Appendix 1

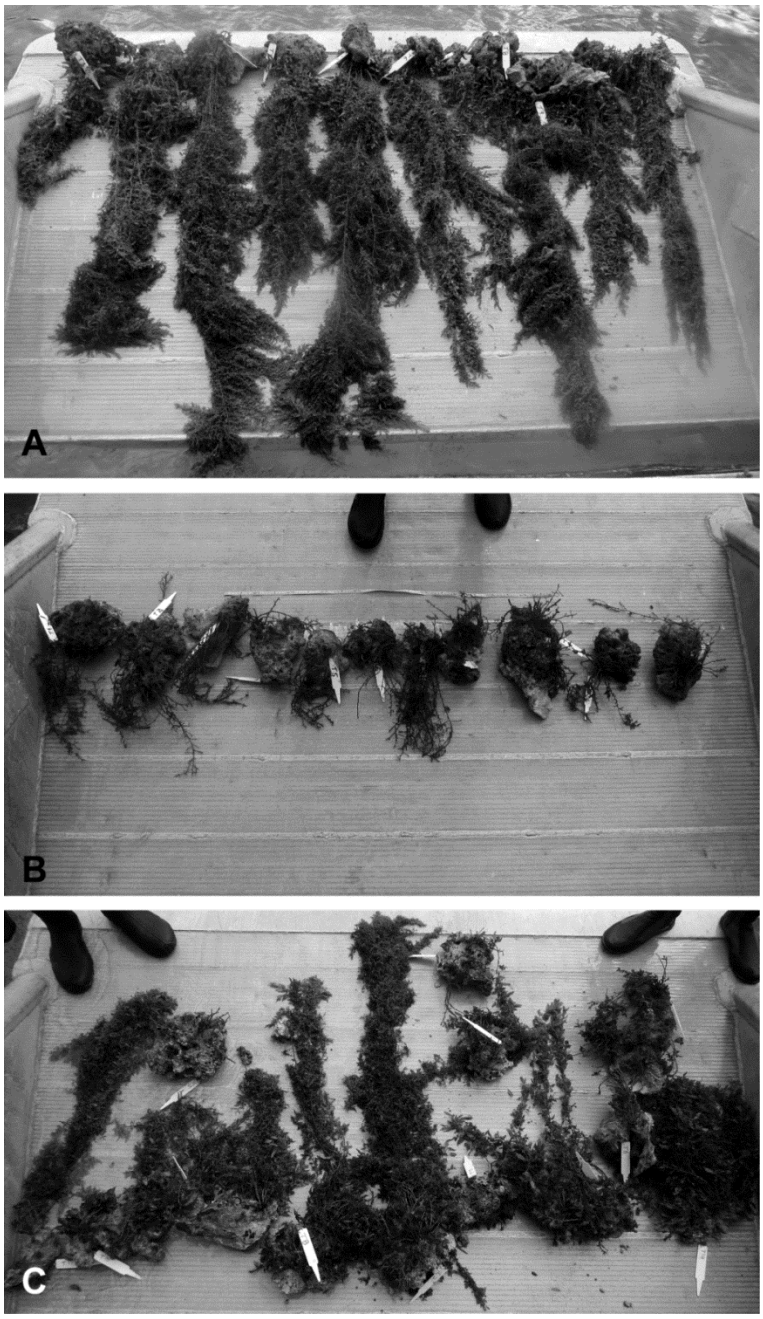

Figure A1.1. A Standard macroalgal bioassays upon deployment. **B** Macroalgal bioassays collected 24 hours later for every deployment 1996-2010 (and 2011-2013 second annual deployments). This extent of removal was considered ‘largely removed’. **C** Macroalgal bioassays collected 24 hours after first annual deployment 2011-2013. Barring the three rocks to the top of the image, this degree of removal would be considered ‘largely intact’.

