Marine and Freshwater Research, 2018, **69**, 997–1006
http://dx.doi.org/10.1071/MF17064_AC

Supplementary material

Effects of herbivores, wave exposure and depth on benthic coral communities of the Easter Island ecoregion

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Table S1. Station information and sampling dates

RN, Rapa Nui. SG, Salas y Gómez. SR, Scott Reef, which was considered part of Salas y Gómez for statistical tests. LE, less exposed. ME, more exposed

Station	Wave-energy exposure	Latitude (decimal degrees)	Longitude (decimal degrees)	Date (2011)
RN1	ME	–27.14519	–109.43725	19-Feb
RN2	ME	–27.10986	–109.42381	19-Feb
RN3	LE	–27.08400	–109.24500	1-Mar
RN4	LE	–27.06688	–109.32056	1-Mar
RN5	LE	–27.06095	–109.39312	2-Mar
RN6	ME	–27.20232	–109.45169	2-Mar
RN7	ME	–27.20015	–109.45435	2-Mar
RN8	ME	–27.15059	–109.33026	3-Mar
RN9	ME	–27.17100	–109.37200	3-Mar
RN10	ME	–27.15824	–109.44333	4-Mar
SG1	LE	–26.46947	–105.36363	22-Feb
SG2	ME	–26.47713	–105.36271	23-Feb
SG3	ME	–26.47100	–105.36757	23-Feb
SG4	LE	–26.47061	–105.35796	23-Feb
SG5	LE	–26.46965	–105.36252	24-Feb
SG6	ME	–26.47252	–105.36770	24-Feb
SG7	ME	–26.47539	–105.36028	25-Feb
SG8	ME	–26.46921	–105.36610	25-Feb
SR1	ME	–26.45716	–105.35033	24-Feb
SR2	ME	–26.45715	–105.35030	25-Feb

Table S2. The average cover of sessile benthos per station

Station	Depth (m)	*Porites lobate* (%)	*Pocillopora* spp. (%)	*Lobophora variegata* (%)	*Stypopodium* spp. (%)	*Zonaria stipitata* (%)	*Halimeda* spp. (%)	*Sargassum obtusifolium* (%)	Turf algae (%)	CCA (%)	Total coral (%)	Total macroalgae (%)
RN1	10	13.2	14.8	0.0	0.0	13.6	0.0	0.0	0.0	11.2	28.0	13.6
RN1	20	10.4	11.2	0.4	0.0	0.0	0.0	0.0	0.0	9.6	23.6	0.8
RN2	10	48.8	18.4	5.6	0.4	0.0	1.2	0.0	0.0	12.8	67.2	6.8
RN2	20	73.6	11.2	6.4	3.2	0.0	1.2	0.0	0.0	0.8	84.8	8.0
RN3	10	46.0	4.4	20.0	5.6	0.4	2.8	8.4	8.0	0.0	50.4	33.6
RN3	20	47.2	5.6	15.6	7.6	0.0	3.6	3.6	7.2	0.0	52.8	29.6
RN4	10	65.2	2.0	5.6	1.6	0.0	6.0	0.8	8.0	0.0	67.6	12.4
RN4	20	46.4	5.6	22.8	8.4	0.0	1.6	4.4	8.0	0.0	52.0	29.6
RN5	10	53.2	6.4	4.8	2.4	0.0	6.0	0.4	5.2	10.0	59.6	12.0
RN5	20	25.2	8.4	36.4	8.4	1.6	2.8	7.2	6.8	0.4	33.6	48.4
RN6	10	7.6	24.8	3.2	4.0	0.0	0.8	0.0	4.4	4.8	32.4	4.0
RN6	20	23.6	24.0	3.2	0.0	0.0	0.4	0.0	3.6	14.0	47.6	3.6
RN7	10	4.4	41.6	11.6	0.0	0.0	0.0	0.0	2.8	14.4	46.0	12
RN7	20	52.4	19.2	8.8	0.4	0.0	0.8	0.0	5.2	4.0	71.6	9.6
RN8	10	24.4	38.0	14.4	0.0	0.0	0.0	0.0	0.8	8.0	62.4	14.4
RN8	20	49.2	5.2	1.6	0.0	0.0	0.8	0.0	0.4	15.6	54.4	2.4
RN9	10	3.6	16.4	0.4	0.0	0.0	0.0	0.0	0.8	19.2	20.0	0.4
RN9	20	48.8	8.0	10.0	4.4	4.0	4.8	0.0	6.8	0.0	56.8	18.8
RN10	10	70.8	6.8	9.2	3.6	0.4	1.6	0.4	5.2	0.0	77.6	11.6
RN10	20	52.8	12.8	17.2	5.2	0.0	4.0	0.4	4.4	0.0	65.6	22.0
SG1	10	52.8	8.0	0.8	0.0	0.0	0.0	0.0	0.0	28.0	60.8	0.8
SG1	20	33.2	7.6	1.2	0.0	0.0	0.0	0.0	0.0	50.4	40.8	1.2
SG2	10	2.8	29.2	4.0	1.2	0.0	0.0	0.0	0.0	36.8	32.0	4.4
SG2	20	32.8	18.0	0.4	0.0	0.0	0.0	0.0	0.0	34.8	50.8	0.4
SG3	10	1.2	21.7	7.5	2.0	0.0	0.0	0.0	0.0	54.1	23.3	7.51
SG3	20	26.8	19.2	2.0	0.0	0.0	0.0	0.0	0.0	28.0	46.0	2.0
SG4	10	23.51	22.7	2.0	0.0	0.0	0.0	0.0	0.0	23.1	48.2	2.4
SG4	20	41.2	3.6	6.0	0.0	0.0	0.0	0.0	0.0	42.8	44.8	6.0
SG5	10	42.0	8.4	4.8	0.0	0.0	0.0	0.0	0.0	25.6	50.4	7.2
SG5	20	32.8	13.2	2.0	0.0	0.0	0.0	0.0	0.0	30.8	46.0	2.0
SG6	10	14.0	16.9	14.6	4.8	0.0	0.0	0.0	0.0	30.8	30.9	14.56
SG6	20	43.6	6.4	3.2	0.0	0.0	0.0	0.0	0.0	27.6	50.0	3.2
SG7	10	7.1	23.4	8.7	0.0	0.0	0.0	0.0	0.0	37.4	30.4	9.09
SG7	20	40.4	9.6	2.4	0.0	0.0	0.0	0.0	0.0	32.4	50.0	3.2

