

*The following supplement accompanies the article*

## **Post-settlement dispersal ability determines structure of marine benthic metacommunities**

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Fig. S1. Photographs of experimental patches and metacommunities (groups of patches) deployed in an inhospitable soft-bottom subtidal habitat.

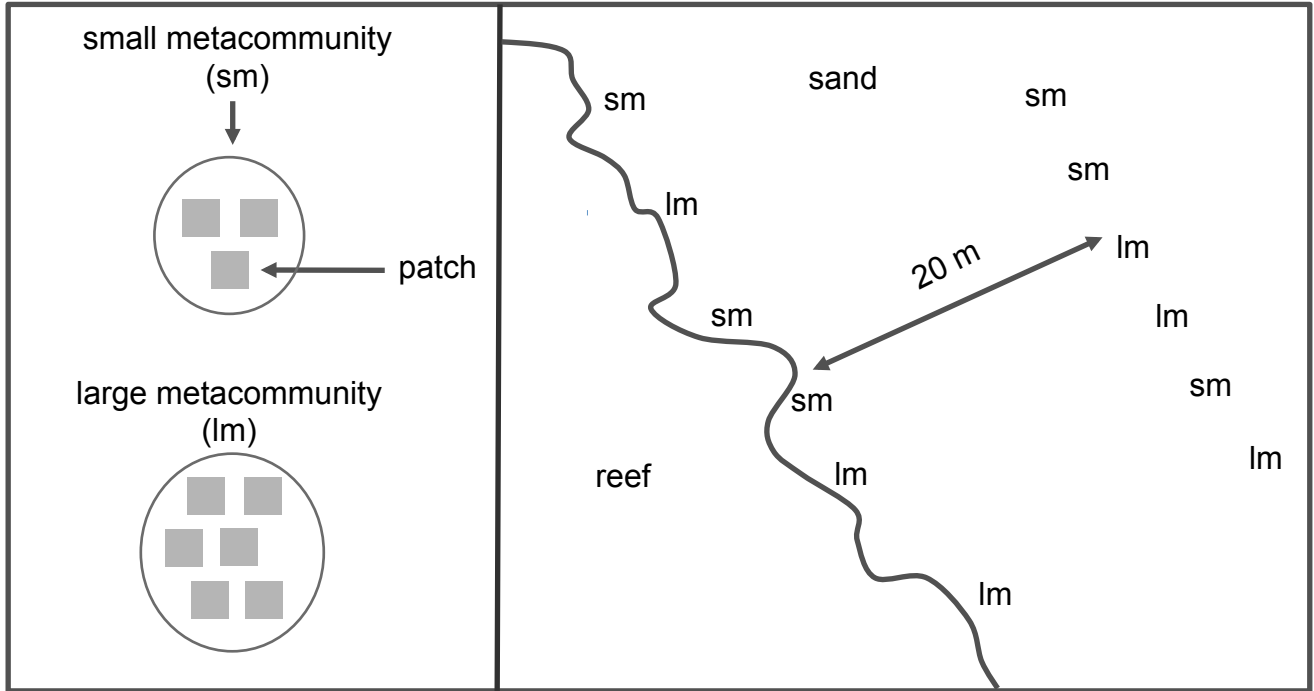


Fig. S2. Schematic representation of experimental design.

