef flat transects at site A. Sites B and C supported extensive growth of Laurencia papillosa and Sargassum polycystum. Both stages of Padina, the erect and the Vaughniella stage, were recorded from several transects. During a walking survey of the reef flat at site C, Ulva lactuca was found on a wave washed bench. Forams were observed throughout the entire reef flat.

The dominant macroalgae of the spur and groove habitat of sites B and C were Liagora species. Padina tenuis and crustose coralline alga were also found to be abundant.

Two Liagora species, crustose coralline algae, and Padina tenuis were common components along the submarine terrace of sites B and C. At site C, Mastophora rosea was usually encountered on rocky substrate.

Algal turf was extensive in all areas, more than fifty percent of the entire surface along the 3-5 m and 8-10 m contour was covered by some type of algal growth (Tables 1-7). An attempt was made to quantify these extensive mats in Table 8 which lists the major species contributing to the algal turfs in each habitat. Some of the major species encountered included Jania spp., Tolypiocladia glomerata, Dictyota friabilis, Amphiroa spp., and Sphacelaria spp..

In summary, the extensive algal cover and species diversity throughout the study area appears to be the result of a well circulated and productive system.

LITERATURE CITED

- Cloud, P.E., Jr. 1959. Geology of Saipan, Mariana Islands, Part 4, Submarine topography and shoalwater ecology. U.S. Geological Survey Professional Paper. 280-k, p 84.
- Pacific Basin Environmental Consultants, Inc. 1984. Biological and physical survey of Bahia Laulau. U.S. Department of Commerce, Office of Coastal Zone Management, Saipan. pp.
- Wilkins, S. de C. 1989. Benthic marine plants of the Ngerukewid Island Wildlife Preserve, Republic of Palau. IN: Resource Survey of Ngerukewid Island Wildlife Preserve, Republic of Palau. Birkeland, C. and H. Manner eds. South Pacific Commission, New Caledonia. pp. 121-130.

Table 1: Occurrence of algae at Site A, reef flat. Results presented as percent cover. A1-A3=Transect 1.

	A1	A2	A3	MEAN	STD.	S.E.
DIVISION CYANOPHYTA						
<u>Hormothamnion enteromorphoides</u>		1.25	1.25	1.25		
<u>Schizothrix calcicola</u>		2.81	0.31	1.56	1.25	0.72
<u>Schizothrix mexicana</u>		0.63	0.63	0.63		
DIVISION CHLOROPHYTA						
<u>Boergesenia forbesii</u>	0.94	43.1	0.63	14.9	20	11.5
<u>Caulerpa cupressoides</u>	0.63		0.63	0.63		
DIVISION PHAEOPHYTA						
<u>Dictyota bartayresii</u>	2.5		0.31	1.41	1.09	0.63
<u>Dictyota cervicornis</u>	0.31			0.31		
<u>Dictyota friabilis</u>	0.63		1.25	0.94	0.31	0.18
<u>Hydroclathrus clathratus</u>		4.06		4.06		
<u>Padina (Vaughniella stage)</u>	1.88			1.88		
<u>Padina minor</u>			0.63	0.63		
<u>Padina tenuis</u>	28.4	8.44	1.88	12.9	11.3	6.52
<u>Sargassum polycystum</u>	9.69	6.56		8.13	1.56	0.9
<u>Turbinaria ornata</u>	7.81		19.1	13.4	5.63	3.25
DIVISION RHODOPHYTA						
<u>Hydrolithon sp.</u>	0.63		0.94	0.78	0.16	0.09
<u>Porolithon onkodes</u>		0.63		0.63		
OTHER						
Rock with turf	20	8.13	11.9	13.3	4.96	2.86
Sand with pebbles	26.6	16.6	55.9	33	16.7	9.65
Worm tubes		8.13		8.13		
Live coral			1.88	1.88		
Sponge			1.25	1.25		
Urchin			1.56	1.56		

Table 2: Occurrence of algae at Site B, reef flat. Results presented as percent cover. B1-B3=Transect 1. B4-B6=Transect 2. B7-B9=Transect 3.