Table A1.1. Functional groups and species assigned to each, observed in Pioneer Bay, Orpheus Island. Facultative herbivores include species that often feed on algae but may have a large dietary component of invertebrates or other prey. These include the primarily invertivorous non-farming damselfishes (Pomacentridae) and angelfishes (Pomacanthidae). Farming damselfishes (Pomacentridae) are a specialist group which defend territories of algal turfs from other herbivorous fishes; their diet is likely to include a portion of the algae they farm however the primary target is infauna and detritus accumulated within (Wilson and Bellwood 1997, Ceccarelli et al. 2005). Scraping and excavating are the two primary modes of feeding in the parrotfishes (Labridae, Tribe: Scarini) defined by (Bellwood and Choat 1990, Bonaldo and Bellwood 2009). The former removes EAMs leaving the carbonate reef matrix largely intact while the latter also removes portions of the carbonate reef matrix while feeding. Browsers prey upon the thalli and fronds of macroalgae and may be responsible for reversing shifts to macroalgal dominance. Grazing surgeonfishes feed upon all components of EAMs while leaving algal holdfasts and the reef matrix essentially untouched (Purcell and Bellwood 1993). Grazing rabbitfishes target similar prey to grazing surgeonfishes, however they often feed on material from crevices on the reef (Brandl et al. 2014, Brandl and Bellwood 2015).

Functional group	**Species observed**
Facultative herbivores	*Pomacentrus adelus* *Pce. bankanensis* *Pce. chrysurus* *Pce. wardi* *Abudefduf bengalensis* *Ab. sexfasciatus* *Ab. vaigiensis* *Ab. whitleyi* *Pomacanthus xanthometopon* *Pca. sexstriatus*
Farming damselfishes	*Stegastes apicalis* *St. nigricans* *Dischistodus melanotus* *D. prosopotaenia* *Hemiglyphidodon plagiometopon* *Neoglyphidodon melas* *N. nigroris*
Scrapers	*Hipposcarus longiceps* *Scarus altipinnis* *Sc. flavipectoralis* *Sc. frenatus* *Sc. ghobban* *Sc. niger* *Sc. rivulatus* *Sc. schlegeli* *Sc.* spp.
Excavators	*Chlorurus spilurus* *Ch. microrhinos*
Browsers	*Naso unicornis* *Kyphosus cinarescens* *Platax pinnatus* *Pl. teira*
Grazing surgeonfishes	*Acanthurus spp.*
Grazing rabbitfishes	*Siganus corallinus* *Sig. doliatus* *Sig. lineatus* *Sig. puellus* *Sig. punctatus* *Sig. vulpinus*

