

Reporting Summary

Nature Research wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Research policies, see [Authors & Referees](#) and the [Editorial Policy Checklist](#).

Statistical parameters

When statistical analyses are reported, confirm that the following items are present in the relevant location (e.g. figure legend, table legend, main text, or Methods section).

n/a Confirmed

- ☐ ☒ The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement
- ☐ ☒ An indication of whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
- ☐ ☒ The statistical test(s) used AND whether they are one- or two-sided
Only common tests should be described solely by name; describe more complex techniques in the Methods section.
- ☒ ☐ A description of all covariates tested
- ☐ ☒ A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
- ☐ ☒ A full description of the statistics including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
- ☐ ☒ For null hypothesis testing, the test statistic (e.g. *F*, *t*, *r*) with confidence intervals, effect sizes, degrees of freedom and *P* value noted
Give P values as exact values whenever suitable.
- ☒ ☐ For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
- ☒ ☐ For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
- ☐ ☒ Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated
- ☐ ☒ Clearly defined error bars
State explicitly what error bars represent (e.g. SD, SE, CI)

Our web collection on [statistics for biologists](#) may be useful.

Software and code

Policy information about [availability of computer code](#)

Data collection

No code was used to collect data in this study.

Data analysis

R software version 3.3.2 was used in this manuscript. This included open source code to conduct Welch's t-tests, one-way ANOVAs, and Fisher's exact tests. We also used code for the `clm` function in package 'ordinal' provided by Christensen 2015.

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors/reviewers upon request. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Research [guidelines for submitting code & software](#) for further information.

Data

Policy information about [availability of data](#)

All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A list of figures that have associated raw data
- A description of any restrictions on data availability

All data supporting the findings of this study are available in the Source Data and Duke University's Digital Repository under the identifier <https://doi.org/10.7924/G8348HFP>, located at <https://repository.duke.edu>. There are no restrictions on the availability of the study data.

Field-specific reporting

Please select the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☐ Life sciences

☐ Behavioural & social sciences

☒ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see [nature.com/authors/policies/ReportingSummary-flat.pdf](https://www.nature.com/authors/policies/ReportingSummary-flat.pdf)

Ecological, evolutionary & environmental sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	The effects of coral predator density on coral tissue loss was studied by manipulating densities of the snail <i>C. abbreviata</i> on brain coral colonies (<i>Diploria labyrinthiformis</i> and <i>Pseudodiploria strigosa</i>). We used 30 similarly-sized colonies and randomly assigned them to one of three treatments: full snail removal (0 snails per colony), average snail density (5 snails per colony), and natural-high snail density (10 snails per colony) (n=10). Treatments corresponded to the following densities based on coral colony size: full snail removal (0 snails per cm ² coral surface area), average density (32 snails per cm ² coral surface area), high density (16 snails per cm ² coral surface area). Treatments were randomly assigned and spatially distributed evenly throughout the experimental site.
Research sample	We selected the 30 coral colonies used in our study because they were located in the same experimental site and were already harboring the snail <i>C. abbreviata</i> , with an average 5.1 ± 2.6 (mean $\pm$ SD) snails per colony. This was important because we were not allowed (in accordance with the Florida Keys National Marine Sanctuaries permitting agency) to add predatory snails to corals that were not previously affected.
Sampling strategy	No sample size calculation was used. We used a sample size of 10 individual and independent coral colonies for each of 3 treatments. This sample size was determined based on the number of coral colonies of the same species that were available in the experimental site that (therefore) experienced the same environmental conditions to reduce variability. This sample size also allowed for enough replication within treatments.
Data collection	Data on the progression of coral tissue loss was collected every 2 weeks by measuring the distance from dead coral skeleton (where snails began, marked by small pins) to the current live tissue-dead skeleton margin (height) every 1 cm along the length of the feeding margin. Height measurements were averaged and multiplied by the measured length of the dead coral skeleton area above the pins to obtain the calculated area in cm ² . All measurements were taken using flexible rulers. For data on coral tissue bleaching and mortality, coral colonies were visually observed by a SCUBA diver and a percent surface area (of coral tissue) were estimated.
Timing and spatial scale	The coral predator density experiment ran from mid-June to mid-August 2014 and data were collected every 2 weeks. This sample timing scale was determined to ensure we had data collected in case of a large storm, as well as to track the progression of snail feeding and coral tissue loss. Data taken on coral bleaching severity occurred in October 2014 due to the timing of the warm temperature and bleaching event (late summer into early fall) so we obtained measurements at or just after the peak of the bleaching event. Data taken on coral tissue mortality after bleaching were obtained in November 2014 as this was the time when the warm temperature and bleaching event ended and we were able to assess coral recovery.
Data exclusions	Only one datum was excluded in one analysis in this paper (described in Line 101). This datum was excluded because the treatment values fell outside of 2 standard deviations for that treatment. However, all data points appear in all figures.
Reproducibility	This study was not repeated for verification of reproducibility due to the seasonal and unknown nature of warm temperature and coral bleaching events.
Randomization	Samples (e.g., coral colonies) were randomly assigned and spatially distributed to treatments throughout the experimental site.
Blinding	Investigators were not blinded to group/treatment allocation because treatments had to be "pressed" throughout the experiment. However, data collection was only obtained at the very end of the experiment.
Did the study involve field work?	☒ Yes ☐ No

Field work, collection and transport

Field conditions	Fieldwork was conducted from June - November 2014. Temperatures were steady on a daily basis and ranged from 27 degrees C to ~31.5 degrees C throughout the study.
Location	The study was conducted at Pickles Reef in the Florida Keys, FL, USA (N 24 59.170, W 80 24.940). The water depth was 7.5-9.5 meters across the experimental site.
Access and import/export	We did not collect samples during this experiment. To conduct our experiment in our study location, we used boats to access the site at Pickles Reef. We obtained the following permits to conduct our experiment with corals from the Florida Keys National Marine Sanctuary: FKNMS-2014-081 (obtained May 24, 2014) and FKNMS 2014-099 (obtained June 19, 2014).
Disturbance	All attempts were made to disturbance the sea floor as little as possible. No damage to living corals were made apart from the experimental treatments with predator additions.

Reporting for specific materials, systems and methods

Materials & experimental systems

n/a	Involvement in the study
☒	☐ Unique biological materials
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology
☐	☒ Animals and other organisms
☒	☐ Human research participants

Methods

n/a	Involvement in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Animals and other organisms

Policy information about [studies involving animals](#); [ARRIVE guidelines](#) recommended for reporting animal research

Laboratory animals

For laboratory animals, report species, strain, sex and age OR state that the study did not involve laboratory animals.

Wild animals

Caribbean coral colonies were studied through visual observations (surveys) for their species and number of coral predators inhabiting them, as well as through field experiments in which predatory snails were added to the base of living coral tissue. Dead coral skeleton was measured using rulers during this experiment. No samples were collected.

Field-collected samples

For laboratory work with field-collected samples, describe all relevant parameters such as housing, maintenance, temperature, photoperiod and end-of-experiment protocol OR state that the study did not involve samples collected from the field.