	B1	B2	B3	B4	B5	B6	B7	B8	B9	MEAN	STD.	S.E.	
DIVISION CYANOPHYTA													
<u>Kormothamion enteromorphoides</u>			0.31			1.88					1.1	0.79	0.26
Unidentified			2.5						3.75	3.13	0.63	0.21	
DIVISION CHLOROPHYTA													
<u>Boergesinia forbesii</u>				1.25		0.31					0.78	0.47	0.16
<u>Boodlea composita</u>		0.31		0.94	0.63		1.88				0.94	0.59	0.2
<u>Caulerpa racemosa</u>			2.81		5.31						4.06	1.25	0.42
<u>Caulerpa sertularioides</u>								0.31			0.31		
<u>Codium geppii</u>		17.5									17.5		
<u>Dictyosphaeria versluysii</u>		0.31		1.56	0.63	2.5			0.94		1.19	0.78	0.26
<u>Neomeris annulata</u>		0.31									0.31		
<u>Valonia aegagropila</u>				0.94							0.94		
DIVISION PHAEOPHYTA													
<u>Dictyota bartayresii</u>					0.31						0.31		
<u>Hydroclathrus clathratus</u>	0.63	0.31			0.63						0.52	0.15	0.05
<u>Padina tenuis</u>	4.38	7.19	0.31	0.94	0.31	3.75	9.69		0.94		3.44	3.28	1.09
<u>Padina (Vaughniella stage)</u>				2.81		2.5		13.1			6.14	4.93	1.64
<u>Sargassum polycystum</u>	14.4	0.31	17.5	3.44		0.31	5.94	0.63	6.25		6.1	6.15	2.05
DIVISION RHODOPHYTA													
<u>Gelidiella acerosa</u>		0.31	1.25	2.81	2.5	0.63		1.88			1.56	0.92	0.31
<u>Gracilaria salicornia</u>		0.94		2.81	0.31	0.31					1.09	1.02	0.34
<u>Laurencia papillosa</u>	3.75	7.5		20	22.8	9.06	21.3	7.5	0.63		11.6	8	2.67
<u>Laurencia mariannensis</u>	6.88	3.13	5.94	2.5	5	3.13	0.31	2.81			3.71	1.97	0.66
<u>Porolithon onkoides</u>	3.12	0.63		2.5	2.81	0.94	2.19				2.03	0.93	0.31
<u>Spyridia filamentosa</u>		3.75	4.06	2.19	1.88		3.13	6.88	0.31		3.17	1.92	0.64
OTHER													
Rock with turf	20.6	22.8	21.3	1.56	5.63	28.1	42.2	64.1	46.6		28.1	18.8	6.26
Sand with turf					27.8	44.1					36	8.15	2.72
Sand/pebbles/rock	45.3	34.4	44.1	53.8	23.4	2.19	13.4	5.63	36.9		28.8	17.4	5.82
Live coral	0.31										0.31		
Dead coral								0.94			0.94		
Cucumber	0.63	0.31				0.31					0.42	0.15	0.05

presented as percent cover.
 B10-B12=Transect 1. B13-B15=Transect 2.
 B16-B18=Transect 3.