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Station	Depth (m)	*Porites lobate* (%)	*Pocillopora* spp. (%)	*Lobophora variegata* (%)	*Stypopodium* spp. (%)	*Zonaria stipitata* (%)	*Halimeda* spp. (%)	*Sargassum obtusifolium* (%)	Turf algae (%)	CCA (%)	Total coral (%)	Total macroalgae (%)
SG8	10	7.0	30.6	5.1	0.0	0.0	0.0	0.0	0.0	26.7	38.8	5.06
SG8	20	63.6	4.8	11.2	0.0	0.0	0.0	0.0	0.0	16.4	68.4	11.6
SR1	10	0.0	44.4	1.6	0.0	0.0	0.0	0.0	0.0	14.4	44.4	1.6
SR1	20	4.8	38.5	2.0	0.0	0.0	0.0	0.0	0.0	26.2	43.2	1.97
SR2	10	0.4	40.4	4.0	0.0	0.0	0.0	0.0	0.0	38.8	40.8	4.4
SR2	20	6.4	40.8	3.2	0.0	0.0	0.0	0.0	0.0	26.0	50.4	3.2

Table S3. The average fish biomass and density of mobile benthos per station

The *Centropyge hotumatua* Fishbase trophic level was 2.8. The *Cirripectes alboapicalis*, *Entomacrodus chapmani*, *Stegastes fasciolatus* and *Acanthurus leucopareius* Fishbase trophic level was 2.00. The *Zanclus cornutus* Fishbase trophic level was 2.49. The *Kyphosus sandwicensis* trophic level was not reported in Fishbase

Station	Depth (m)	*Centropyge hotumatua* (Mg ha^{-1})	*Cirripectes alboapicalis* (Mg ha^{-1})	*Entomacrodus chapmani* (Mg ha^{-1})	*Zanclus cornutus* (Mg ha^{-1})	*Kyphosus sandwicensis* (Mg ha^{-1})	*Stegastes fasciolatus* (Mg ha^{-1})	*Acanthurus leucopareius* (Mg ha^{-1})	Total herbivorous fish (Mg ha^{-1})	*Diadema savignyi* (individuals m^{-2})	*Echinometra insularis* (individuals m^{-2})	*Echinostrephus aciculatus* (individuals m^{-2})	Total urchins (individuals m^{-2})
RN1	10	0.000	0.0002	0.0000	0.0000	0.000	0.000	0.109	0.109	3.3	0.0	2.8	6.1
RN1	20	0.000	0.0000	0.0000	0.0000	0.000	0.000	0.137	0.137	5.3	0.0	0.2	5.5
RN2	10	0.002	0.0003	0.0000	0.0000	0.007	0.023	0.041	0.074	4.1	0.0	0.0	4.1
RN2	20	0.015	0.0000	0.0000	0.0000	0.000	0.007	0.013	0.035	3.0	0.0	0.0	3.0
RN3	10	0.012	0.0002	0.0000	0.0000	0.017	0.000	0.116	0.145	0.2	0.0	0.2	0.4
RN3	20	0.013	0.0000	0.0000	0.0000	0.000	0.000	0.081	0.094	0.6	0.0	0.0	0.6
RN4	10	0.011	0.0005	0.0000	0.0000	0.000	0.000	0.142	0.154	0.4	0.0	0.2	0.6
RN4	20	0.020	0.0000	0.0000	0.0000	0.079	0.014	0.024	0.137	0.6	0.0	0.0	0.6
RN5	10	0.002	0.0002	0.0000	0.0000	0.000	0.004	0.161	0.167	0.8	0.0	0.2	1.0
RN5	20	0.008	0.0000	0.0000	0.0000	0.034	0.000	0.099	0.141	0.0	0.0	0.0	0.0
RN6	10	0.000	0.0000	0.0000	0.0000	0.017	0.002	0.040	0.059	1.0	0.0	0.2	1.2
RN6	20	0.001	0.0000	0.0000	0.0000	0.115	0.007	0.784	0.907	3.2	0.0	0.4	3.6
RN7	10	0.002	0.0002	0.0000	0.0000	0.010	0.002	0.017	0.031	4.2	1.0	2.2	7.4
RN7	20	0.002	0.0000	0.0000	0.0000	0.010	0.000	0.017	0.028	1.8	0.0	0.0	1.8
RN8	10	0.007	0.0000	0.0000	0.0000	0.000	0.006	0.152	0.165	5.2	0.2	0.8	6.2
RN8	20	0.011	0.0002	0.0000	0.0000	0.000	0.000	0.035	0.047	3.4	0.0	0.0	3.4
RN9	10	0.001	0.0002	0.0000	0.0000	0.000	0.018	0.042	0.060	3.2	0.0	0.4	3.6
RN9	20	0.019	0.0001	0.0000	0.0000	0.000	0.018	0.018	0.055	0.6	0.0	0.0	0.6
RN10	10	0.011	0.0000	0.0000	0.0000	0.000	0.007	0.066	0.0834	1.0	0.0	0.0	1.0
RN10	20	0.006	0.0000	3.18×10^{-5}	0.0000	0.024	0.000	0.141	0.171	1.6	0.0	0.0	1.6
SG1	10	0.002	0.0001	0.0000	0.0000	0.224	0.004	0.000	0.229	9.5	0.0	0.0	9.5
SG1	20	0.004	0.0011	0.0000	0.0000	0.134	0.017	0.008	0.163	16.6	0.0	0.0	16.6
SG2	10	0.000	0.0000	0.0000	0.0000	0.197	0.037	0.005	0.238	0.5	0.0	0.0	0.5
SG2	20	0.015	0.0005	0.0000	0.0000	0.010	0.004	0.018	0.047	9.0	0.0	0.0	9.0
SG3	10	0.002	0.0004	0.0000	0.0184	2.173	0.008	0.116	2.318	2.4	1.2	0.4	4.0
SG3	20	0.001	0.0000	0.0000	0.0000	0.212	0.005	0.006	0.222	11.8	0.0	0.0	11.8
SG4	10	0.003	0.0000	0.0000	0.0000	0.127	0.017	0.006	0.153	8.0	1.0	0.0	9.0
SG4	20	0.027	0.0013	0.0000	0.0000	0.049	0.011	0.015	0.102	11.0	0.0	0.0	11.0

