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Supplement of

Will daytime community calcification reflect reef accretion on future, degraded coral reefs?

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Tables

Table S1: One-way ANOVA results (p-values) comparing measured percent coral and algae cover between triplicate transects within each Lagoon site (Lagoon site 1, Lagoon site 2). Data were pooled among replicate point-contact survey efforts (n = 2 transect^{-1}). A **bolded** value (p-value < 0.05) indicates that the percent cover significantly differed between transects within each Lagoon site.

Point-Contact Survey Method				
Cover	**Lagoon site 1**		**Lagoon site 2**	
	df	**p-value**	**df**	**p-value**
% Coral Cover	2	0.791	2	0.959
% Algae Cover	2	0.256	2	0.214
% Sediment Cover	2	0.421	2	0.956

Table S2: One-way ANOVA results (p-values) comparing measured percent coral and algae cover between Lagoon site 1 and Lagoon site 2. Data were pooled among replicate point-contact survey efforts and triplicate transects within each Lagoon site (n = 6 site^{-1}). A **bolded** value (p-value < 0.05) indicates that the percent cover significantly differed between Lagoon sites.

Point-Contact Survey Method		
Cover	**df**	**p - value**
% Coral Cover	**1**	**0.001**
% Algae Cover	**1**	**0.011**
% Sediment Cover	1	0.122

Table S3: One-way ANOVA results (p-values) comparing measured percent coral and algae cover between triplicate transects within each Lagoon site (Lagoon site 1, Lagoon site 2). Data were pooled among triplicate photo-quadrat survey efforts over time (n = 120 transect^{-1}). A **bolded** value (p-value < 0.05) indicates that the percent cover significantly differed between transects.

Photo-Quadrat Survey Method				
Cover	**Lagoon site 1**		**Lagoon site 2**	
	df	**p-value**	**df**	**p-value**
% Coral Cover	2	0.469	2	0.818
% Algae Cover	2	0.721	2	0.796
% Sediment Cover	2	0.859	2	0.403

Table S4: One-way ANOVA results (p-values) comparing measured percent coral and algae cover between Lagoon site 1 and Lagoon site 2. Data were pooled among triplicate photo-quadrat survey efforts and triplicate transects within each Lagoon site (n = 360 site^{-1}). A **bolded** value (p-value < 0.05) indicates that the percent cover significantly differed between Lagoon site 1 and Lagoon site 2.

Photo-Quadrat Survey Method		
Cover	**df**	**p - value**
% Coral Cover	**1**	**0.000**
% Algae Cover	1	0.273
% Sediment Cover	1	0.140

Table S5: One-way ANOVA results for percent bleached coral tissue (Coral Bleaching) and percent sediment exhibiting overgrowth (Sediment Overgrowth) compared over the three survey efforts through time (Jan 24, Feb 6, and Feb12 2020) at Lagoon site 1. Data were pooled among all triplicate transects. Tukey HSD post-hoc test results are to compare differences between each survey effort (n = 3). A **bolded** value (p-value < 0.05) indicates that the difference was significant between time points.

Photo-Quadrat Survey Method: Lagoon site 1			
Lagoon site 1	**df**	**F-value**	**p - value**
Coral Bleaching	**2**	**67.2**	**0.000**
Sediment Overgrowth	**2**	**18.3**	**0.003**

Tukey HSD

Dependent Variable	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Coral Bleaching	Jan 24	Feb 6	**-16.33**	**4.93**	**.037**	**-31.48**	**-1.18**
		Feb 12	**-55.66**	**4.93**	**.000**	**-70.81**	**-40.51**
	Feb 6	Jan 24	**16.33**	**4.93**	**.037**	**1.18**	**31.48**
		Feb 12	**-39.33**	**4.93**	**.001**	**-54.48**	**-24.18**
	Jan 24	Feb 6	**55.66**	**4.93**	**.000**	**40.51**	**70.81**
		Feb 12	**39.33**	**4.93**	**.001**	**24.18**	**54.48**
Sediment Overgrowth	Jan 24	Feb 6	-2.33	1.36	.275	-6.50	1.84
		Feb 12	**-8.00**	**1.36**	**.003**	**-12.17**	**-3.82**
	Feb 6	Jan 24	2.33	1.36	.275	-1.84	6.50
		Feb 12	**-5.66**	**1.36**	**.014**	**-9.84**	**-1.49**
	Jan 24	Feb 6	**8.00**	**1.36**	**.003**	**3.82**	**12.17**

	Feb 12	**5.66**	**1.36**	**.014**	**1.49**	**9.84**

Table S6: One-way ANOVA results for percent bleached coral tissue (Coral Bleaching) and percent sediment exhibiting overgrowth (Sediment Overgrowth) compared over the three survey efforts through time (Jan 24, Feb 6, and Feb12 2020) at Lagoon site 2. Data were pooled among all triplicate transects. Tukey HSD post-hoc test results are to compare differences between each survey effort (n = 3). A **bolded** value (p-value < 0.05) indicates that the difference was significant between time points.