	B10	B11	B12	B13	B14	B15	B16	B17	B18	MEAN	STD.	S.E.
DIVISION CYANOPHYTA												
<u>Microcoleus lyngbyaceus</u>						0.31				0.31		
<u>Schizothrix calcicola</u>		1.25	0.63			0.63			5	1.88	1.82	0.61
<u>Schizothrix mexicana</u>		0.63								0.63		
<u>Seytonema hofmannii</u>							0.94			0.94		
Unidentified	1.25	0.94								1.1	0.16	0.05
DIVISION CHLOROPHYTA												
<u>Ecodlea composita</u>				0.63						0.63		
<u>Caulerpa racemosa</u>				0.94		0.31				0.63	0.32	0.11
<u>Caulerpa serrulata</u>	0.31	0.94	0.31	0.31	0.31					0.44	0.25	0.08
<u>Caulerpa taxifolia</u>	1.25		1.56	0.63	0.31	1.25				1	0.46	0.15
<u>Dictyosphaeria versluysii</u>	0.31									0.31		
<u>Keomeris annulata</u>				0.31	0.31	2.19	0.31		0.31	0.69	0.75	0.25
<u>Udotea argentea</u>				0.31						0.31		
<u>Udotea geddi</u>	0.63	2.5	0.94	0.31		1.56				1.19	0.78	0.26
<u>Valonia fastigiata</u>					0.31					0.31		
DIVISION PHAEOPHYTA												
<u>Dictyota bartayresii</u>	0.94	0.63		0.31		2.19				1.02	0.71	0.24
<u>Padina tenuis</u>	1.25	0.94	1.25	0.31		1.88	0.94			1.1	0.47	0.16
<u>Schacelaria tribuloides</u>			1.88	0.31						1.1	0.79	0.26
DIVISION RHODOPHYTA												
<u>Actinotrichia fragilis</u>							0.31			0.31		
<u>Anansia glomerulata</u>	0.31		4.38			0.63		1.56		1.72	1.6	0.53
<u>Arohiroa foliacea</u>					0.31					0.31		
<u>Asparagopsis taxiformis</u>								5	1.25	3.13	1.88	0.63
<u>Galaxaura marginata</u>				0.63		0.94				0.79	0.16	0.05
<u>Galaxaura oblongata</u>	1.56	0.63	1.88	2.81	1.88	3.75	0.63	0.63		1.72	1.06	0.35
<u>Gelidium sp.</u>		0.31										
<u>Hydrolython sp.</u>	1.88	0.31	1.56			3.75	4.06	2.5		2.34	1.29	0.43
<u>Jania capillacea</u>				3.44	0.63	0.63				1.57	1.32	0.44
<u>Liagora sp.</u>	9.69			4.06	1.25	14.7	2.81	1.25	0.63	4.91	4.91	1.64
<u>Liagora farinosa</u>	10.9			1.25	1.25	0.63			0.31	2.54	2.76	0.92
<u>Peysoneilia rubra</u>						1.25				1.25		
<u>Porolithon onkodes</u>	2.5	1.88	0.63		0.63	0.94	5.31	4.38	3.75	2.43	1.63	0.54
<u>Sporolithon sp.</u>	1.56	1.88	0.94	1.88	5.31					2.03	1.67	0.56
<u>Tolyptocladia glomerulata</u>	0.31					0.31	4.06			1.56	1.77	0.59
OTHER												
Rock with turf	51.3	63.4	65	40.9	53.1	49.1	53.8	70.9	65	56.9	9.08	3.03
Coralline algae with turf					3.75					3.75		
Dead coral with turf								3.44		3.44		
Sand/pebbles/rock	12.8	7.5	15.6	25.6	16.3	9.38	15.9	2.5	7.19	12.5	6.41	2.14
Live coral		12.2	2.5	7.81	12.8	3.13	5.63	9.38	17.5	8.87	4.83	1.61
Dead coral				7.19						7.19		
<u>Chrysoevstis fragilis</u>	0.94	2.19	1.88	0.31	0.31	0.63	0.31			0.94	0.73	0.24
Cucumber			0.63							0.63		
Urchin	0.31								0.31	0.31		
Anemone								2.19		2.19		
Unidentified					1.25					1.25		

Table 4: Occurrence of algae at Site B, submarine terrace.
 Results presented as percent cover.
 B19-B21=Transect 1. B22-B24=Transect 2.
 B25-B27=Transect 3.

