Benthic cover data from survey sites on Caribbean coral reefs, 2008-2012 (Sponge Chem Ecology project)

Website: https://www.bco-dmo.org/dataset/683464
Data Type: Other Field Results
Version: 1
Version Date: 2017-03-01

Project
» Chemical ecology of sponges on Caribbean coral reefs (Sponge Chem Ecology)

Contributors	Affiliation	Role
Pawlik, Joseph	University of North Carolina - Wilmington (UNC-Wilmington)	Principal Investigator
Loh, Tse-Lynn	University of North Carolina - Wilmington (UNC-Wilmington)	Scientist
Copley, Nancy	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
This dataset contains benthic cover survey results that were conducted on coral reefs at 69 sites from 12 countries across the Tropical Northwestern Atlantic (Caribbean) marine province from 2008 to 2012.

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Coverage

Spatial Extent: **N**:25.75527 **E**:-61.06267 **S**:9.24195 **W**:-87.43235
Temporal Extent: 2008-08-20 - 2012-07-08

Dataset Description

This dataset contains benthic cover survey results that were conducted on coral reefs at 69 sites from 12 countries across the Tropical Northwestern Atlantic (Caribbean) marine province from 2008 to 2012.

Related Reference (see full citations in Related Publications):
Loh, T.-L. and Pawlik, J.R. (2014). [Author's pdf: http://people.uncw.edu/pawlikj/2014PNASLoh.pdf]

Loh, T.-L., et al. (2015). This dataset appears as Suppl. Info. 'Benthic cover data for all survey sites'. (Excel spreadsheet).

Methods & Sampling

From Loh, T.-L., and Pawlik, J.R. (2014) PNAS. See paper for citations referred to below:
Study Sites. Surveys were conducted on coral reefs at 69 sites from 12 countries across the Tropical Northwestern Atlantic marine province (referred to herein as "Caribbean" for brevity) from 2008 to 2012. At

each location, sponge community data and fish densities were recorded at 3-11 geographically distinct sites (>2 km apart) by a team of three to four that only included personnel from among the same five surveyors to minimize interobserver subjectivity. Transect lines were laid out along a contiguous section of the reef at 10-20 m (except for the shallow reefs off Bocas del Toro, Panama, and two sites off Key Largo, FL, 2-7 m).

From Loh, T.-L., et al. (2015) PeerJ:
Benthic Cover. At the same sites where fish abundance was counted, benthic community surveys were carried out by evenly placing a 1 × 1 m quadrat 5 times along each 20 m transect line, with 5 replicate transect lines laid end-to-end at similar depth, and a gap of 5 m between each transect (total of 25 quadrats per survey site). The benthos under 25 points within each quadrat were classified into the following categories: reef-building coral, sponge, fire coral (Millepora sp. C Linnaeus, 1758), gorgonian, zoanthid, other benthos, bare rock or dead coral, rubble, sand, silt, macroalgae (all erect species, but primarily Dictyota JV Lamouroux, 1809; Halimeda JV Lamouroux, 1812; Lobophora J Agardh, 1894; and Microdictyon spp. Decaisne, 1841), turfs (including cyanobacterial mats), and coralline algae. A total of 625 points were recorded at each survey site (Table S1). Coral-sponge interactions were quantified within the same number of quadrats along the same transect lines. For all coral colonies with at least 50% of their surface areas within each quadrat, we counted coral colonies in 3 categories: (1) those having no contact with sponges, (2) those that were growing adjacent to and in contact with sponges, and (3) those that were overgrown by sponges such that sponge tissue was covering live coral tissue.

Data Processing Description

BCO-DMO Processing notes:
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- replaced spaces with underscores
- original dataset was joined with site data (location, site, lat, lon, depth, date)

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Data Files

File	
benthic_cover_joined.csv	(Comma Separated Values (.csv), 8.93 KB) MD5:b4942be899a07a0c84e05de1526bb16d
Primary data file for dataset ID 683464	

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Related Publications

Loh, T.-L., & Pawlik, J. R. (2014). Chemical defenses and resource trade-offs structure sponge communities on Caribbean coral reefs. Proceedings of the National Academy of Sciences, 111(11), 4151–4156. doi:10.1073/pnas.1321626111
Results

Loh, T.-L., McMurray, S. E., Henkel, T. P., Vicente, J., & Pawlik, J. R. (2015). Indirect effects of overfishing on Caribbean reefs: sponges overgrow reef-building corals. PeerJ, 3, e901. doi:10.7717/peerj.901
Results

