Supporting Information for

Nitrogen pollution interacts with heat stress to increase coral bleaching across the seascape

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Table S1. Bleaching prevalence and severity across habitats for two coral genera. Numbers are means with 95% credible intervals in brackets.

		Pocillopora	*Acropora*
Severity	Fringing Reef	0.40 [0.35-0.44]	0.44 [0.33-0.57]
	Back Reef	0.50 [0.48-0.53]	0.61 [0.56-0.65]
Prevalence	Fringing Reef	0.22 [0.17-0.27]	0.07 [0.02-0.16]
	Back Reef	0.37 [0.33-0.42]	0.55 [0.43-0.68]

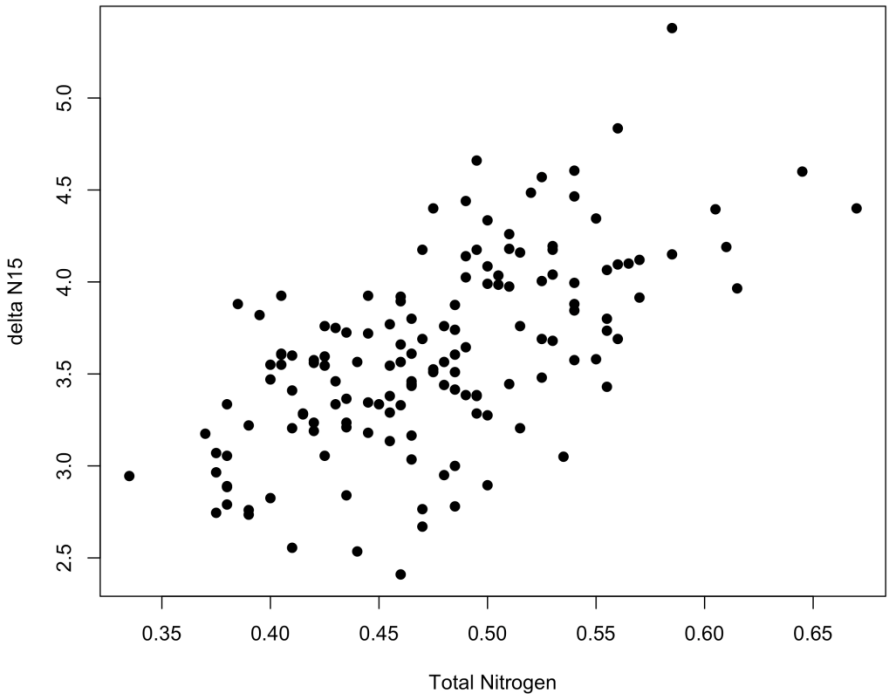
Table S2. Model convergence across the 3 MCMC chains assessed with Gelman-Rubin statistic, where a value of 1 approximates convergence for the main parameters across the severity and prevalence portions of the models for each taxon.

		Pocillopora	*Acropora*
Severity	Colony Size	1.000	1.001
	Depth	1.000	1.000
	Nitrogen	1.000	1.000
	Heat Stress	1.000	1.001
	Nitrogen x Heat Stress	1.000	1.000
	Fringing Reef	1.000	1.001
	Back Reef	1.000	1.001
Prevalence	Colony Size	1.000	1.001
	Depth	1.000	1.000
	Nitrogen	1.000	1.000
	Heat Stress	1.001	1.000
	Nitrogen x Heat Stress	1.000	1.000
	Fringing Reef	1.000	1.001
	Back Reef	1.000	1.000

Table S3. Model diagnostics for severity and prevalence portions of models for each taxon. Posterior predictive check (P-value) compares observed values to simulated values from the model and represents the probability that the test statistic from the simulated data is more extreme than the observed data, thus values near 0.5 represent a good fit, and values of 0 or 1 represent lack of fit. R^2 calculated as the ratio of variance of the predicted values and the variance of the predicted values and errors.

		Pocillopora	*Acropora*
Severity	P-value fit	0.43	0.28
	R^2	0.41	0.41
Prevalence	P-value fit	0.48	0.35
	R^2	0.36	0.46

Figure S1. Correlation between total N and δN^{15}, each representing averages between January and May 2016. Total N and δN^{15} were positively correlated ($\rho = 0.62$, $p < 0.01$)



Correlations between predictors and potential covarying effects

To rule out the potential for site specific heat history that can influence bleaching to be covarying with N we investigated correlations among N and temperature thresholds (Fig. S2) and thermal history (Fig. S3). We found that sites with larger maximum monthly temperatures were uncorrelated with N, and that N were also not correlated with the long term mean temperature, or the average standard deviation of daily temperature.

Figure S2. Correlation between temperature thresholds by site and N by site. Bolded number in top right corner is the correlation between the variables.