	B19	B20	B21	B22	B23	B24	B25	B26	B27	MEAN	STD.	S.E.	
DIVISION CYANOPHYTA													
<u>Microcoleus lyngbyaceus</u>						0.31				0.31			
<u>Schizothrix calcicola</u>	1.56	2.81	0.63							1.67	0.9	0.3	
<u>Schizothrix mexicana</u>	1.56	0.31	1.25	0.31	0.31	0.94				0.78	0.5	0.17	
Unidentified		1.25	3.75						0.31	1.77	1.45	0.48	
DIVISION CHLOROPHYTA													
<u>Caulerpa serrulata</u>	0.63		0.63			0.31				0.52	0.15	0.05	
<u>Caulerpa taxifolia</u>				0.31						0.31			
<u>Halimeda opuntia</u>	0.63									0.63			
<u>Neomeris annulata</u>				0.31	0.31				0.31	0.31			
<u>Tydemania expeditionis</u>	1.25	0.63								0.94	0.31	0.1	
<u>Udotea geppii</u>	0.31			0.94						0.63	0.31	0.1	
DIVISION PHAEOPHYTA													
<u>Dictyota bartayresii</u>	1.56	1.25								1.41	0.16	0.05	
<u>Dictyota friabilis</u>				0.31		1.56				0.94	0.63	0.21	
<u>Padina tenuis</u>	0.94	1.25		0.94						1.04	0.15	0.05	
<u>Schacelaria tribuloides</u>		5.94								5.94			
DIVISION RHODOPHYTA													
<u>Amansia glomerulata</u>						0.31	0.94		0.31	0.52	0.29	0.1	
<u>Amphiroa foliacea</u>	0.94	0.63				1.56				1.04	0.39	0.13	
<u>Asparagopsis taxiformis</u>				0.31			3.44	1.56		1.77	1.28	0.43	
<u>Galaxaura marginata</u>			0.31	0.63					0.31	0.42	0.15	0.05	
<u>Galaxaura oblongata</u>				2.19	0.31	0.94	1.25	1.25	1.88	1.3	0.61	0.2	
<u>Gelidium sp.</u>		0.63					0.31		0.31	0.42	0.15	0.05	
<u>Hydrolithon sp.</u>	3.44	0.63		1.25	0.31	5	0.94	10.3	1.56	2.93	3.16	1.05	
<u>Jania capillacea</u>		0.63		7.19		0.63				2.81	3.09	1.03	
<u>Liagora sp.</u>	7.19		2.19	4.69	19.7	7.81			1.56	7.19	6.05	2.02	
<u>Liagora farinosa</u>							0.94	2.19	5	2.71	1.7	0.57	
<u>Lithophyllum mollucensis</u>						0.31				0.31			
<u>Porolithon onkodes</u>	10.6	3.44	6.56		0.63	1.56		0.63	3.13	3.79	3.38	1.13	
OTHER													
Rock with turf	15.3	52.5		64.7	17.2	44.1	76.3	50.9	60	47.6	20.3	6.75	
Rock with "scuz"			48.8							48.8			
Dead coral with turf	20.3					11.6	0.94	11.3		11	6.86	2.29	
Sand/pebbles/rock	13.1	5.94	13.1	1.25	59.4	11.6	4.06	11.6	18.4	15.4	16.3	5.44	
Live coral		20	22.2	5.63	10.9	1.88	10.3	10.9	10	6.56	10.9	6.14	2.05
Dead coral			9.06	3.44						6.25	2.81	0.94	
<u>Chryso cystis fragilis</u>	0.63		8.13	0.31		0.94		0.31	0.31	1.77	2.85	0.95	
Sponge						0.31				0.31			