http://dx.doi.org/10.1071/MF17064_AC

Station	Depth (m)	*Centropyge hotumatua* (Mg ha^{-1})	*Cirripectes alboapicalis* (Mg ha^{-1})	*Entomacrodus chapmani* (Mg ha^{-1})	*Zanclus cornutus* (Mg ha^{-1})	*Kyphosus sandwicensis* (Mg ha^{-1})	*Stegastes fasciolatus* (Mg ha^{-1})	*Acanthurus leucopareius* (Mg ha^{-1})	Total herbivorous fish (Mg ha^{-1})	*Diadema savignyi* (individuals m^{-2})	*Echinometra insularis* (individuals m^{-2})	*Echinostrephus aciculatus* (individuals m^{-2})	Total urchins (individuals m^{-2})
SG5	10	0.007	0.0025	0.0000	0.0000	0.407	0.019	0.005	0.440	4.0	0.0	0.0	4.0
SG5	20	0.021	0.0000	0.0000	0.0000	0.035	0.021	0.000	0.078	9.4	0.0	0.0	9.4
SG6	10	0.001	0.0005	0.0000	0.0000	0.042	0.004	0.002	0.049	1.2	0.2	0.0	1.4
SG6	20	0.009	0.0012	0.0000	0.0000	0.071	0.000	0.001	0.082	8.6	0.0	0.0	8.6
SG7	10	0.000	0.0004	0.0000	0.0000	0.541	0.027	0.014	0.582	0.6	0.2	0.0	0.8
SG7	20	0.007	0.0001	0.0000	0.0000	0.234	0.009	0.003	0.252	6.2	0.0	0.0	6.2
SG8	10	0.010	0.0019	0.0000	0.0000	0.026	0.005	0.025	0.069	6.2	1.2	0.2	7.6
SG8	20	0.005	0.0010	0.0000	0.0000	0.010	0.019	0.000	0.034	10.0	0.0	0.0	10.0
SR1	10	0.000	0.0007	0.0000	0.0000	2.923	0.008	0.007	2.939	3.0	1.4	0.2	4.6
SR1	20	0.002	0.0004	0.0000	0.0000	1.054	0.002	0.000	1.059	8.4	0.0	0.0	8.4
SR2	10	0.000	0.0004	0.0000	0.0000	0.345	0.009	0.000	0.354	0.0	4.2	0.0	4.2
SR2	20	0.001	0.0008	0.0000	0.0000	0.062	0.000	0.003	0.067	3.4	0.0	0.0	3.4

Table S4. Test results for PERMANOVA and PERMDISP analyses run in Primer, ver. 7, with 9999 permutations

PERMANOVA settings were permutation method = permutation of raw data and sum of squares = type III (partial). PERMDISP was run with setting 'distances are to centroids'

Test data for PERMANOVA with fixed factors Island (Is), Depth (De), and Wave Exposure/Protection (Pr) for all stations

Table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Is	1	8161.5	8161.5	8.4749	0.0001	9936
De	1	2969	2969	3.083	0.009	9920
Pr	2	4875.2	2437.6	2.5312	0.0062	9924
IsxDe	1	1562	1562	1.622	0.1261	9944
IsxPr[A]	1	1061.7	1061.7	1.1025	0.3396	9934
DexPr	2	1605.3	802.65	0.83347	0.618	9925
IsxDexPr[A]	1	534.88	534.88	0.55542	0.7995	9943
Res	30	28891	963.02			
Total	39	58887				

[A] Term has one or more empty cells

Details of the expected mean squares (EMS) for the model

Source	EMS
Is	1*V(Res) + 14.53*S(Is)
De	1*V(Res) + 14.057*S(De)
Pr	1*V(Res) + 10.404*S(Pr)
IsxDe	1*V(Res) + 7.2649*S(IsxDe)
IsxPr	1*V(Res) + 7.2649*S(IsxPr)
DexPr	1*V(Res) + 5.202*S(DexPr)
IsxDexPr	1*V(Res) + 3.6324*S(IsxDexPr)
Res	1*V(Res)

Construction of Pseudo-F ratio(s) from mean squares

Source	Numerator	Denominator	Num.df	Den.df
Is	1*Is	1*Res	1	30
De	1*De	1*Res	1	30
Pr	1*Pr	1*Res	2	30
IsxDe	1*IsxDe	1*Res	1	30
IsxPr	1*IsxPr	1*Res	1	30
DexPr	1*DexPr	1*Res	2	30
IsxDexPr	1*IsxDexPr	1*Res	1	30

Test data for PERMANOVA PAIR-WISE TESTS for the Wave Exposure for Protected (P), semi-exposed (SE), and Exposed (E) stations

Table of results

Groups	t	P(perm)	Unique perms
SE, P	1.8357	0.0141	9939
SE, E	1.158	0.2043	9939
P, E	1.7626	0.012	9942

Denominators

Groups	Denominator	Den.df
SE, P	1*Res	12
SE, E	1*Res	26
P, E	1*Res	22

Average Similarity between/within groups

	SE	P	E
SE	48.432		
P	45.644	76.219	
E	48.122	43.729	47.955

Test data for PERMANOVA with fixed factors Island (Is), Depth (De), and Wave Exposure/Protection (Pr) with protected stations excluded

Table of results

Source	df	SS	MS	Pseudo-F	P(perm)	Unique perms
Is	1	8161.5	8161.5	7.5296	0.0001	9941
De	1	3937	3937	3.6322	0.0012	9926
Pr	1	1453.6	1453.6	1.341	0.2134	9949
IsxDe	1	1562	1562	1.4411	0.1722	9928
IsxPr	1	1061.7	1061.7	0.97952	0.4485	9937
DexPr	1	1035.3	1035.3	0.95512	0.458	9942
IsxDexPr	1	534.88	534.88	0.49347	0.8783	9933
Res	26	28182	1083.9			
Total	33	49060				

Details of the expected mean squares (EMS) for the model

Source	EMS
Is	1*V(Res) + 14.53*S(Is)
De	1*V(Res) + 14.53*S(De)
Pr	1*V(Res) + 14.53*S(Pr)
IsxDe	1*V(Res) + 7.2649*S(IsxDe)
IsxPr	1*V(Res) + 7.2649*S(IsxPr)
DexPr	1*V(Res) + 7.2649*S(DexPr)
IsxDexPr	1*V(Res) + 3.6324*S(IsxDexPr)
Res	1*V(Res)