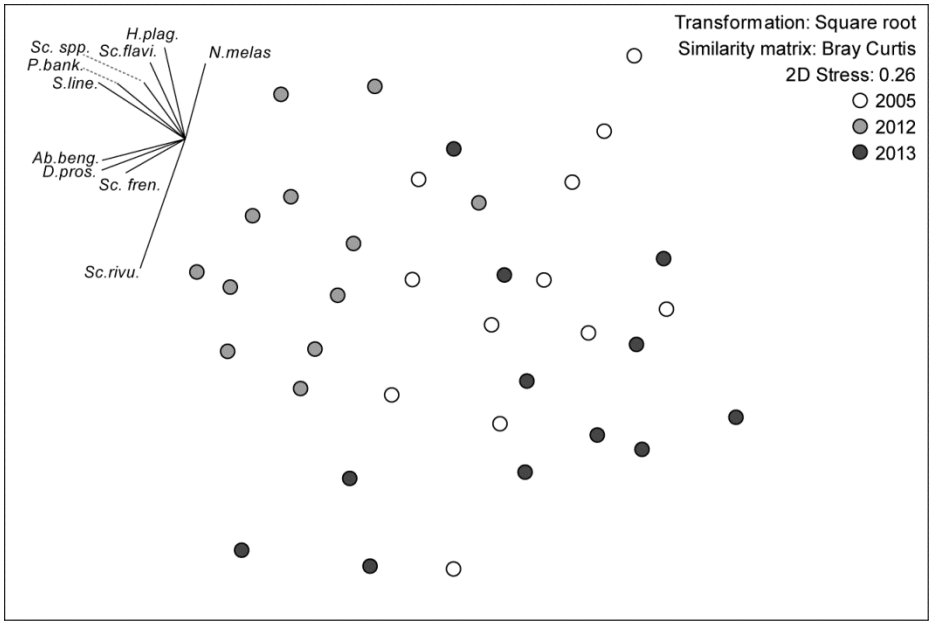

Figure A1.2. Taxonomic MDS on biomass of species; vectors calculated using multiple partial correlations in PRIMER 6.0 PERMANOVA +. 1 way ANOSIM with sites pooled: Global R=0.39. No groupings are apparent.

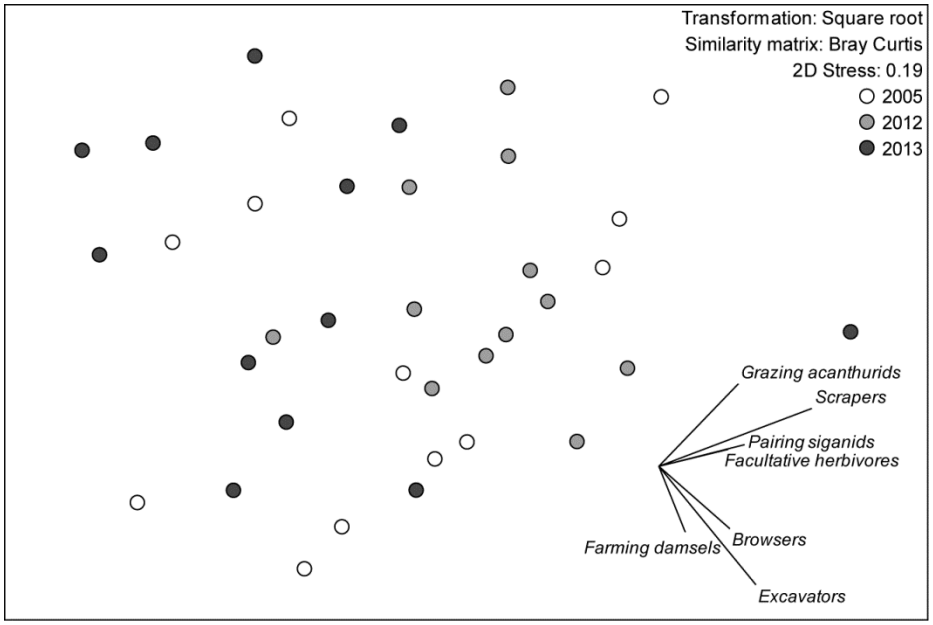

Figure A1.3. Functional group MDS of biomass data of seven functional groups of herbivorous fishes (see Table S1); vectors calculated using multiple partial correlations in PRIMER 6.0 PERMANOVA+. 1 way ANOSIM with sites pooled: Global R = 0.2. No groupings are apparent.

Table A1.2. The taxonomic composition of the herbivorous fish assemblage at each sampling period. Numbers represent the mean percentage of biomass of the herbivorous fish assemblage made up by each family. Numbers in parentheses are standard errors (n = 12 replicate censuses per period [sites pooled]).

Family	2005	2012	2013
Acanthuridae	5.06 (2.00)	9.86 (2.86)	3.47 (1.79)
Ephippidae	- -	2.15 (1.80)	- -
Kyphosidae	- -	2.11 (1.65)	- -
Labridae	67.66 (6.07)	55.62 (4.26)	71.10 (4.95)
Pomacanthidae	- -	4.73 (2.00)	8.32 (3.07)
Pomacentridae	5.10 (3.32)	3.61 (0.75)	4.46 (1.72)
Siganidae	22.18 (4.55)	21.91 (3.40)	12.65 (2.71)

Table A1.3. Two-way ANOVA of mass standardised bite data of grazing herbivores on $1m^2$ plots of EAM on the reef crest at Orpheus Island (sites pooled as no significant difference was found, data square-root transformed to meet assumptions of the test).