	C1	C2	C3	C4	C5	C6	C7	C8	C9	MEAN	STD.	S.E.
DIVISION CYANOPHYTA												
<u>Schizothrix mexicana</u>	0.31									0.31		
DIVISION CHLOROPHYTA												
<u>Boodlea composita</u>			0.31							0.31		
<u>Caulerpa cupressoides</u>								0.94		0.94		
<u>Caulerpa racemosa</u>	1.56	8.44	1.88		0.31			15.6	5.94	5.63	5.27	1.76
<u>Caulerpa sertularioides</u>	1.25	0.63	0.31					0.94		0.78	0.35	0.12
<u>Dictyosphaeria versluysii</u>		2.81	0.94	0.63					0.94	1.33	0.87	0.29
<u>Halimeda velasquezii</u>	0.31									0.31		
<u>Halimeda opuntia</u>									0.94	0.94		
<u>Rhipilia sinuosa</u>			0.31							0.31		
<u>Valonia fastigiata</u>						0.31			0.31	0.31		
DIVISION PHAEOPHYTA												
<u>Dictyota bartayresii</u>	1.25				0.63				0.94	0.94	0.26	0.09
<u>Dictyota cervicornis</u>		0.31				0.31	1.56			0.73	0.59	0.2
<u>Dictyota friabilis</u>	0.63									0.63		
<u>Hydroclathrus clathratus</u>						0.63	0.94			0.78	0.16	0.05
<u>Padina minor</u>	0.31		0.31						0.63	0.42	0.15	0.05
<u>Padina tenuis</u>	19.1	20	6.88		3.75		0.94	3.13	4.69	8.35	7.27	2.42
<u>Padina (Vaughniella stage)</u>								3.13		3.13		
<u>Sargassum polycystum</u>	6.88	0.94	2.81		5.94			0.94	5.63	3.85	2.4	0.8
<u>Schacelaria tribuloides</u>	1.56	1.88	2.19	1.25	0.31				0.94	1.35	0.62	0.21
<u>Schacelaria novaehollandiae</u>						0.31	0.63	0.31		0.42	0.15	0.05
<u>Turbinaria ornata</u>	0.31	0.63								0.47	0.16	0.05
DIVISION RHODOPHYTA												
<u>Acanthophora spicifera</u>			0.31							0.31		
<u>Anchiroa fragilissima</u>	0.31									0.31		
<u>Gelidium crinale</u>						1.88				1.88		
<u>Gelidium pusillum</u>	0.31									0.31		
<u>Gelidiella acerosa</u>	8.44		0.63					2.19		3.75	3.38	1.13
<u>Hydroolithon sp.</u>	0.63		1.56						0.63	0.94	0.44	0.15
<u>Hypnea cervicornis</u>	0.31									0.31		
<u>Laurencia papillosa</u>				21.3	46.3		7.5	2.19		19.3	17	5.68
<u>Laurencia paniculata</u>				4.69	1.25		16.9	4.69		6.88	5.94	1.98
<u>Lithophyllum sp.</u>			0.31							0.31		
<u>Porolithon onkodes</u>		0.63			1.25	1.56				1.15	0.39	0.13
<u>Sporolithon sp.</u>									0.63	0.63		
<u>Spyridia filamentosa</u>				0.31			1.56	3.13		1.67	1.15	0.38
OTHER												
Rock with turf	21.3	30	15	25.9	5	16.6	34.1	38.1	21.9	23.1	9.68	3.23
Sand/pebbles/rock	32.5	26.6	57.2	45.9	82.8	30.9	33.8	29.4	50.3	43.3	17.1	5.71
Live coral		0.94	0.31						1.88	1.04	0.64	0.21
Cucumber								0.63		0.63		
Encrusting sponge	1.88	6.25	8.75							5.63	2.84	0.95
Shell	0.31									0.31		
Urchin								0.63		0.63		