Construction of Pseudo-F ratio(s) from mean squares

Source	Numerator	Denominator	Num.df	Den.df
Is	1*Is	1*Res	1	26
De	1*De	1*Res	1	26
Pr	1*Pr	1*Res	1	26
IsxDe	1*IsxDe	1*Res	1	26
IsxPr	1*IsxPr	1*Res	1	26
DexPr	1*DexPr	1*Res	1	26
IsxDexPr	1*IsxDexPr	1*Res	1	26

Test data for PERDISP on fixed factor Island for rapa Nui (RN) and Salas y Gomez (SG)

DEVIATIONS FROM CENTROID

F: 0.10548 df1: 1 df2: 38
P(perm): 0.7825

PAIRWISE COMPARISONS

Groups	t	P(perm)
(RN,SG)	0.32478	0.7791

MEANS AND STANDARD ERRORS

Group	Size	Average	SE
RN	20	32.029	2.4975
SG	20	30.884	2.4912

Test data for PERDISP on fixed factor Depth for 10 and 20 m

DEVIATIONS FROM CENTROID
F: 2.5466 df1: 1 df2: 38
P(perm): 0.167

PAIRWISE COMPARISONS

Groups	t	P(perm)
(10,20)	1.5958	0.1669

MEANS AND STANDARD ERRORS

Group	Size	Average	SE
10	19	37.769	1.9452
20	21	32.705	2.4508

Test data for PERDISP on fixed factor Wave Exposure for protected (P), semi-exposed (SE), and exposed stations (E)

DEVIATIONS FROM CENTROID
F: 9.589 df1: 2 df2: 37
P(perm): 0.0019

PAIRWISE COMPARISONS

Groups	t	P(perm)
(SE,P)	3.2916	0.011
(SE,E)	0.3694	0.7592
(P,E)	5.0198	0.0001

MEANS AND STANDARD ERRORS

Group	Size	Average	SE
SE	12	34.747	3.9151
P	6	15.174	2.8267
E	22	36.217	2.0356

Table S5. Test results for the three-way ANOVAs and pairwise Tukey–Kramer analyses run in JMP, ver. 11.2.0, with factors: island, depth and exposure (SE and E only)

Protection SyG exposed, wave exposure. CCA, crustose coraline algae; macroalgae, total macroalgae less turf algae; RN, Rapa Nui; SyG, Salas y Gómez; I - Island; D, depth; ns, not significant; na, not applicable; 20, 20 m; and 10, 10 m

Centropyge hotumatua (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	0.00064505	0.000092	2.5958
Error	26	0.00092297	0.000035	**Prob > F**
C. Total	33	0.00156802		0.0359*

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	0.00003548	0.9994	0.3267
Depth	1	1	0.00040896	11.5202	0.0022*
2Island*Depth	1	1	0.00000845	0.2381	0.6297
Protection SyG exposed	1	1	0.00006689	1.8842	0.1816
2Island*Protection SyG exposed	1	1	0.00010100	2.8450	0.1036
Depth*Protection SyG exposed	1	1	0.00005230	1.4734	0.2357
2Island*Depth*Protection SyG exposed	1	1	0.00003083	0.8684	0.3600

Cirripectes alboapicalis (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	0.00000310	4.4278e-7	1.3444
Error	26	0.00000856	3.2935e-7	**Prob > F**
C. Total	33	0.00001166		0.2700

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	2.62019e-6	7.9557	0.0091*
Depth	1	1	9.05444e-8	0.2749	0.6045
2Island*Depth	1	1	1.45329e-8	0.0441	0.8353
Protection SyG exposed	1	1	1.36738e-7	0.4152	0.5250
2Island*Protection SyG exposed	1	1	8.08107e-8	0.2454	0.6245
Depth*Protection SyG exposed	1	1	3.71944e-8	0.1129	0.7395
2Island*Depth*Protection SyG exposed	1	1	2.50853e-8	0.0762	0.7847

Kyphosus sandwicensis (test on rank-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	2144.5923	306.370	7.3490
Error	26	1083.9077	41.689	**Prob > F**
C. Total	33	3228.5000		<.0001*

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	1741.6992	41.7786	<.0001*
Depth	1	1	39.2008	0.9403	0.3411
2Island*Depth	1	1	89.5251	2.1475	0.1548
Protection SyG exposed	1	1	19.7857	0.4746	0.4970
2Island*Protection SyG exposed	1	1	6.0452	0.1450	0.7064
Depth*Protection SyG exposed	1	1	4.9197	0.1180	0.7340
2Island*Depth*Protection SyG exposed	1	1	0.00078829	0.0000	0.9966

Stegastes fasciolatus (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	0.00065004	0.000093	1.1461
Error	26	0.00210673	0.000081	**Prob > F**
C. Total	33	0.00275677		0.3662

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	0.00018474	2.2800	0.1431
Depth	1	1	0.00009925	1.2249	0.2785
2Island*Depth	1	1	0.00000311	0.0384	0.8462
Protection SyG exposed	1	1	0.00006270	0.7738	0.3871
2Island*Protection SyG exposed	1	1	0.00002932	0.3618	0.5527
Depth*Protection SyG exposed	1	1	0.00000671	0.0828	0.7758
2Island*Depth*Protection SyG exposed	1	1	0.00016160	1.9944	0.1697

Acanthurus leucoparius (test on rank-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	1938.0357	276.862	5.4350
Error	26	1324.4643	50.941	**Prob > F**
C. Total	33	3262.5000		0.0006*

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	1663.9141	32.6636	<.0001*
Depth	1	1	12.5149	0.2457	0.6243
2Island*Depth	1	1	0.2554	0.0050	0.9441
Protection SyG exposed	1	1	0.1303	0.0026	0.9600
2Island*Protection SyG exposed	1	1	16.1519	0.3171	0.5782
Depth*Protection SyG exposed	1	1	43.1635	0.8473	0.3658
2Island*Depth*Protection SyG exposed	1	1	30.9041	0.6067	0.4431

Total herbivorous fishes (test on rank-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	831.0595	118.723	1.2643
Error	26	2441.4405	93.902	**Prob > F**
C. Total	33	3272.5000		0.3059