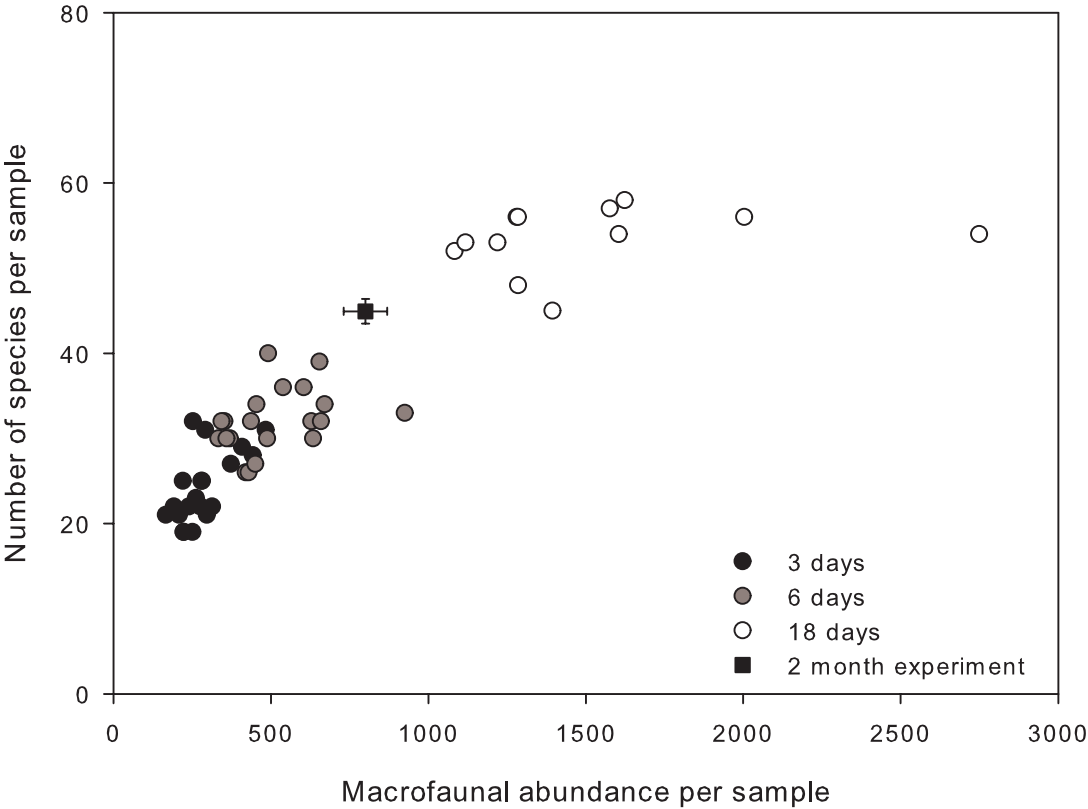


Fig. S3. Numbers of species and total abundance in experimental patches after 3, 6 and 18 days of deployment and averaged ( $\pm$  SE) over our main experiment (2 months).

Table S1. List of taxa (species or morpho-species) identified present in the experimental turfs.

Phylum	Class	Subclass/ Order	Taxa	Post- settlement dispersal	
Annelida	Clitellata	Oligochaeta	Oligochaeta sp1	Motile	
			Oligochaeta sp2	Motile	
			Oligochaeta sp3	Motile	
			Oligochaeta sp4	Motile	
			Oligochaeta sp5	Motile	
			Oligochaeta sp6	Motile	
Annelida	Polychaeta	Errantia	Errantia sp1	Motile	
			Errantia sp2	Motile	
			Errantia sp3	Motile	
			Errantia sp4	Motile	
			Errantia sp5	Motile	
			Errantia sp6	Motile	
			Errantia sp7	Motile	
			Errantia sp8	Motile	
			Errantia sp9	Motile	
			Errantia sp10	Motile	
			Errantia sp11	Motile	
			Errantia sp12	Motile	
			Errantia sp13	Motile	
			Errantia sp14	Motile	
				<i>Euphrosine foliosa</i>	Motile
				Sedentaria	
				Sedentaria sp1	Sessile
				Spirorbid sp1	Sessile
				Spirorbid sp2	Sessile
				Spirorbid sp3	Sessile
Arthropoda	Arachnida	Sarcoptiformes	Acarii sp1	Motile	
			Acarii sp2	Motile	
			Acarii sp3	Motile	
Arthropoda	Malacostraca	Amphipoda	<i>Abludomelita obtusata</i>	Motile	
			Amphipoda sp1	Motile	
			Amphipoda sp2	Motile	
			Amphipoda sp3	Motile	
			Amphipoda sp4	Motile	
			Amphipoda sp5	Motile	
			Amphipoda sp6	Motile	
			Amphipoda sp7	Motile	
			<i>Amphitoe rubricata</i>	Motile	
			<i>Aora gracilis</i>	Motile	
			<i>Apherusa jurinei</i>	Motile	
			<i>Caprella acanthifera</i>	Motile	
			<i>Caprella linearis</i>	Motile	
			<i>Dexamine spinosa</i>	Motile	
			<i>Ericthonius difformis</i>	Motile	
			<i>Ericthonius punctatus</i>	Motile	
			<i>Gammarella fucicola</i>	Motile	