	C10	C11	C12	C13	C14	C15	C16	C17	C18	MEAN	STD.	S.E.
DIVISION CYANOPHYTA												
<u>Hormothamnion enteromorphoides</u>	1.56									1.56		
<u>Microcoleus lyngbyaceus</u>	0.63	2.19		0.94			0.31			1.02	0.71	0.24
<u>Schizothrix calcicola</u>		1.56	0.63							1.09	0.47	0.16
<u>Schizothrix mexicana</u>			3.44							3.44		
DIVISION CHLOROPHYTA												
<u>Caulerpa cupressoides</u>			0.94							0.94		
<u>Caulerpa taxifolia</u>				0.31					0.31	0.31		
<u>Chlorodesmis fastigiata</u>									0.31	0.31		
<u>Halimeda opuntia</u>					0.31					0.31		
<u>Neomeris annulata</u>	0.63	0.63								0.63		
DIVISION PHAEOPHYTA												
<u>Dictyota friabilis</u>		0.31	1.88							1.09	0.78	0.26
<u>Padina jonesii</u>								0.63		0.63		
<u>Padina minor</u>	0.31	1.25	0.94							0.83	0.39	0.13
<u>Padina tenuis</u>	1.25	3.13		27.2	1.88		7.19	1.25	6.56	6.92	8.58	2.86
<u>Padina (Vaughniella stage)</u>						23.8				23.8		
<u>Schacelaria novaehollandiae</u>				0.63						0.63		
DIVISION RHODOPHYTA												
<u>Actinotrichia fragilis</u>			0.94		0.31					0.63	0.31	0.1
<u>Amansia glomerulata</u>				0.31	1.25		2.19			1.25	0.77	0.26
<u>Amchiroa foliacea</u>			0.63							0.63		
<u>Amchiroa fragilissima</u>	1.25	0.31	0.63					1.88	0.31	0.88	0.61	0.2
<u>Cheilosporum multifidum</u>									0.31	0.31		
<u>Galaxaura filamentosa</u>	0.63									0.63		
<u>Galaxaura marginata</u>			0.31							0.31		
<u>Galaxaura oblongata</u>	1.25	1.88		1.56	0.31	0.63	2.19		0.31	1.16	0.7	0.23
<u>Gelidium crinale</u>					0.31		0.63			0.47	0.16	0.05
<u>Hypnea cervicornis</u>	0.63									0.63		
<u>Jania capillacea</u>	0.31	0.63	2.81					1.25		1.25	0.96	0.32
<u>Jania decussato-dichotoma</u>	0.31	2.19						1.25		1.25	0.77	0.26
<u>Liaqora sp.</u>	1.56	0.63		0.63	0.31		0.63	4.06	1.56	1.34	1.2	0.4
<u>Liaqora farinosa</u>					4.38					4.38		
<u>Liaqora mucosa</u>		1.56								1.56		
<u>Lithophyllum sp.</u>		1.56	1.25						0.63	1.15	0.39	0.13
<u>Mastophora rosea</u>			0.63		0.63					0.63		
<u>Neogoniolithon sp.</u>			1.56						0.63	1.09	0.47	0.16
<u>Polysiphonia sp.</u>							0.94		0.31	0.63	0.31	0.1
<u>Porolithon onkodes</u>	0.63	1.25	3.75	1.25		0.31	1.25	14.4	5.31	3.52	4.4	1.47
<u>Sporolithon sp.</u>	0.94	2.81	2.5		3.13		0.31	9.38	1.25	2.9	2.82	0.94
<u>Tolypiocladia glomerulata</u>	0.94			1.56	2.19					1.56	0.51	0.17
<u>Lithochyllum sp.</u>					0.31					0.31		
OTHER												
Rock with turf	68.4	65	49.7	40.3	70.3	21.9	43.4	32.2	32.5	47.1	16.5	5.5
Sand/pebbles/rock	1.88	7.19		10		35	13.4	2.5	23.1	13.3	11.1	3.7
Live coral	16.6	13.1	19.7	15.9	18.4	13.4	27.5	29.1	27.8	20.2	5.97	1.99
Urchin				0.31				0.94		0.63	0.31	0.1