	SS	DF	MS	F	p
Year	74.42	2	37.21	32.15	< 0.0001
Taxon	37.41	1	37.41	32.32	< 0.0001
Year × Taxon	20.63	2	10.31	8.910	< 0.001
Residual	77.55	67	1.158		

Table A1.4. Two-way ANOVA of turf length bioassay data, comparing lengths of algal turfs on EAM covered rocks moved from the reef flat to the crest (treatment) with controls moved and replaced on the flat. pooling site where it was found to have no effect (sites pooled as no significant difference was found, data Log10(n+1) transformed to meet assumptions of the test).

	SS	DF	MS	F	p
Year	0.955	2	0.477	52.38	< 0.0001
Treatment	0.110	1	0.110	12.09	< 0.001
Year × Treatment	0.392	2	0.196	21.49	< 0.0001
Residual	0.674	74	0.009		

Table A1.5. Repeated measure ANOVA of sediment load over time and material (particulate vs. sediment).

	SS	DF	MS	F	p
Year × Material	0.639	1	0.639	4.546	0.047
Material	32.59	1	32.59	232.0	< 0.0001
Year	5092	1	5092	34.62	< 0.0001
Subjects (matching)	2648	18	147.1	1047	< 0.0001
Residual	2.529	18	0.141		

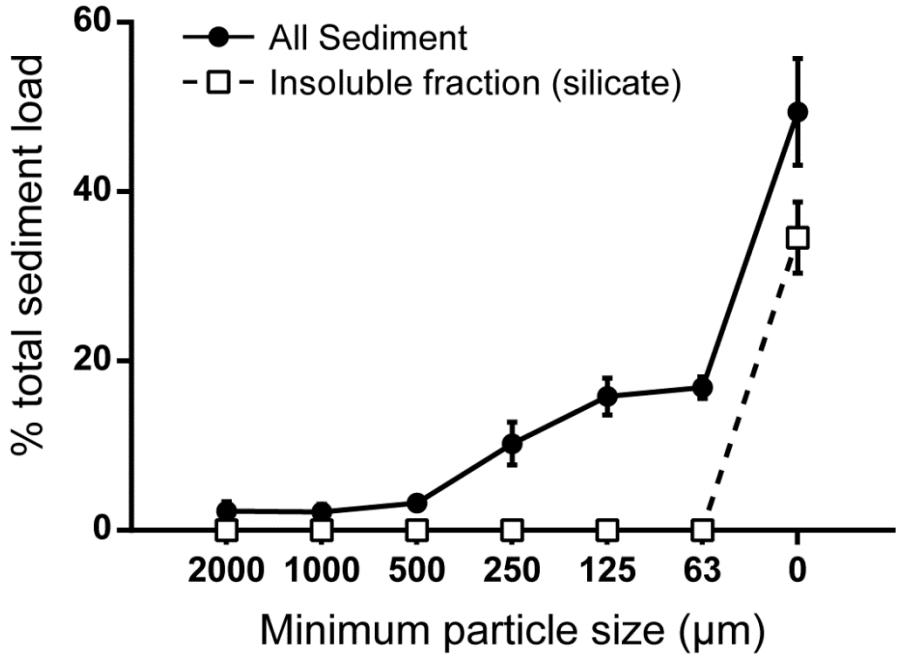

Figure A1.4. Grain size distribution of all sediment (circles) and insoluble fraction (siliceous material; squares) of 10 replicate benthic sediment samples taken from Pioneer Bay reef crest. On average 34.6 ± 4.2 % (mean ± standard error) of each sediment sample was siliceous material, all of which was in the <63 µm grain size category. On average 70.9 ± 2.2 % of all sediment in this grain size class was siliceous material.

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