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	401.86622	4.2797	0.0486*
Depth	1	1	90.97304	0.9688	0.3340
2Island*Depth	1	1	111.27574	1.1850	0.2863
Protection SyG exposed	1	1	43.16351	0.4597	0.5038
2Island*Protection SyG exposed	1	1	27.27162	0.2904	0.5945
Depth*Protection SyG exposed	1	1	0.11898	0.0013	0.9719
2Island*Depth*Protection SyG exposed	1	1	0.44331	0.0047	0.9457

Porites lobata (test on rank-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	1909.1310	272.733	5.2069
Error	26	1361.8690	52.380	**Prob > F**
C. Total	33	3271.0000		0.0008*

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	70.81088	1.3519	0.2555
Depth	1	1	506.30792	9.6661	0.0045*
2Island*Depth	1	1	66.55656	1.2707	0.2699
Protection SyG exposed	1	1	462.18790	8.8238	0.0063*
2Island*Protection SyG exposed	1	1	21.64736	0.4133	0.5259
Depth*Protection SyG exposed	1	1	222.62548	4.2502	0.0494*
2Island*Depth*Protection SyG exposed	1	1	23.16602	0.4423	0.5119

Tukey–Kramer HSD Pairwise Comparisons: Quantile = 2.74332, Adjusted d.f. = 26.0

Depth	Protection SyG exposed	-Depth	-Protection SyG exposed	Difference	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%
10	E	10	SE	-13.5119	4.007098	-3.37	0.0118*	-24.5047	-2.5191
10	E	20	E	-13.8839	3.207623	-4.33	0.0011*	-22.6835	-5.0844
10	E	20	SE	-16.3244	3.575348	-4.57	0.0006*	-26.1327	-6.5161
10	SE	20	E	-0.3720	4.007098	-0.09	0.9997	-11.3648	10.6207
10	SE	20	SE	-2.8125	4.307099	-0.65	0.9135	-14.6283	9.0033
20	E	20	SE	-2.4405	3.575348	-0.68	0.9028	-12.2488	7.3679

Pocillopora spp. (test on logit-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	10.072184	1.43888	2.9889
Error	26	12.516830	0.48142	**Prob > F**
C. Total	33	22.589014		0.0193*

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	0.0989295	0.2055	0.6541
Depth	1	1	3.7342654	7.7568	0.0099*
2Island*Depth	1	1	0.0546259	0.1135	0.7389
Protection SyG exposed	1	1	3.7035545	7.6930	0.0101*
2Island*Protection SyG exposed	1	1	0.4921643	1.0223	0.3213
Depth*Protection SyG exposed	1	1	0.2642091	0.5488	0.4654
2Island*Depth*Protection SyG exposed	1	1	0.0428337	0.0890	0.7679

Lobophora variegata (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	0.01385852	0.001980	0.9323
Error	26	0.05520956	0.002123	**Prob > F**
C. Total	33	0.06906808		0.4987

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	0.00353509	1.6648	0.2083
Depth	1	1	0.00010485	0.0494	0.8259
2Island*Depth	1	1	0.00190684	0.8980	0.3520
Protection SyG exposed	1	1	0.00196373	0.9248	0.3451
2Island*Protection SyG exposed	1	1	0.00021507	0.1013	0.7528
Depth*Protection SyG exposed	1	1	0.00505094	2.3787	0.1351
2Island*Depth*Protection SyG exposed	1	1	0.00054135	0.2549	0.6179

Stypopodium spp. (test on rank-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	718.5089	102.644	1.9015
Error	26	1403.4911	53.980	**Prob > F**
C. Total	33	2122.0000		0.1102

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	304.83605	5.6472	0.0251*
Depth	1	1	6.08470	0.1127	0.7398
2Island*Depth	1	1	148.57659	2.7524	0.1091
Protection SyG exposed	1	1	0.07659	0.0014	0.9702
2Island*Protection SyG exposed	1	1	99.98470	1.8522	0.1852
Depth*Protection SyG exposed	1	1	55.83605	1.0344	0.3185
2Island*Depth*Protection SyG exposed	1	1	5.06308	0.0938	0.7618

Zonaria stipitata (test on rank-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	221.75000	31.6786	1.4431
Error	26	570.75000	21.9519	**Prob > F**
C. Total	33	792.50000		0.2311

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	135.10946	6.1548	0.0199*
Depth	1	1	0.25541	0.0116	0.9149
2Island*Depth	1	1	0.25541	0.0116	0.9149
Protection SyG exposed	1	1	34.76351	1.5836	0.2194
2Island*Protection SyG exposed	1	1	34.76351	1.5836	0.2194
Depth*Protection SyG exposed	1	1	38.85000	1.7698	0.1950
2Island*Depth*Protection SyG exposed	1	1	38.85000	1.7698	0.1950

Halimeda spp. (test on rank-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	1342.9375	191.848	7.9546
Error	26	627.0625	24.118	**Prob > F**
C. Total	33	1970.0000		<.0001*

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	824.96655	34.2057	<.0001*
Depth	1	1	141.04764	5.8483	0.0229*
2Island*Depth	1	1	141.04764	5.8483	0.0229*
Protection SyG exposed	1	1	4.43412	0.1839	0.6716
2Island*Protection SyG exposed	1	1	4.43412	0.1839	0.6716
Depth*Protection SyG exposed	1	1	21.46115	0.8898	0.3542
2Island*Depth*Protection SyG exposed	1	1	21.46115	0.8898	0.3542

Tukey–Kramer HSD Pairwise Comparisons: Quantile = 2.74332, Adjusted d.f. = 26.0

2Island	Depth	-2Island	-Depth	Difference	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%
RN	10	RN	20	-8.8125	2.745325	-3.21	0.0173*	-16.3438	-1.2812
RN	10	SG	10	6.2500	2.719053	2.30	0.1244	-1.2092	13.7092
RN	10	SG	20	6.2500	2.719053	2.30	0.1244	-1.2092	13.7092
RN	20	SG	10	15.0625	2.426085	6.21	<.0001*	8.4070	21.7180
RN	20	SG	20	15.0625	2.426085	6.21	<.0001*	8.4070	21.7180
SG	10	SG	20	0.0000	2.396316	0.00	1.0000	-6.5739	6.5739

Sargassum obtusifolium (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	0.00001412	2.0168e-6	3.2773
Error	26	0.00001600	6.1538e-7	**Prob > F**
C. Total	33	0.00003012		0.0124*