Photo-Quadrat Survey Method: Lagoon site 2			
Lagoon site 2	**df**	**F-value**	**p - value**
Coral Bleaching	**2**	**142.9**	**.000**
Sediment Overgrowth	**2**	**10.5**	**.011**

Tukey HSD

Dependent Variable	(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Coral Bleaching	Jan 24	Feb 6	**-24.00**	**3.88**	**.002**	**-35.92**	**-12.07**
		Feb 12	**-65.00**	**3.88**	**.000**	**-76.92**	**-53.07**
	Feb 6	Jan 24	**24.00**	**3.88**	**.002**	**12.07**	**35.92**
		Feb 12	**-41.00**	**3.88**	**.000**	**-52.92**	**-29.07**
	Jan 24	Feb 6	**65.00**	**3.88**	**.000**	**53.07**	**76.92**
		Feb 12	**41.00**	**3.88**	**.000**	**29.07**	**52.92**
Sediment Overgrowth	Jan 24	Feb 6	-3.00	2.8	.564	-11.59	5.59
		Feb 12	**-12.33**	**2.80**	**.011**	**-20.93**	**-3.73**
	Feb 6	Jan 24	3.00	2.80	.564	-5.59	11.59
		Feb 12	**-9.33**	**2.80**	**.036**	**-17.93**	**-.73**
	Jan 24	Feb 6	**12.33**	**2.80**	**.011**	**3.73**	**20.93**
		Feb 12	**9.33**	**2.80**	**.036**	**.73**	**17.93**

Table S7: One-way ANOVA results for percent bleached coral tissue (Coral Bleaching) and percent sediment exhibiting overgrowth (Sediment Overgrowth) compared over the three survey efforts

through time (Jan 24, Feb 6, and Feb12 2020) between Lagoon site 1 and Lagoon site 2. Data were pooled among all triplicate transects. A **bolded** value (p-value < 0.05) indicates that the difference was significant between Lagoon sites.

Photo-Quadrat Survey Method				
	Coral Bleaching		**Sediment Overgrowth**	
Date	**df**	**p - value**	**df**	**p - value**
Jan 24 2020	1	1.00	1	0.899
Feb 6 2020	1	0.067	1	0.692
Feb 12 2020	1	0.256	1	0.231

Table S8: List of invertebrate taxonomy described in section 3.2.4.

Group	**Taxon**	**Common name**
Algae	*Caulerpa* spp.	
	Chlorophyta spp.	Green algae
	Halimeda spp.	
	Laurencia spp.	
	Padina sp.	

	Rhodophyta spp.	Red algae
	Valonia ventricosa	Sailor's eyeball alga
Corals	*Acropora secale*	
	Acropora millepora	
	Acropora muricata	
	Acropora spp.	Staghorn corals
	Astrea curta	
	Cyphastrea chalcidicum	
	Dipsastraea sp.	
	Favites halicora	
	Favites rotundata	
	Goniastrea edwardsi	Honeycomb coral
	Goniopora sp.	Flowerpot coral
	Isopora palifera	
	Cladiella sp.	
	Lobophyllia agaricia	
	Montipora digitata	
	Montipora grisea	
	Montipora hispida	
	Montipora sp.	
	Platygyra daedalea	Lesser valley coral
	Platygyra spp.	
	Pocillopora damicornis	
	Pocillopora sp.	Cauliflower coral
	Porites attenuate	
	Porites cylindrica	Yellow finger coral
	Porites sp.	Pore coral
	Sarcophyton spp.	Toadstool leather corals
	Stylophora pistillata	Hood coral
Crustaceans	Alpheidae sp.	Snapping shrimp
	Alpheus sp.	Snapping shrimp