	C19	C20	C21	C22	C23	C24	C25	C26	C27	MEAN	STD.	S.E.
DIVISION CYANOPHYTA												
<u>Schizothrix calcicola</u>	0.63	2.19	0.63			0.63		0.94		1	0.61	0.2
<u>Schizothrix mexicana</u>	0.31	1.25			0.63					0.73	0.39	0.13
DIVISION CHLOROPHYTA												
<u>Dictyosphaeria versluysii</u>									0.31	0.31		
<u>Halimeda discoidea</u>	0.63									0.63		
<u>Halimeda velasquezii</u>		0.31	0.94		0.31		0.63	0.31	0.63	0.52	0.23	0.08
<u>Halimeda opuntia</u>	0.63									0.63		
<u>Microdictyon okamurai</u>			0.31							0.31		
<u>Neomeris annulata</u>								0.31		0.31		
DIVISION PHAEOPHYTA												
<u>Dictyota bartayresii</u>					0.63					0.63		
<u>Dictyota friabilis</u>	1.25	0.63								0.94	0.31	0.1
<u>Padina jonesii</u>								0.63		0.63		
<u>Padina minor</u>			1.56							1.56		
<u>Padina tenuis</u>	2.81	6.88	4.06	4.69	0.31	4.06	0.63		11.3	4.34	3.29	1.1
<u>Schacelaria tribuloides</u>			0.31							0.31		
DIVISION RHODOPHYTA												
<u>Actinotrichia fragilis</u>							0.63		0.31	0.47	0.16	0.05
<u>Amansia glomerulata</u>	1.25	1.88		3.75	5.63	0.31	5.94			3.13	2.14	0.71
<u>Amphiroa fragilissima</u>	0.94		0.63			0.31	0.94	1.56	1.56	0.99	0.46	0.15
<u>Asparagopsis taxiformis</u>								4.06		4.06		
<u>Galaxaura filamentosa</u>	0.63	0.63								0.63		
<u>Galaxaura marginata</u>	1.88	0.63	1.88				0.31	0.63	1.25	1.09	0.62	0.21
<u>Galaxaura oblongata</u>	2.5	0.31	0.63	1.56	1.25		0.31	2.5		1.29	0.87	0.29
<u>Gelidium pusillum</u>			0.63						0.31	0.47	0.16	0.05
<u>Gelidium sp.</u>			0.94			1.88				1.41	0.47	0.16
<u>Hydrolithon sp.</u>					3.13		1.56		3.13	2.6	0.74	0.25
<u>Jania capillacea</u>		0.94	0.63			0.31		1.25		0.78	0.35	0.12
<u>Jania decussato-dichotoma</u>		0.63						0.31		0.47	0.16	0.05
<u>Liagora sp.</u>	3.75	2.5	0.94							2.4	1.15	0.38
<u>Lithophyllum sp.</u>			0.31							0.31		
<u>Mastophora rosea</u>				3.13			10.3	4.69	10	7.03	3.18	1.06
<u>Neogoniolithon sp.</u>			0.63					1.56		1.09	0.47	0.16
<u>Porolithon onkodes</u>	0.63	0.31	0.94		0.63	1.56		3.13	1.25	1.21	0.87	0.29
<u>Sporolithon sp.</u>	3.13	1.88	3.44					2.19		2.66	0.64	0.21
<u>Tolypocladia glomerulata</u>	0.63					0.94			1.25	0.94	0.26	0.09
Unidentified			0.63							0.63		
OTHER												
Rock with turf	50.6	40.6	54.7	22.8	81.6	61.3	70.6	66.3	55.3	56	16.2	5.41
Sand/pebbles/rock	19.4	28.4	18.1	63.1	1.88	20.9	4.06	3.13	0.94	17.8	18.6	6.21
Live coral	7.81	9.69	5.94	0.94	2.81	7.5	4.06	6.25	12.5	6.39	3.33	1.11
Soft coral (Sinularia sp.)					1.25	0.31				0.78	0.47	0.16
Sponge									0.31	0.31		

Table 8: List of algae identified from turf collected at Sites A (A1=A1-3), B (B1=B1-9; B2=B9-18; B3=B19-27), and C (C1=C1-9; C2=C10-18; C3=C19-27) and those found within the general vicinity of the transects and not yet recorded, O. The presence of an alga is indicated by an X and an O.