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	1.81622e-6	2.9514	0.0977
Depth	1	1	1.81622e-6	2.9514	0.0977
2Island*Depth	1	1	1.81622e-6	2.9514	0.0977
Protection SyG exposed	1	1	1.81622e-6	2.9514	0.0977
2Island*Protection SyG exposed	1	1	1.81622e-6	2.9514	0.0977
Depth*Protection SyG exposed	1	1	1.81622e-6	2.9514	0.0977
2Island*Depth*Protection SyG exposed	1	1	1.81622e-6	2.9514	0.0977

Turf algae (test on rank-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	1699.1250	242.732	14.9595
Error	26	421.8750	16.226	**Prob > F**
C. Total	33	2121.0000		<.0001*

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	820.13514	50.5446	<.0001*
Depth	1	1	62.68784	3.8634	0.0601
2Island*Depth	1	1	62.68784	3.8634	0.0601
Protection SyG exposed	1	1	250.75135	15.4537	0.0006*
2Island*Protection SyG exposed	1	1	250.75135	15.4537	0.0006*
Depth*Protection SyG exposed	1	1	23.86622	1.4709	0.2361
2Island*Depth*Protection SyG exposed	1	1	23.86622	1.4709	0.2361

Tukey–Kramer HSD Pairwise Comparisons: Quantile = 2.74332, Adjusted d.f. = 26.0

2Island	Protection SyG exposed	-2Island	-Protection SyG exposed	Difference	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%
RN	E	RN	SE	11.75000	2.251802	5.22	0.0001*	5.5726	17.92742
RN	E	SG	E	16.50000	1.785285	9.24	<.0001*	11.6024	21.39761
RN	E	SG	SE	16.50000	2.175448	7.58	<.0001*	10.5320	22.46795
RN	SE	SG	E	4.75000	2.049723	2.32	0.1200	-0.8730	10.37305
RN	SE	SG	SE	4.75000	2.397226	1.98	0.2207	-1.8264	11.32636
SG	E	SG	SE	0.00000	1.965534	0.00	1.0000	-5.3921	5.39209

CCA (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	0.52680046	0.075257	11.7050
Error	26	0.16716622	0.006429	**Prob > F**
C. Total	33	0.69396668		<.0001*

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	0.39930311	62.1051	<.0001*
Depth	1	1	0.00059228	0.0921	0.7639
2Island*Depth	1	1	0.02116140	3.2913	0.0812
Protection SyG exposed	1	1	5.46285e-9	0.0000	0.9993
2Island*Protection SyG exposed	1	1	0.00530685	0.8254	0.3720
Depth*Protection SyG exposed	1	1	0.01214798	1.8894	0.1810
2Island*Depth*Protection SyG exposed	1	1	0.03754815	5.8400	0.0230*

Total coral (test on rank-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	1438.8690	205.553	2.9202
Error	26	1830.1310	70.390	**Prob > F**
C. Total	33	3269.0000		0.0215*

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	108.91898	1.5474	0.2246
Depth	1	1	258.17304	3.6678	0.0665
2Island*Depth	1	1	111.27574	1.5809	0.2198
Protection SyG exposed	1	1	56.49736	0.8026	0.3785
2Island*Protection SyG exposed	1	1	9.83790	0.1398	0.7115
Depth*Protection SyG exposed	1	1	331.29736	4.7066	0.0394*
2Island*Depth*Protection SyG exposed	1	1	155.60006	2.2106	0.1491

Tukey–Kramer HSD Pairwise Comparisons: Quantile = 2.74332, Adjusted d.f. = 26.0

Depth	Protection SyG exposed	-Depth	-Protection SyG exposed	Difference	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%
10	E	10	SE	-9.5417	4.645189	-2.05	0.1948	-22.2849	3.2016
10	E	20	E	-12.7143	3.718405	-3.42	0.0105*	-22.9151	-2.5135
10	E	20	SE	-8.7500	4.144687	-2.11	0.1761	-20.1202	2.6202
10	SE	20	E	-3.1726	4.645189	-0.68	0.9026	-15.9159	9.5706
10	SE	20	SE	0.7917	4.992962	0.16	0.9985	-12.9056	14.4890
20	E	20	SE	3.9643	4.144687	0.96	0.7749	-7.4059	15.3345

Total macroalgae (test on logit-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	6.412823	0.916118	0.9470
Error	26	25.153158	0.967429	**Prob > F**
C. Total	33	31.565981		0.4887

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	4.1082652	4.2466	0.0495*
Depth	1	1	0.2488680	0.2572	0.6163
2Island*Depth	1	1	0.2370742	0.2451	0.6247
Protection SyG exposed	1	1	0.0000436	0.0000	0.9947
2Island*Protection SyG exposed	1	1	1.1994575	1.2398	0.2757
Depth*Protection SyG exposed	1	1	0.0010367	0.0011	0.9741
2Island*Depth*Protection SyG exposed	1	1	0.8342685	0.8624	0.3616

Diadema savigny (test on ln-tranformed raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	10.895231	1.55646	6.6182
Error	26	6.114684	0.23518	**Prob > F**
C. Total	33	17.009915		0.0002*

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	2.6479591	11.2593	0.0024*
Depth	1	1	0.6218724	2.6442	0.1160
2Island*Depth	1	1	2.6436889	11.2411	0.0025*
Protection SyG exposed	1	1	1.4896780	6.3342	0.0183*
2Island*Protection SyG exposed	1	1	0.7609632	3.2357	0.0837
Depth*Protection SyG exposed	1	1	0.2877110	1.2234	0.2788
2Island*Depth*Protection SyG exposed	1	1	0.2476199	1.0529	0.3143

Total urchins (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	309.55259	44.2218	6.6466
Error	26	172.98631	6.6533	**Prob > F**
C. Total	33	482.53890		0.0001*

http://dx.doi.org/10.1071/MF17064_AC

Effects test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
2Island	1	1	123.63405	18.5823	0.0002*
Depth	1	1	12.04822	1.8109	0.1900
2Island*Depth	1	1	92.86497	13.9577	0.0009*
Protection SyG exposed	1	1	38.98011	5.8587	0.0228*
2Island*Protection SyG exposed	1	1	24.96811	3.7527	0.0637
Depth*Protection SyG exposed	1	1	0.00822	0.0012	0.9722
2Island*Depth*Protection SyG exposed	1	1	0.00011	0.0000	0.9968