	Brachyura spp.	Crabs
	Calcinus latens	Hidden hermit crab
	Caridea sp.	Caridean shrimp
	Clibanarius corallinus	Coral hermit crab
	Dardanus megistos	White-spotted hermit crab
	Majidae sp.	Spider crab
	Stomatopoda spp.	Mantis shrimps
	Thalamita sp.	
	Trapezia serenei	Coral crab
	Zenopontonia soror	Seastar shrimp
Echinoderms	*Culcita novaeguineae*	Pillow cushion star
	Holothuria atra	Lollyfish sea cucumber
	Holothuria edulis	Pinkfish sea cucumber
	Holothuria leucospilota	Black sea cucumber
	Holothuria sp.	
	Linckia guildingi	Guilding’s sea star
	Linckia laevigata	Blue linckia
	Nardoa novaecaledoniae	Yellow mesh sea star
	Stichopus herrmanni	Herrmann’s sea cucumber
	Stichopus chloronotus	Greenfish sea cucumber
Molluscs	*Aplysia argus*	White-speckled seahare
	Atactodea striata	Striate beach clam
	Codakia paytenorum	Payten's codakia
	Chrysostoma paradoxum	Orange-mouthed top shell
	Clypeomorus bifasciata	Double-banded creeper
	Coralliophila sp.	
	Ergalataxinae	
	Gymnodoris sp.	
	Melo amphora	Giant baler
	Pitar sp.	
	Spondylus sp.	Thorny oyster

	Tectus fenestratus	Latticed top shell
	Tonna chinensis	China tun
	Tridacna maxima	Small giant clam
	Tubulophilinopsis gardineri	Gardiner's headshield slug
	Turbo argyrostomus	Silvermouth turban
Polychaetes	*Perinereis* sp.	
	Spirobranchus sp.	Christmas tree worm
	Terebellidae sp.	Spaghetti worm
Sponges	Porifera sp.	

Table S9: Shapiro-Wilk test for normality in reef metabolism. Data are organized by rates of NEP and NEC measured at Lagoon site 1, Lagoon site 2, and the larger lagoon area (Slack Water). Data for each Lagoon site were pooled among triplicate parallel transects. NEP data were not included for the slack-water method. If the significant value (Sig.) of the test is > 0.05 the data exhibit a normal distribution.

		Shapiro-Wilk		
	Site	**Statistic**	**df**	**Sig.**
NEP	Lagoon site 1	.951	36	.112
	Lagoon site 2	.984	36	.857
	Slack Water			
NEC	Lagoon site 1	.967	36	.356
	Lagoon site 2	.952	36	.117
	Slack Water	.962	33	.287

Table S10: One-way ANOVA results (p-values) comparing measured reef metabolism (NEP and NEC) between triplicate transects within each Lagoon site (Lagoon site 1, Lagoon site 2, and Slack Water). Data were pooled among all 11 (Slack water) and 12 (Lagoon site 1 and Lagoon site 2) days of measurements (3 days for Night NEC). A **bolded** value (p-value < 0.05) indicates that the measured response in that specific metabolic parameter significantly differed between triplicate transects.

Metabolism	**Lagoon site 1**		**Lagoon site 2**		**Slack Water**	
	df	**p-value**	**df**	**p-value**	**df**	**p-value**
NEP	2	.471	2	.917		
NEC	2	.169	2	.489	2	.581
Night NEC					2	.617

Table S11: One-way ANOVA results (p-values) comparing measured reef metabolism (NEP and NEC) between measurement days within each Lagoon site (Lagoon site 1 and Lagoon site 2 = 12; Slack Water = 11; Night NEC = 3). Data were pooled among all triplicate transects. A **bolded** value (p-value < 0.05) indicates that the measured response in that specific metabolic parameter significantly differed between triplicate transects.

Metabolism	**Lagoon site 1**		**Lagoon site 2**		**Slack Water**	
	df	**p-value**	**df**	**p-value**	**df**	**p-value**
NEP	11	.181	11	.099		
NEC	11	.506	11	.365	10	.073
Night NEC					2	.083

Table S12: One-way ANOVA results for NEP compared amongst Lagoon site 1 and Lagoon site 2 and for NEC compared amongst Lagoon site 1, Lagoon site 2, and Slack Water. Data were pooled among all triplicate transects and measurements days. Tukey HSD post-hoc test results are displayed for NEC (n = 3). A **bolded** value (p-value < 0.05) indicates that the difference was significant between Lagoon sites.

