

Cross-shelf benthic community structure on the Great Barrier Reef: relationships between macroalgal cover and herbivore biomass

Sharon Wismer, Andrew S. Hoey, David R. Bellwood*

Australian Research Council Centre of Excellence for Coral Reef Studies, and School of Marine and Tropical Biology, James Cook University, Townsville, Queensland 4811, Australia

*Corresponding author. Email: david.bellwood@jcu.edu.au

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Appendix 1. Cover of damselfish territories was generally low (<11%) across all habitats, increasing only in the northern outer-shelf back reef and reef crest. These proportions were substantially lower than previous findings. Ceccarelli et al. (2005) estimated that approximately 50% of the reef crest at Magnetic Island (inner-shelf, central Great Barrier Reef, GBR) was occupied by damselfish territories (*Pomacentrus tripunctatus*, *P. wardi* and *Stegastes apicalis*). The differences between Ceccarelli et al. (2005) and the present study may simply reflect variation in the temporal and spatial cover of damselfish territories or be related to the survey methods used. Surveys in the present study only included visually distinctive damselfish territories, based on the epilithic algal matrix (EAM) configuration. Less conspicuous territories, such as those of *P. chrysurus* and *P. tripunctatus*, which have a limited impact on the EAM, may therefore have been included in the EAM category

LITERATURE CITED

Ceccarelli DM, Jones GP, McCook LJ (2005) Effects of territorial damselfish on an algal-dominated coastal coral reef. *Coral Reefs* 24:606–620

Table A1. Results of 3-way ANOVAs for the substratum categories across 2 regions, 3 shelf positions, and 3 or 4 habitats; (a) macroalgae, (b) epilithic algal matrix, (c) crustose coralline algae, (d) live coral, (e) damselfish territory, (f) sand and rubble, (g) 'other' and (h) dead coral. Values in bold represent significant effects ($p < 0.006$, Bonferroni corrected)

Source of variation	Type IV SS	df	MS	F	p
a) Macroalgae					
Region	4.324	1	4.324	204.386	<0.0001
Shelf	24.148	2	12.074	570.760	<0.0001
Habitat	0.884	3	0.295	13.925	<0.0001
Region × Shelf	0.114	2	0.057	2.701	0.0681
Region × Habitat	1.099	3	0.366	17.322	<0.0001
Shelf × Habitat	1.850	5	0.370	17.492	<0.0001
Region × Shelf × Habitat	1.023	5	0.205	9.973	<0.0001
Residual	10.916	516	0.021		
b) Epilithic algal matrix					
Region	0.453	1	0.453	14.219	0.0002
Shelf	4.787	2	2.394	75.059	<0.0001
Habitat	8.094	3	2.698	84.610	<0.0001
Region × Shelf	2.738	2	1.369	42.925	<0.0001
Region × Habitat	0.435	3	0.145	4.542	0.0037
Shelf × Habitat	0.490	5	0.098	3.072	0.0096
Region × Shelf × Habitat	2.224	5	0.445	13.951	<0.0001
Residual	16.454	516	0.032		
c) Crustose coralline algae					
Region	2.476	1	2.476	136.209	<0.0001
Shelf	6.293	2	3.147	173.107	<0.0001
Habitat	1.598	3	0.533	29.303	<0.0001
Region × Shelf	1.190	2	0.595	32.722	<0.0001
Region × Habitat	0.551	3	0.184	10.107	<0.0001
Shelf × Habitat	1.294	5	0.259	14.241	<0.0001
Region × Shelf × Habitat	0.496	5	0.099	5.455	<0.0001
Residual	9.380	516	0.018		

Table A1 (continued)