Tukey–Kramer HSD Pairwise Comparisons: Quantile = 2.74332, Adjusted d.f. = 26.0

2Island	Depth	-2Island	-Depth	Difference	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%
RN	10	RN	20	2.28750	1.441930	1.59	0.4035	-1.6682	6.24318
RN	10	SG	10	-0.55000	1.428131	-0.39	0.9802	-4.4678	3.36782
RN	10	SG	20	-5.41310	1.428131	-3.79	0.0042*	-9.3309	-1.49527
RN	20	SG	10	-2.83750	1.274255	-2.23	0.1425	-6.3332	0.65819
RN	20	SG	20	-7.70060	1.274255	-6.04	<.0001*	-11.1963	-4.20490
SG	10	SG	20	-4.86310	1.258620	-3.86	0.0035*	-8.3159	-1.41030

Table S6. Test results for the one-way ANOVA and Student's *t*-test run in JMP, ver. 11.2.0, for wave exposure at RN

Abbreviations as in Table S5 plus P, protected; and S, semi-exposed. Confidence quantile: t = 2.10982, $\alpha = 0.05$

Centropyge hotumatua (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	0.00012410	0.000062	1.5805	0.2347
Error	17	0.00066744	0.000039		
C. Total	19	0.00079155			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
P	E	0.0056245	0.0033840	-0.001515	0.0127641	0.1148	
P	S	0.0051438	0.0036176	-0.002489	0.0127763	0.1732	
S	E	0.0004807	0.0033840	-0.006659	0.0076203	0.8887	

Cirripectes alboapicalis (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	1.67362e-8	8.3681e-9	0.3330	0.7213
Error	17	4.27171e-7	2.5128e-8		
C. Total	19	4.43908e-7			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
P	S	0.0000706	0.0000915	-0.000122	0.0002637	0.4510	
P	E	0.0000546	0.0000856	-0.000126	0.0002352	0.5325	
E	S	0.0000161	0.0000856	-0.000165	0.0001967	0.8534	

Kyphosus sandwicensis (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	0.00087502	0.000438	0.5097	0.6095
Error	17	0.01459119	0.000858		
C. Total	19	0.01546621			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
P	S	0.0158778	0.0169145	-0.019809	0.0515643	0.3610	
E	S	0.0129119	0.0158221	-0.020470	0.0462936	0.4257	
P	E	0.0029658	0.0158221	-0.030416	0.0363476	0.8535	

Stegastes fasciolatus (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	0.00005212	0.000026	0.4701	0.6328
Error	17	0.00094224	0.000055		
C. Total	19	0.00099436			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
E	P	0.0036849	0.0040207	-0.004798	0.0121678	0.3722	
S	P	0.0032563	0.0042983	-0.005812	0.0123249	0.4591	
E	S	0.0004287	0.0040207	-0.008054	0.0089116	0.9163	

Acanthurus leucoparius (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	0.00326619	0.001633	0.0976	0.9075
Error	17	0.28434159	0.016726		
C. Total	19	0.28760778			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
E	S	0.0308626	0.0698456	-0.116499	0.1782240	0.6642	
P	S	0.0179684	0.0746681	-0.139567	0.1755044	0.8127	
E	P	0.0128942	0.0698456	-0.134467	0.1602556	0.8557	

Total herbivorous fishes (test on raw data)

Analysis of variance whole model

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
E	S	0.0308626	0.0698456	-0.116499	0.1782240	0.6642	
P	S	0.0179684	0.0746681	-0.139567	0.1755044	0.8127	
E	P	0.0128942	0.0698456	-0.134467	0.1602556	0.8557	

Student's t tests

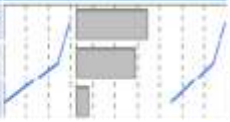
Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
E	S	0.0379903	0.0743085	-0.118787	0.1947676	0.6158	
P	S	0.0344039	0.0794391	-0.133198	0.2020059	0.6704	
E	P	0.0035864	0.0743085	-0.153191	0.1603637	0.9621	

Porites lobata (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	6.374955	3.18748	2.2755	0.1332
Error	17	23.813630	1.40080		
C. Total	19	30.188585			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
P	E	1.246253	0.6391926	-0.10233	2.594831	0.0679	
S	E	1.034081	0.6391926	-0.31450	2.382659	0.1241	
P	S	0.212172	0.6833256	-1.22952	1.653863	0.7600	

Pocillopora spp. (test on logit-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	7.341497	3.67075	8.8390	0.0023*
Error	17	7.059935	0.41529		
C. Total	19	14.401433			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
E	P	1.460434	0.3480321	0.726150	2.194717	0.0006*	
S	P	0.917356	0.3720620	0.132374	1.702338	0.0246*	
E	S	0.543078	0.3480321	-0.191206	1.277361	0.1371	

Lobophora variegata (test on rank-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	627.4396	313.720	2.1365	0.1487
Error	17	2496.2604	146.839		
C. Total	19	3123.7000			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
P	SE	12.75000	6.996162	-2.0106	27.51061	0.0860	
P	E	11.77083	6.544310	-2.0365	25.57812	0.0899	
E	SE	0.97917	6.544310	-12.8281	14.78645	0.8828	

Stypopodium spp. (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	0.00756213	0.003781	6.6605	0.0073*
Error	17	0.00965067	0.000568		
C. Total	19	0.01721280			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
P	E	0.0456667	0.0128676	0.018518	0.0728149	0.0025*	
P	SE	0.0360000	0.0137560	0.006977	0.0650227	0.0180*	
SE	E	0.0096667	0.0128676	-0.017482	0.0368149	0.4628	

Zonaria stipitata (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	0.00153333	0.000767	0.7735	0.4770
Error	17	0.01685067	0.000991		
C. Total	19	0.01838400			

Student's t tests

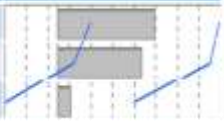
Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
SE	P	0.0200000	0.0181771	-0.018350	0.0583502	0.2865	
SE	E	0.0183333	0.0170031	-0.017540	0.0542067	0.2960	
E	P	0.0016667	0.0170031	-0.034207	0.0375400	0.9231	

Halimeda spp. (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	0.00307987	0.001540	5.7875	0.0121*
Error	17	0.00452333	0.000266		
C. Total	19	0.00760320			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
P	E	0.0285000	0.0088094	0.009914	0.0470863	0.0049*	
P	SE	0.0246667	0.0094177	0.004797	0.0445362	0.0180*	
SE	E	0.0038333	0.0088094	-0.014753	0.0224196	0.6689	