Metabolism	**df**	**F-value**	**p - value**
NEP	1	3.47	.067
NEC	**2**	**8.17**	**.001**

Tukey HSD

(I) Site	**(J) Site**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval**	
					Lower Bound	**Upper Bound**
Lagoon site 1	Lagoon site 2	-.8742	1.015	.666	-3.2916	1.5431
	Slack Water	**3.0361***	**1.015**	**.010**	**.6187**	**5.4534**
Lagoon site 2	Lagoon site 1	.8742	1.015	.666	-1.5431	3.2916
	Slack Water	**3.9103***	**1.015**	**.001**	**1.4929**	**6.3277**
Slack Water	Lagoon site 1	**-3.0361***	**1.015**	**.010**	**-5.4534**	**-.6187**
	Lagoon site 2	**-3.9103***	**1.01544**	**.001**	**-6.3277**	**-1.4929**

Figures

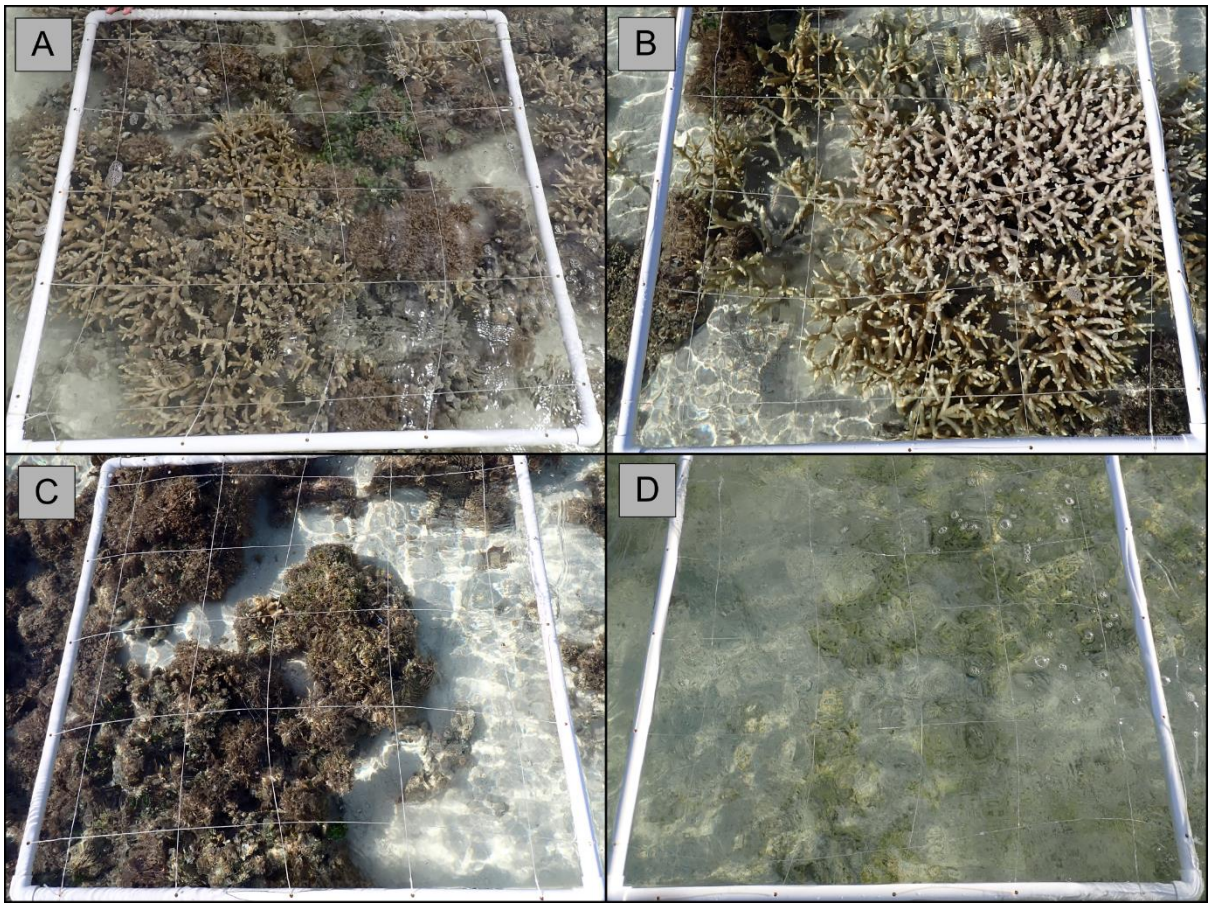

Figure S.1: Photo-quadrat examples of various reef health. A) Healthy *Acropora* spp. coral observed during the first survey effort. B) Bleached *Acropora* spp. observed during the final survey effort. C) Example of fleshy algal growth as the dominant benthic organism D) Example of Chlorophyta overgrowth on the sediment.