<b>Phylum</b>	<b>Class</b>	<b>Subclass/ Order</b>	<b>Taxa</b>	<b>Post- settlement dispersal</b>
			<i>Jassa falcata</i>	Motile
			<i>Maera grossimana</i>	Motile
			<i>Phtisica marina</i>	Motile
			Pseudoprotellaphasma	Motile
			Thalassosmittiaatlantica	Motile
		Cumacea	<i>Diastylis</i> sp.	Motile
		Decapoda	Decapoda sp1	Motile
			Decapoda sp2	Motile
			Decapoda sp3	Motile
			Decapoda sp4	Motile
			Decapoda sp5	Motile
			Decapoda sp6	Motile
			Decapoda sp7	Motile
			<i>Macropodia</i> sp.	Motile
			Pagurus sp1	Motile
			Pagurus sp2	Motile
		Isopoda	<i>Anthura gracilis</i>	Motile
			<i>Dynamene bidentata</i>	Motile
			<i>Gnathia maxillaris</i>	Motile
			<i>Janiropsis breviremis</i>	Motile
		Tanaidacea	<i>Leptochelia caldera</i>	Motile
			<i>Paratanais martinsi</i>	Motile
			<i>Tanais grimaldii</i>	Motile
	Maxillopoda	Copepoda	Copepoda sp1	Motile
			Copepoda sp2	Motile
			Copepoda sp3	Motile
			Copepoda sp4	Motile
			Copepoda sp5	Motile
	Pycnogonida	Pantopoda	<i>Achelia echinata</i>	Motile
			Pycnogonida sp1	Motile
Bryozoa	Stenolaemata		Bryozoa sp1	Sessile
			Bryozoa sp2	Sessile
			Bryozoa sp3	Sessile
			Bryozoa sp4	Sessile
			Bryozoa sp5	Sessile
			Bryozoa sp6	Sessile
			Bryozoa sp7	Sessile
			Bryozoa sp8	Sessile
Chordata	Actinopterygii	Gobiesocidae	Diplecogaster sp1	Motile
			Diplecogaster sp2	Motile
			Diplecogaster sp3	Motile
Echinodermata	Echinoidea	Echinoida	Echinoida sp1	Motile
			Echinoida sp2	Motile
			Echinoida sp3	Motile
	Ophiuroidea	Ophiurida	Ophiurida sp1	Motile
			Ophiurida sp2	Motile

Phylum	Class	Subclass/ Order	Taxa	Post- settlement dispersal			
Mollusca	Bivalvia		Ophiurida sp3	Motile			
			Ophiurida sp4	Motile			
			Bivalve sp1	Sessile			
			Bivalve sp2	Sessile			
			<i>Chlamis</i> sp1	Sessile			
			<i>Chlamis</i> sp2	Sessile			
			<i>Ervilia castanea</i>	Sessile			
			<i>Limaria hians</i>	Sessile			
			<i>Papillicardium papillosum</i>	Sessile			
			Gastropoda			<i>Alvania angioyi</i>	Motile
						<i>Alvania cancellata</i>	Motile
						<i>Bittium nanum</i>	Motile
						<i>Caecum wayae</i>	Motile
						Gastropoda sp1	Motile
	Gastropoda sp2	Motile					
	<i>Gibbula magus</i>	Motile					
	<i>Jaeropsis brevicornis</i>	Motile					
	<i>Jujubinus pseudogravinae</i>	Motile					
	<i>Lamellaria perspicua</i>	Motile					
	<i>Manzonina unifasciata</i>	Motile					
	<i>Microprotopus maculatus</i>	Motile					
	<i>Nassarius cf cuvierii</i>	Motile					
	<i>Nassarius cf recidivus</i>	Motile					
	Nudibranchia sp1	Motile					
				Nudibranchia sp2	Motile		
				Nudibranchia sp3	Motile		
				Nudibranchia sp4	Motile		
Nudibranchia sp5				Motile			
<i>Odostomia cf bernardi</i>				Motile			
<i>Omalogyra atomus</i>				Motile			
<i>Philine</i> sp.				Motile			
Raphitoma sp1				Motile			
Raphitoma sp2				Motile			
Raphitoma sp3				Motile			
<i>Retusa truncatula</i>				Motile			
<i>Rissoela</i> sp1				Motile			
<i>Setia subvaricosa</i>				Motile			
<i>Solariella azorensis</i>				Motile			
<i>Tricolia pullus azorica</i>				Motile			
<i>Tricolia</i> sp1				Motile			
<i>Trophonopsis muricatus</i>				Motile			
Platyhelminthes				Rhabditophora	Tricladida	Planaria sp1	Motile
						<i>Grantia</i> sp.	Sessile
Porifera						Porifera sp1	Sessile
	Porifera sp2	Sessile					
Retaria			Foraminifera sp1	Motile			

