GPS location coordinates of Acanthaster individuals used in a tagging study in Viti Levu, Fiji from 2010-2012

Website: https://www.bco-dmo.org/dataset/705902
Data Type: Other Field Results
Version: 1
Version Date: 2017-06-23

Project
» Killer Seaweeds: Allelopathy against Fijian Corals (Killer Seaweeds)

Contributors	Affiliation	Role
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Abstract
GPS location coordinates of Acanthaster individuals used in a tagging study in Viti Levu, Fiji from 2010-2012

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Coverage

Spatial Extent: **N**:-18.1784 **E**:177.7277 **S**:-18.2267 **W**:177.6
Temporal Extent: 2013-06-03 - 2013-07-05

Dataset Description

GPS location coordinates of Acanthaster used in our tagging study.

Methods & Sampling

To test whether Acanthaster selectively migrated into the MPAs versus the fished areas, 120 adults of 36 ± 2 cm diameter (from the tips of opposite arms) were collected from the MPAs and adjacent fished areas of reefs flats near Votua, Vatu-o-lalai, and Namada villages, with 20 individuals collected from within and 20 from outside the MPAs at each village site (40 individuals village-1 site-1). Each individual was tagged with five plastic tag fasteners between the base of individual arms, and labeled flagging tape was attached to the end of each tag fastener to aid in location and identification. Individuals were then enclosed within cages located along the MPA border perpendicular to the coastline at each site (20 individuals border-1 location-1) for 48 h to allow for tag acclimation. Upon release, individuals' movements were monitored at 24 h intervals for four to eight days by physically locating each individual and recording its location via GPS (Garmin GPS 76CSX).

Data Processing Description

These are the raw GPS data.

BCO-DMO Data Processing Notes:

- reformatted the column names to comply with BCO-DMO standards
- replaced spaces with underscores
- replaced "N/A" with "nd"

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Data Files

File
acanthaster_GPS.csv (Comma Separated Values (.csv), 24.75 KB) MD5:21928c9bfea10284d0c19204ec5b5929 Primary data file for dataset ID 705902

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Related Publications

Clements, C. S., & Hay, M. E. (2017). Size matters: Predator outbreaks threaten foundation species in small Marine Protected Areas. PLOS ONE, 12(2), e0171569. doi:10.1371/journal.pone.0171569
General

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Parameters

Parameter	Description	Units
village	The village site where the data were collected on the Coral Coast of Viti Levu Fiji	unitless
border	The MPA border where individual sea stars were released and monitored.	unitless
acanthaster_ID	The identification number for individual sea stars released at each MPA border	unitless
date	The latitude of an individuals location	unitless
lat	The longitude of an individuals location	decimal degrees
lon	The data the location was recorded	decimal degrees

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Instruments

Dataset-specific Instrument Name	Garmin GPS 76CSX
Generic Instrument Name	GPS receiver
Dataset-specific Description	Used to monitor individuals' movements
Generic Instrument Description	Acquires satellite signals and tracks your location. This term has been deprecated. Use instead: https://www.bco-dmo.org/instrument/560

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Deployments

Fiji_2011

Website	https://www.bco-dmo.org/deployment/480730
Platform	Hay_GaTech
Start Date	2010-11-01
End Date	2012-01-01
Description	Studies for this deployment were conducted: November 2010 through February 2011 and between November 2011 and January 2012 on shallow (~1 m below the surface at low tide, equal or shallower than 2 m at high tide), intertidal fringing reefs platforms in Villages of Votua, Vatu-o-lalai and Namada, Coral Coast Viti Levu, Fiji. May–December 2011 on an approximately1.5-2.5 m deep reef flat within a no-take marine reserve at Votua Village, Viti Levu, Fiji.