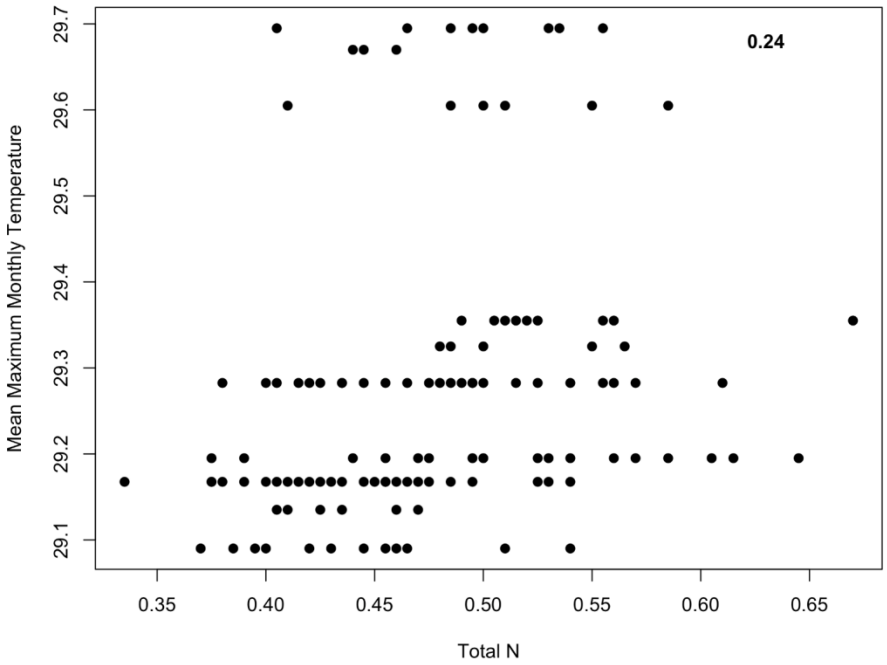
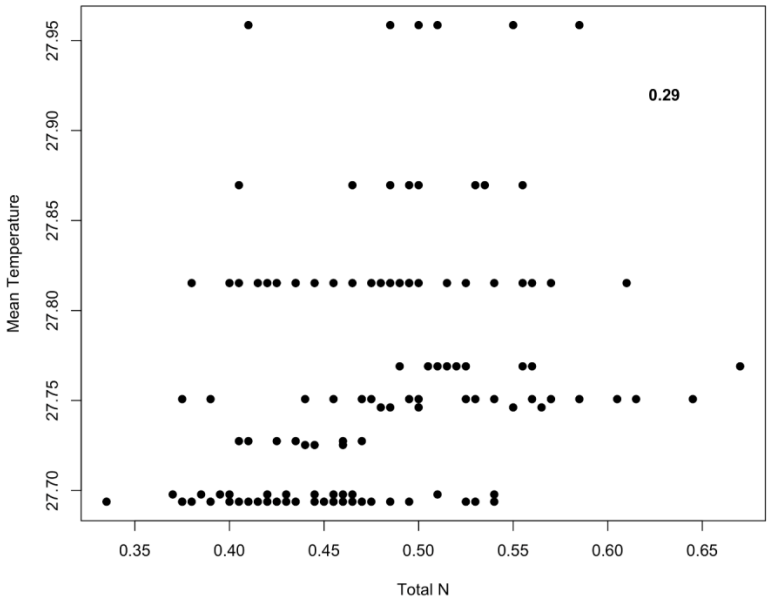


Figure S3. Correlation between N by site and site thermal history represented as A) long term mean temperature and B) average daily variation in temperature. Bolded number in top right corner is correlation between the variables.



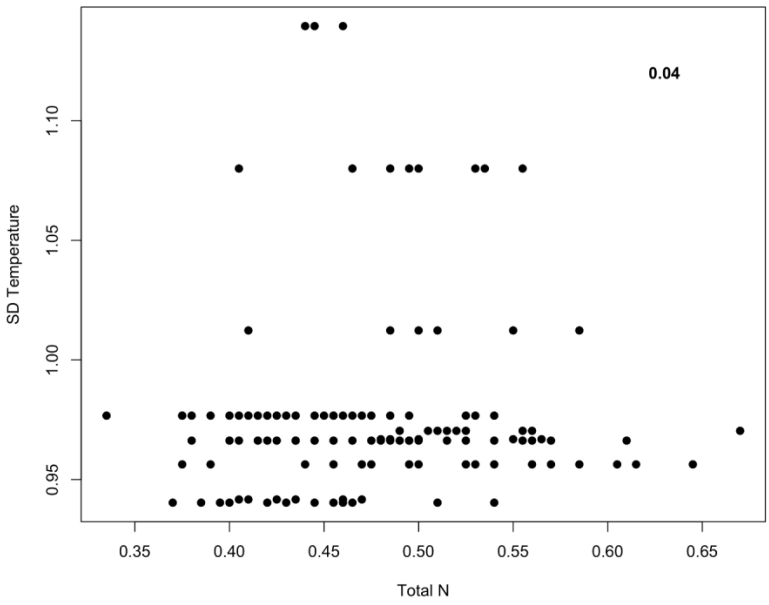


Figure S4. Visualization of the negative interaction between nitrogen and heat stress on bleaching severity for *Acropora* (blue) and *Pocillopora* (red) in the back reef. Plotted are the mean values (black circles) and 95% credible intervals (black lines) predicted from the models for bleaching severity across the range of nitrogen values when heat stress was held to a low (1.84 ºC-weeks), a moderate (2.14 ºC-weeks), and a high value (2.81 ºC-weeks). Colored circles are the underlying mean values from the observed data where the size of the circle is proportional to the number of colonies observed at that site.