Source of variation	Type IV SS	df	MS	F	p
d) Live scleractinian coral					
Region	0.111	1	0.111	4.475	0.0349
Shelf	2.814	2	1.407	56.857	<0.0001
Habitat	4.550	3	1.517	61.292	<0.0001
Region × Shelf	1.104	2	0.522	22.307	<0.0001
Region × Habitat	1.319	3	0.440	17.769	<0.0001
Shelf × Habitat	6.566	5	1.313	53.068	<0.0001
Region × Shelf × Habitat	2.497	5	0.499	20.183	<0.0001
Residual	12.769	516	0.025		
e) Damselfish territory					
Region	0.317	1	0.317	70.602	<0.0001
Shelf	0.508	2	0.254	56.618	<0.0001
Habitat	0.404	3	0.135	30.012	<0.0001
Region × Shelf	0.216	2	0.108	24.031	<0.0001
Region × Habitat	0.211	3	0.070	15.654	<0.0001
Shelf × Habitat	0.041	5	0.008	1.839	0.1036
Region × Shelf × Habitat	0.347	5	0.069	15.490	<0.0001
Residual	2.314	516	0.004		
f) Sand and rubble					
Region	0.497	1	0.497	18.904	<0.0001
Shelf	1.111	2	0.556	21.145	<0.0001
Habitat	4.302	3	1.434	54.569	<0.0001
Region × Shelf	0.667	2	0.333	12.688	<0.0001
Region × Habitat	0.338	3	0.113	4.282	0.0053
Shelf × Habitat	8.942	5	1.788	68.055	<0.0001
Region × Shelf × Habitat	2.438	5	0.488	18.554	<0.0001
Residual	13.559	516	0.026		
g) 'Other'					
Region	0.040	1	0.040	2.652	0.1040
Shelf	0.008	2	0.004	0.271	0.7625
Habitat	4.164	3	1.388	91.798	<0.0001
Region × Shelf	0.709	2	0.354	23.431	<0.0001
Region × Habitat	0.563	3	0.188	12.419	<0.0001
Shelf × Habitat	0.313	5	0.063	4.140	0.0011
Region × Shelf × Habitat	0.640	5	0.128	8.465	<0.0001
Residual	7.802	516	0.015		
h) Dead coral					
Region	2.260	1	2.260	109.631	<0.0001
Shelf	0.030	2	0.015	0.732	0.4813
Habitat	4.085	3	1.362	66.053	<0.0001
Region × Shelf	0.634	2	0.342	16.581	<0.0001
Region × Habitat	1.386	3	0.462	22.419	<0.0001
Shelf × Habitat	0.472	5	0.094	4.578	0.0004
Region × Shelf × Habitat	1.600	5	0.320	15.521	<0.0001
Residual	10.637	516	0.021		

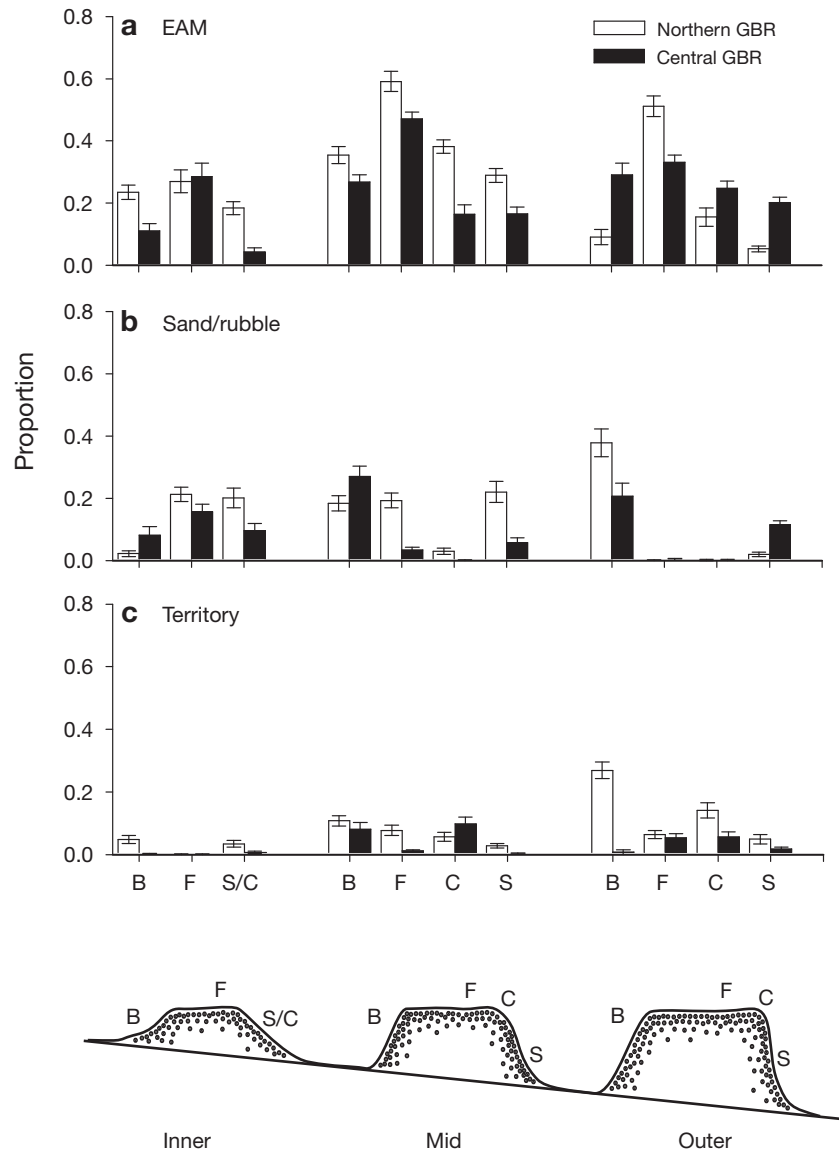


Fig. A1. Cross-shelf variation in the cover (mean proportion \pm SE) of (a) epilithic algal matrix (EAM), (b) sand/rubble and (c) damselfish territories within the northern and central regions of the GBR. Each mean is based on 12 transects from each of 2 reefs ($n = 24$). Habitats: B: back reef; F: reef flat; C: reef crest; S: reef slope. Continental shelf positions: inner, mid, outer

Appendix 1 (continued)