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Project Information

Killer Seaweeds: Allelopathy against Fijian Corals (Killer Seaweeds)

Coverage: Viti Levu, Fiji (18º13.049’S, 177º42.968’E)

Extracted from the NSF award abstract:

Coral reefs are in dramatic global decline, with reefs commonly converting from species-rich and topographically-complex communities dominated by corals to species- poor and topographically-simplified communities dominated by seaweeds. These phase-shifts result in fundamental loss of ecosystem function. Despite debate about whether coral-to-algal transitions are commonly a primary cause, or simply a consequence, of coral mortality, rigorous field investigation of seaweed-coral competition has received limited attention. There is limited information on how the outcome of seaweed-coral competition varies among species or the relative importance of different competitive mechanisms in facilitating seaweed dominance. In an effort to address this topic, the PI will conduct field experiments in the tropical South Pacific (Fiji) to determine the effects of seaweeds on corals when in direct contact, which seaweeds are most damaging to corals, the role allelopathic lipids that are transferred via contact in producing these effects, the identity and surface concentrations of these metabolites, and the dynamic nature of seaweed metabolite production and coral response following contact. The herbivorous fishes most responsible for controlling allelopathic seaweeds will be identified, the roles of seaweed metabolites in allelopathy vs herbivore deterrence will be studied, and the potential for better managing and conserving critical reef herbivores so as to slow or reverse conversion of coral reef to seaweed meadows will be examined.

Preliminary results indicate that seaweeds may commonly damage corals via lipid- soluble allelochemicals. Such chemically-mediated interactions could kill or damage adult corals and produce the suppression of coral

fecundity and recruitment noted by previous investigators and could precipitate positive feedback mechanisms making reef recovery increasingly unlikely as seaweed abundance increases. Chemically-mediated seaweed-coral competition may play a critical role in the degradation of present-day coral reefs. Increasing information on which seaweeds are most aggressive to corals and which herbivores best limit these seaweeds may prove useful in better managing reefs to facilitate resilience and possible recovery despite threats of global-scale stresses. Fiji is well positioned to rapidly use findings from this project for better management of reef resources because it has already erected >260 MPAs, Fijian villagers have already bought-in to the value of MPAs, and the Fiji Locally-Managed Marine Area (FLMMA) Network is well organized to get information to villagers in a culturally sensitive and useful manner.

The broader impacts of this project are far reaching. The project provides training opportunities for 2-2.5 Ph.D students and 1 undergraduate student each year in the interdisciplinary areas of marine ecology, marine conservation, and marine chemical ecology. Findings from this project will be immediately integrated into classes at Ga Tech and made available throughout Fiji via a foundation and web site that have already set-up to support marine conservation efforts in Fiji and marine education efforts both within Fiji and internationally. Business and community leaders from Atlanta (via Rotary International Service efforts) have been recruited to help organize and fund community service and outreach projects in Fiji -- several of which are likely to involve marine conservation and education based in part on these efforts there. Media outlets (National Geographic, NPR, Animal Planet, Audubon Magazine, etc.) and local Rotary clubs will be used to better disseminate these discoveries to the public.

PUBLICATIONS PRODUCED AS A RESULT OF THIS RESEARCH

Rasher DB, Stout EP, Engel S, Kubanek J, and ME Hay. "Macroalgal terpenes function as allelopathic agents against reef corals", Proceedings of the National Academy of Sciences, v. 108, 2011, p. 17726.

Beattie AJ, ME Hay, B Magnusson, R de Nys, J Smeathers, JFV Vincent. "Ecology and bioprospecting," Austral Ecology, v.36, 2011, p. 341.

Rasher DB and ME Hay. "Seaweed allelopathy degrades the resilience and function of coral reefs," Communicative and Integrative Biology, v.3, 2010.

Hay ME, Rasher DB. "Corals in crisis," The Scientist, v.24, 2010, p. 42.

Hay ME and DB Rasher. "Coral reefs in crisis: reversing the biotic death spiral," Faculty 1000 Biology Reports 2010, v.2, 2010.

Rasher DB and ME Hay. "Chemically rich seaweeds poison corals when not controlled by herbivores", Proceedings of the National Academy of Sciences, v.107, 2010, p. 9683.

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Funding

Funding Source	Award
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