<b>Phylum</b>	<b>Class</b>	<b>Subclass/ Order</b>	<b>Taxa</b>	<b>Post- settlement dispersal</b>
			Foraminifera sp2	Motile
			Foraminifera sp3	Motile
Sipuncula	Sipunculidea	Sipunculiformes	Sipuncula sp1	Motile
			Sipuncula sp2	Motile
			Sipuncula sp3	Motile
			Sipuncula sp4	Motile
			Sipuncula sp5	Motile
			Sipuncula sp6	Motile

Table S2. Permutational ANOVA testing the response of species richness to size and proximity to reef when considering the (a) whole assemblage, (b) the sessile assemblage and (c) the motile assemblage. Responses were calculated at the patch- (averaged among patches within metacommunities) or at the metacommunity-scale (total number of species within each metacommunity). Analyses were performed using PERMANOVA based on Euclidean distances.

Source	df	Patch-scale						Metacommunity-scale					
		(a) Whole		(b) Sessile		(c) Motile		(a) Whole		(b) Sessile		(c) Motile	
		<i>F</i>	P	<i>F</i>	P	<i>F</i>	P	<i>F</i>	P	<i>F</i>	P	<i>F</i>	P
Location = L	1	<0.01	0.965	6.94	0.020	0.54	0.504	<0.01	0.957	2.35	0.137	0.29	0.598
Proximity to reef = P	1	2.08	0.183	8.73	0.006	0.91	0.328	5.06	0.036	11.88	0.003	3.42	0.081
Size = S	1	3.77	0.064	1.08	0.328	4.59	0.048	3.26	0.09	0.92	0.334	3.42	0.084
L × P	1	Pooled		Pooled		Pooled		Pooled		Pooled		Pooled	
L × S	1	Pooled		Pooled		Pooled		Pooled		Pooled		Pooled	
P × S	1	0.01	0.915	1.25	0.28	0.06	0.787	0.75	0.394	0.92	0.366	0.68	0.415
L × P × S	1	Pooled		Pooled		Pooled		Pooled		Pooled		Pooled	
Res	16												

Pooling was done when P > 0.25 (Underwood 1997).

Table S3. Permutational ANOVA testing the response of assemblage structure to size and proximity to reef (as in Table C1). Analyses were performed using PERMANOVA based on Bray-Curtis and Jaccard similarities.

Source	df	Patch-scale						Metacommunity-scale					
		Bray -Curtis			Jaccard			Bray-Curtis			Jaccard		
		Whole	Sessile	Motile	Whole	Sessile	Motile	Whole	Sessile	Motile	Whole	Sessile	Motile
		<i>F</i>	<i>F</i>	<i>F</i>	<i>F</i>	<i>F</i>	<i>F</i>	<i>F</i>	<i>F</i>	<i>F</i>	<i>F</i>	<i>F</i>	<i>F</i>
Location = L	1	14.07***	5.39***	16.40***	3.61***	5.70***	3.24***	14.07***	5.39***	16.40***	3.61***	5.75***	3.24***
Proximity to reef = P	1	2.52	1.18	2.23	2.00	1.25	2.21	2.53	1.19	2.23	2.00	1.25	2.21
Size = S	1	2.08*	0.96	2.56**	2.07**	0.91	2.30**	2.08*	0.96	2.56*	2.07**	1.21	2.30**
L x P	1	5.59***	1.89	8.22***	1.74*	3.62**	1.50	5.59***	1.89	8.22***	1.74*	3.65**	1.50
L x S	1	Pooled		1.42	Pooled	Pooled	1.31	Pooled	Pooled	1.42	Pooled	Pooled	Pooled
P X S	1	0.27	0.17	0.37	0.87	0.29	0.98	0.27	0.17	0.37	0.87	0.20	0.98
L X P X S	1	1.52	Pooled	1.64	1.55	Pooled	1.61	1.52	Pooled	1.64	1.55	1.48	1.61

Pooling was done when P > 0.25 (Underwood 1997).