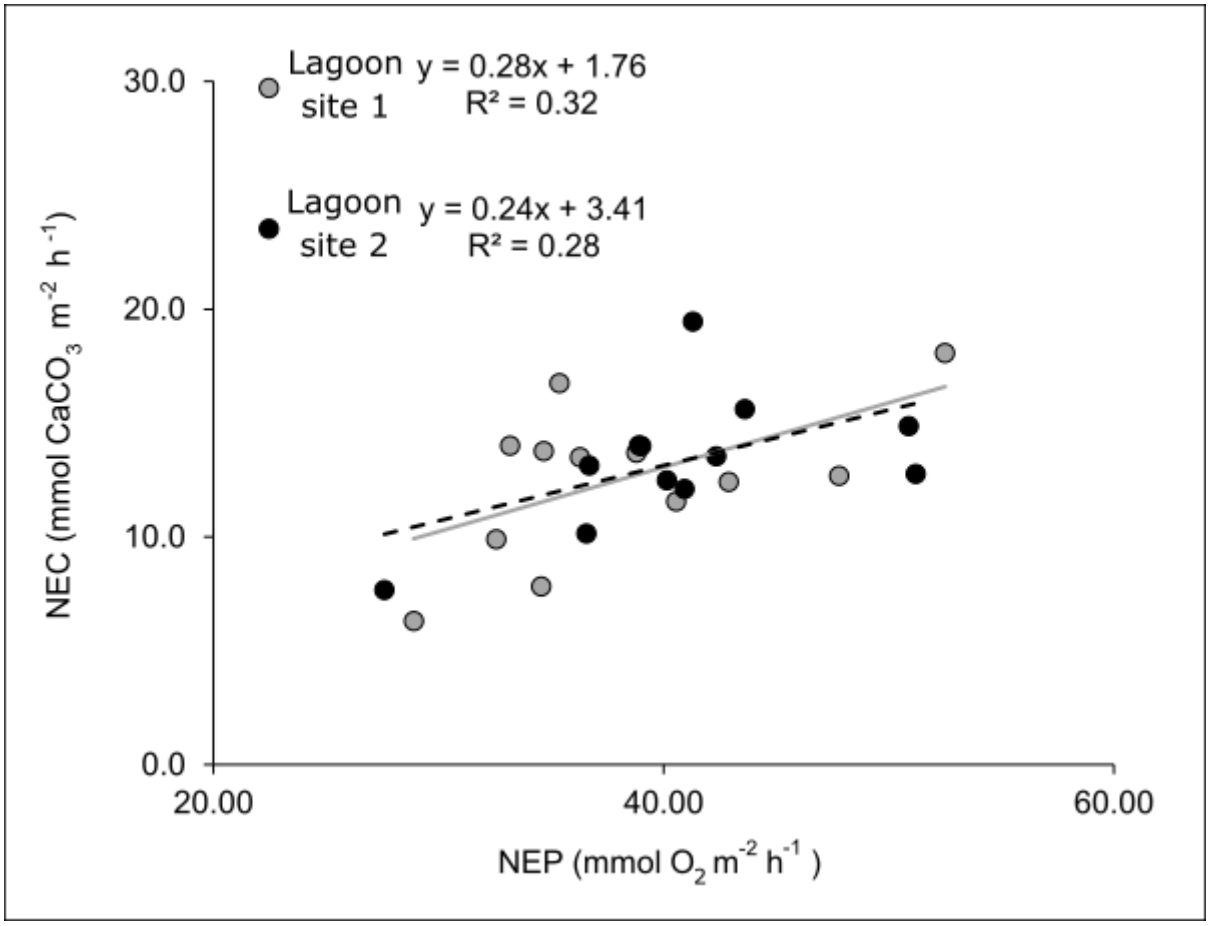

Figure S.2: Rates of net ecosystem calcification (NEC) as a function of net ecosystem production (NEP) separated between study Lagoon site 1 (grey) and Lagoon site 2 (black).