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Related Datasets

IsRelatedTo

Pawlik, J., Loh, T. (2021) **Sponge community survey site descriptions on Caribbean coral reefs, 2008-2012 (Sponge Chem Ecology project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2017-03-01 doi:10.26008/1912/bco-dmo.683255.1 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
location	broad location of survey	unitless
site	more specific site of survey	unitless
site_id	site identifier	unitless
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees
depth_range	depth range of sampling site	meters
date_survey	date of survey formatted as yyyy-mm-dd	unitless
overfished_flag	whether the site was overfished or not	unitless
turf	the percent cover of turf	dimensionless
coralline_algae	the percent cover of coralline algae	dimensionless
fire_coral	the percent cover of fire coral	dimensionless
rock	the percent cover of rock	dimensionless
gorgonian	the percent cover of gorgonian	dimensionless
hard_coral	the percent cover of hard coral	dimensionless
macroalgae	the percent cover of macroalgae	dimensionless
other_benthos	the percent cover of other benthos	dimensionless

rubble	the percent cover of rubble	dimensionless
sand	the percent cover of sand	dimensionless
silt	the percent cover of silt	dimensionless
sponge	the percent cover of sponge	dimensionless
zoanthid	the percent cover of zoanthid	dimensionless

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Deployments

Pawlik_Caribbean

Website	https://www.bco-dmo.org/deployment/683263
Platform	Caribbean_Coral_Reefs
Start Date	2008-08-20
End Date	2012-07-08
Description	Benthic surveys

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Project Information

Chemical ecology of sponges on Caribbean coral reefs (Sponge Chem Ecology)

Website: http://people.uncw.edu/pawlikj/chemical.html

Coverage: Caribbean Sea

NSF Award Abstract:

Sponges are now the dominant habitat-forming animals on most Caribbean coral reefs. Unlike corals and some macroalgae, sponges have uncalcified skeletons, and are less prone to effects of ocean acidification. A recently published demographic study of the giant barrel sponge on the Florida Keys reefs showed population increases by ~40% between 2000 and 2006. This renewal project would investigate the chemical ecology of Caribbean reef sponges, a group whose taxonomy and secondary metabolites are well described. Some reef sponges produce chemical defenses, while others are subject to grazing by fish predators. The collective community is found over a large biogeographic area where variable anthropogenic impacts permit the testing of fundamental hypotheses about ecosystem function, indirect effects, and resource allocation.

Intellectual merits: Previous NSF-funded research has transformed understanding of Caribbean coral reef ecosystems. A survey of chemical, structural and nutritional anti-predatory defenses of over 70 species of Caribbean sponges, followed by field experiments using natural populations of reef fishes, resulted in the isolation and identification of deterrent compounds from over 15 species. A series of manipulative experiments clearly demonstrated that sponge-eating fishes limit sponge distributions, and that parrotfishes are major spongivores, thereby overturning conventional ideas about effects of sponge-eating fishes on reef

communities. Novel gel-based assays revealed differential allelopathic effects of sponge metabolites against other sponge and coral species. The ecosystem model for Caribbean reefs thus involves trophic and competitive interactions, predicting cascades and indirect effects known for other ecosystems.

Three primary objectives for testing the ecosystem model are to: (1) extend studies of top-down control of the sponge community. Guided by the World Resources Institute "Reefs at Risk" database, predictions and comparisons will be made of the community structure of sponges and their predators on overfished vs. well-protected reefs across sub-regions of the Caribbean. Parrotfish predation on sponges will be video recorded during food choice experiments on differently impacted reefs. Studies of allelopathic competitive interactions between sponges and corals (sponge metabolites on coral photosynthesis and bleaching) will continue using a modified gel-based field assay and diving-PAM fluorometry; (2) improve testing of the alternative hypothesis that bottom-up processes -- availability of picoplankton as food -- control reef communities. Predator-exclusion experiments will decouple effects of predation from sponge growth at picoplankton-rich and -poor, deep- and shallow-reef sites; (3) expand studies of sponge life history trade-offs in resource allocation between chemical defense, growth and reproduction. Differences in recruitment and succession will be examined among sponge communities of known age on artificial reef surfaces. This component builds on the recent discovery of sponge community succession on the deck of the Spiegel Grove shipwreck off Key Largo, FL, which strongly suggests a resource trade-off between chemical defenses and reproduction or growth.

Broader impacts: Renewal of this research program will provide (1) support and training for undergraduate and graduate students at a teaching-intensive, predominantly MS-level university (>68% of direct costs for student support), (2) collaboration between scientists and students from the US and abroad on three 2-week research cruises, (3) web-based outreach, including updated links on the demographics, bleaching, and chemical defenses of Caribbean sponges and further refinement of an easy-to-use photographic key to sponges of the Caribbean. Results of this project will be useful in judging the general applicability of chemical defense theories derived from studies of terrestrial ecosystems, while advancing understanding of the complex relationships between benthic invertebrates, their predators and their competitors in coral reef environments where the effects of global climate change and ocean acidification may be tipping the competitive balance toward non-calcifying organisms, such as sponges.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1029515

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