Table S4. SIMPER analysis comparing (a) occurrences (presence-absences) of sessile taxa in habitats differing in proximity to reefs (close and away), and (b) abundances (untransformed) of motile taxa in habitats differing in proximity to reef and size (large and small metacommunities).

Taxa	Proximity to reef effect							
	Av. away	Av. close	Av. Diss.	% Cont.				
(a) Sessile assemblages								
Sessile polychaetes	0.50	0.58	4.96	39				
Porifera	0.75	0.83	3.69	29				
Cnidarians	0.92	0.92	1.95	15				
Bryozoans	0.92	1.00	1.16	9				
(b) Motile assemblage								
Taxa	Proximity to reef effect				Size effect			
	Av. away	Av. close	Av. Diss.	% Cont.	Av. Large	Av. Small	Av. Diss.	% Cont.
Amphipods	2486.9	658.1	44.48	80	1668.7	1474.8	36.11	76
Motile polychaetes	75.0	120.1	2.15	4	103.6	91.5	2.15	5
Gastropods	113.8	79.6	1.65	3	104.4	89.0	1.76	4
Oligochaetes	59.6	26.8	1.09	2	53.8	32.6	1.03	2
Cumaceans	56.3	24.9	0.96	2	42.4	38.9	0.97	2
Pycnogonids	-	-			42.9	29.3	0.98	2