Species	TRANSECTS							O
	A1	B1	B2	B3	C1	C2	C3	
DIVISION CYANOPHYTA								
<u>Calothrix</u> sp.					X			
<u>Hormothamnion enteromorphoides</u>		X	X		X			
<u>Microcoleus lyngbyaceus</u>				X	X		X	
<u>Schizothrix calcicola</u>					X	X	X	
<u>Schizothrix mexicana</u>							X	
DIVISION CHLOROPHYTA								
<u>Boergesenia forbesii</u>	X		X		X			
<u>Boodlea composita</u>		X			X			
<u>Caulerpa lentillifera</u>								O
<u>C. racemosa</u>		X			X			
<u>C. peltata</u>						X		
<u>C. webbiana</u>	X					X		
<u>Chaetomorpha crassa</u>								O
<u>Cladophoropsis membranacea</u>							X	
<u>Dictyosphaera versluvsii</u>	X	X		X				
<u>Enteromorpha clathrata</u>								O
<u>Halimeda opuntia</u>							X	
<u>H. velasquezii</u>					X	X	X	
<u>Microdictyon okamurai</u>								O
<u>Rhipilia sinuosa</u>								O
<u>Ulva lactuca</u>								O
<u>Valonia fastigiata</u>	X							
DIVISION PHAEOPHYTA								
<u>Colpomenia sinuosa</u>								O
<u>Ectocarpus breviarticulatus</u>								O
<u>Dictyoctenaria repens</u>	X					X	X	
<u>Dictyota friabilis</u>					X	X		
<u>Dictyota bartavresii</u>		X	X	X	X	X		
<u>Hydroclathrus clathratus</u>	X	X			X			
<u>Lobophora variegata</u>								O
<u>Padina minor</u>	X				X	X	X	
<u>Padina</u> (Vaughniella stage)		X		X	X	X		
<u>Sargassum polycystum</u>		X			X			
<u>Sphacelaria tribuloides</u>					X			

Table 8 (continued)

DIVISION RHODOPHYTA

<u>Acanthophora spicifera</u>												o
<u>Actinotrichia fragilis</u>	X		X		X	X			X			
<u>Amansia glomerata</u>			X	X	X	X			X			
<u>Amphiroa fragilissima</u>			X	X	X	X			X			
<u>A. foliacea</u>									X			
<u>Centroceras clavulatum</u>					X				X			
<u>Ceramium gracillum</u>						X			X			
<u>C. mazatlanense</u>					X	X						
<u>Corallina sp.</u>												
<u>Galaxaura filamentosa</u>								X	X			
<u>Gelidiella acerosa</u>	X	X							X	X		
<u>Gelidium crinale</u>		X							X	X		
<u>G. pussillum</u>					X							
<u>Gelidiopsis intricata</u>	X				X							
<u>Gracilaria salicornia</u>		X			X							o
<u>Halymenia sp.</u>								X	X			
<u>Herposiphonia sp.</u>	X							X	X			
<u>Heteroderma sp.</u>	X	X										
<u>Hvonea esperi</u>	X		X	X						X		
<u>Jania capillacea</u>	X					X	X	X	X	X		
<u>J. decussato-dichotoma</u>		X				X	X			X		
<u>Laurencia papillosa</u>						X						
<u>L. tropica</u>										X		
<u>Leveillea jungermannioides</u>	X							X	X	X		
<u>Mastophora rosea</u>			X	X								
<u>Mesophyllum mesomorphum</u>	X											
<u>Polysiphonia sp.</u>								X				
<u>Spyridia filamentosa</u>						X						
<u>Tolyptocladia glomerulata</u>		X				X	X	X	X			
Unidentified red 1												o
Unidentified red 2												o

ANTHOPHYTA

Enhalus acoroides

o