Sargassum obtusifolium (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	0.00698453	0.003492	11.1539	0.0008*
Error	17	0.00532267	0.000313		
C. Total	19	0.01230720			

Student's t tests

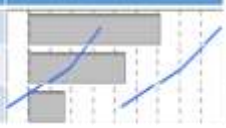
Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
P	E	0.0413333	0.0095562	0.021172	0.0614951	0.0005*	
P	SE	0.0400000	0.0102160	0.018446	0.0615538	0.0011*	
SE	E	0.0013333	0.0095562	-0.018828	0.0214951	0.8907	

Turf algae (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	0.01021920	0.005110	11.5633	0.0007*
Error	17	0.00751200	0.000442		
C. Total	19	0.01773120			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
P	SE	0.0560000	0.0121365	0.030394	0.0816057	0.0002*	
P	E	0.0410000	0.0113526	0.017048	0.0649520	0.0022*	
E	SE	0.0150000	0.0113526	-0.008952	0.0389520	0.2039	

CCA (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	0.02365013	0.011825	3.4341	0.0559
Error	17	0.05853867	0.003443		
C. Total	19	0.08218880			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
E	P	0.0826667	0.0316913	0.015804	0.1495295	0.0184*	
E	SE	0.0426667	0.0316913	-0.024196	0.1095295	0.1959	
SE	P	0.0400000	0.0338794	-0.031479	0.1114794	0.2540	

Total coral (test on rank-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	75.2083	37.604	0.2058	0.8160
Error	17	3106.5417	182.738		
C. Total	19	3181.7500			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value
SE	E	3.958333	7.300583	-11.4445	19.36122	0.5947
P	E	3.958333	7.300583	-11.4445	19.36122	0.5947
P	SE	0.000000	7.804651	-16.4664	16.46637	1.0000

Total macroalgae (test on logit-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	10.666270	5.33313	5.0201	0.0194*
Error	17	18.059985	1.06235		
C. Total	19	28.726255			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value
P	E	1.711587	0.5566441	0.537170	2.886003	0.0069*
P	S	1.362934	0.5950776	0.107430	2.618438	0.0351*
S	E	0.348653	0.5566441	-0.825764	1.523069	0.5394

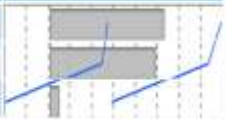
Diadema savigny (test on ln-transformed data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	3.7562509	1.87813	11.6972	0.0006*
Error	17	2.7295580	0.16056		
C. Total	19	6.4858089			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value
S	P	0.9861284	0.2313455	0.498032	1.474225	0.0005*
E	P	0.9111210	0.2164039	0.454549	1.367693	0.0006*
S	E	0.0750074	0.2164039	-0.381565	0.531580	0.7331



Total urchins (test on raw data)

Analysis of variance whole model

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
Protection SyG exposed	2	37.162167	18.5811	5.1900	0.0174*
Error	17	60.863333	3.5802		
C. Total	19	98.025500			

Student's t tests

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value
SE	P	3.016667	1.092428	0.71185	5.321488	0.0133*
E	P	2.941667	1.021873	0.78570	5.097630	0.0104*
SE	E	0.075000	1.021873	-2.08096	2.230963	0.9423

Table S7. Test results for the one-way ANOVA run in JMP, ver. 11.2.0, on the size of the most abundant herbivores

Abbreviation as in Tables S1–S6, except LE, protected

Diadema savigny (test on raw data)

Analysis of variance by Island

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
2Island	1	0.1686	0.16865	0.1194	0.7297
Error	864	1220.1835	1.41225		
C. Total	865	1220.3522			

Analysis of variance by Depth

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
DEPTH	1	28.2678	28.2678	20.4879	<.0001*
Error	864	1192.0844	1.3797		
C. Total	865	1220.3522			

Analysis of variance by Exposure

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
3Protection	2	37.5945	18.7973	13.7154	<.0001*
Error	863	1182.7577	1.3705		
C. Total	865	1220.3522			

Student's t tests (t=1.96272, α = 0.05)

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
LE	E	0.9306184	0.3425064	0.258375	1.602861	0.0067*	
LE	SE	0.5493528	0.3428358	-0.123537	1.222242	0.1094	
SE	E	0.3812657	0.0801700	0.223915	0.538617	<.0001*	

Kyphosus sandwicensis (test on raw data)

Analysis of variance by Island

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
2Island	1	222.5638	222.564	35.6885	<.0001*
Error	1088	6785.0850	6.236		
C. Total	1089	7007.6489			

Analysis of variance by Depth

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
DEPTH	1	327.7227	327.723	53.3782	<.0001*
Error	1088	6679.9262	6.140		
C. Total	1089	7007.6489			

Analysis of variance by Exposure

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
3 Protection	2	184.1329	92.0664	14.6664	<.0001*
Error	1087	6823.5160	6.2774		
C. Total	1089	7007.6489			

Student's t tests (t=1.96293, α = 0.05)

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
SE	LE	0.4002650	0.0804177	0.242031	0.5584985	<.0001*	
E	LE	0.2579688	0.0795184	0.101505	0.4144329	0.0013*	
SE	E	0.1422961	0.0739277	-0.003167	0.2877598	0.0552	

http://dx.doi.org/10.1071/MF17064_AC

Acanthurus leucopareius (test on raw data)

Analysis of variance by Island

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
2Island	1	31.7356	31.7356	9.1257	0.0026*
Error	801	2785.5590	3.4776		
C. Total	802	2817.2945			

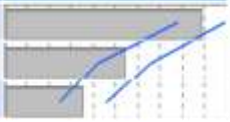
Analysis of variance by Depth

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
DEPTH	1	344.2567	344.257	111.5024	<.0001*
Error	801	2473.0378	3.087		
C. Total	802	2817.2945			

Analysis of variance by Exposure

Source	DF	Sum of Squares	Mean Square	F Ratio	Prob > F
3 Protection	2	727.9149	363.957	139.3552	<.0001*
Error	800	2089.3796	2.612		
C. Total	802	2817.2945			

Student's t tests (t=1.96293, $\alpha = 0.05$)

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value	
E	SE	2.268497	0.1358820	2.001769	2.535224	<.0001*	
LE	SE	1.374647	0.1537722	1.072803	1.676492	<.0001*	
E	LE	0.893849	0.1403267	0.618397	1.169301	<.0001*	