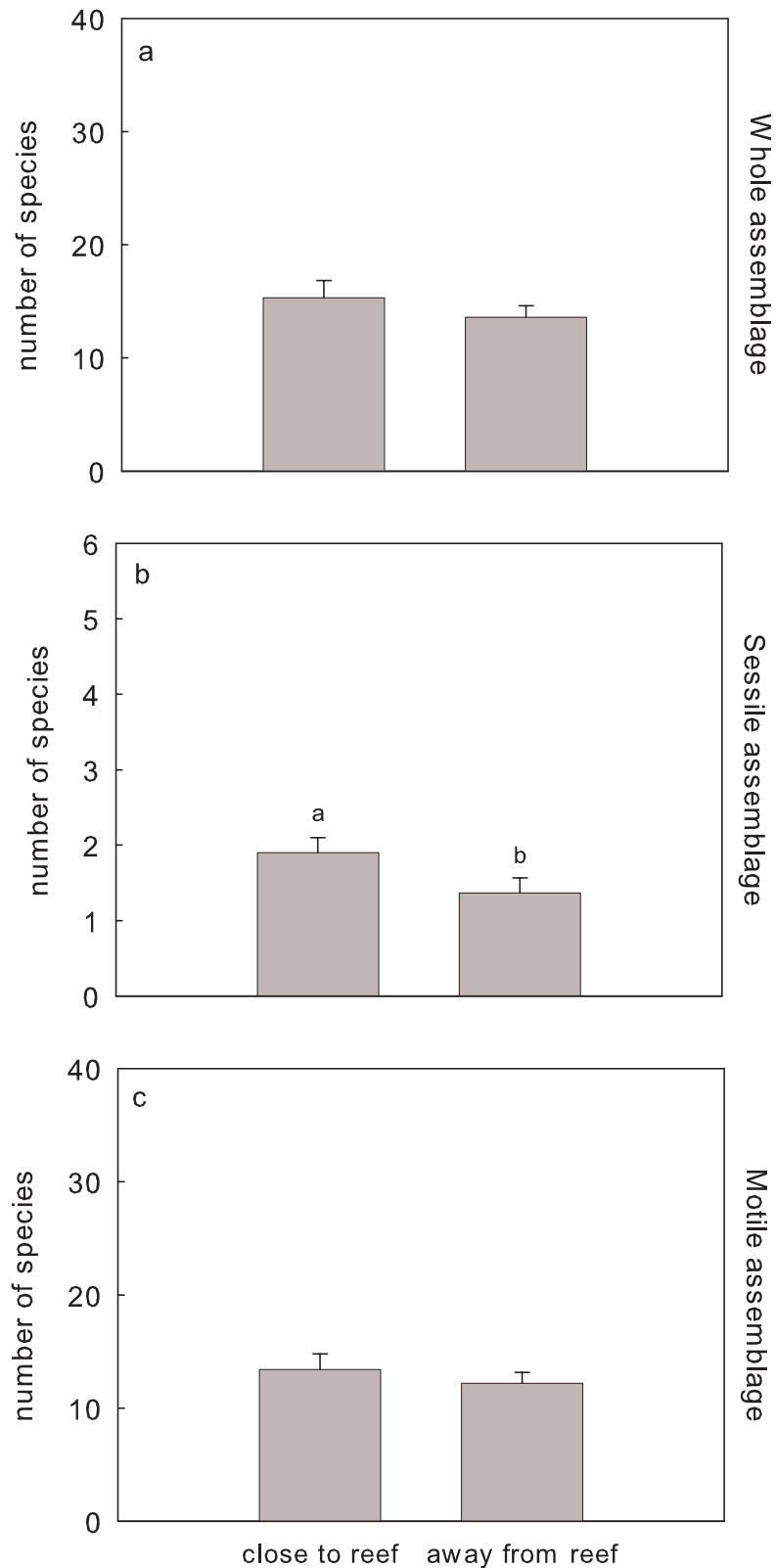


Figure S4. Mean (+SE) numbers of species found on experimental patches deployed close and away from the reef after 3 days of colonisation. Data are (a) the total numbers of species (b), numbers of sessile species only, and (c) numbers of motile species only. Note that this experiment was repeated 3 times and that there were no differences between trials. Letters indicate significant pairwise comparisons of means at  $P < 0.05$ .

Table S5. Permutational ANOVA comparing the short-term response of species richness to proximity to reef (close and away) when considering the (a) whole assemblage, (b) the sessile assemblage and (c) the motile assemblage. Analyses were performed using PERMANOVA based on Euclidean distances.

Source	df	(a) Whole		(b) Sessile		(c) Motile	
		<i>F</i>	P	<i>F</i>	P	<i>F</i>	P
Location = L	1	7.71	0.186	9.14	0.185	7.42	0.168
Time = T	2	2.23	0.475	2.59	0.348	2.15	0.415
Proximity to reef = P	1	0.93	0.377	4.30	0.039	0.84	0.396
L × T	2	3.35	0.044	1.06	0.335	3.14	0.060
L × P	1	Pooled		Pooled		Pooled	
T × P	2	1.63	0.200	Pooled		Pooled	
L × T × P	2	Pooled		Pooled		Pooled	
Res	48						

Table S6. PERMANOVA comparing the short-term response of assemblages to proximity to reef (close and away) when considering the (a) whole assemblage, (b) the sessile assemblage and (c) the motile assemblage. Analyses were two different dissimilarity measures: Bray-Curtis and Jaccard index.

Source	df	Bray-Curtis						Jaccard					
		(a) Whole		(b) Sessile		(c) Motile		(a) Whole		(b) Sessile		(c) Motile	
		<i>F</i>	P	<i>F</i>	P	<i>F</i>	P	<i>F</i>	P	<i>F</i>	P	<i>F</i>	P
Location = L	1	7.71	0.186	1.04	0.338	3.72	0.178	2.40	0.182	3.16	0.104	2.28	0.171
Time = T	2	2.23	0.475	0.44	0.851	2.20	0.171	1.12	0.391	0.88	0.486	1.13	0.397
Proximity to reef = P	1	0.93	0.377	4.09	0.003	2.04	0.167	1.46	0.083	2.48	0.046	1.41	0.11
L × T	2	3.35	0.044	2.97	0.011	3.17	0.001	2.36	0.001	1.61	0.104	2.44	0.001
L × P	1	Pooled		Pooled		Pooled		Pooled		Pooled		Pooled	
T × P	2	1.63	0.200	Pooled		Pooled		Pooled		Pooled		Pooled	
L × T × P	2	Pooled		Pooled		1.34	0.139	Pooled		Pooled		Pooled	
Res	48												

Table S7. SIMPER analysis comparing patterns of occurrence (presence-absence data) of sessile taxa in habitats differing in proximity to reefs (close and away).

Taxa	Av. Away	Av. Close	Av. Diss.	% Cont.
<i>Ervillea castanea</i>	0.73	0.87	17.58	31
Unidentified bryozoan sp1	0.13	0.37	10.62	19
<i>Gregariella semigranata</i>	0.17	0.13	8.01	14
<i>Papillicardium papillosum</i>	0.10	0.20	6.91	12
Unidentified bryozoan sp2	0.10	0.03	2.93	5
<i>Limaria hians</i>	0.03	0.03	2.43	4
Porifera	0.07	0.00	2.04	4
Unidentified bryozoan sp3	0.00	0.07	1.46	3