Coral health survey from the nearshore reefs in Guam during 2014 (Reef Resilience in Guam project)

Website: https://www.bco-dmo.org/dataset/639879
Data Type: Other Field Results
Version: 1
Version Date: 2021-01-28

Project
» Documenting bleaching susceptibility and resilience in Guam, Micronesia (Reef Resilience in Guam)

Contributors	Affiliation	Role
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Abstract
Coral health survey from the nearshore reefs in Guam during 2014.

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Coverage

Spatial Extent: **N**:13.54853 **E**:144.81 **S**:13.2464 **W**:144.63631
Temporal Extent: 2014-01-23 - 2014-05-07

Dataset Description

Coral health survey carried out along 10 m x 5 contiguous segments, Guam 2014.

Methods & Sampling

At each of 15 sites, a 50m transect was laid out along the depth contour. 10-m segments were processed, equating to (5) 10m transects per site. The beginning and end points of transects were marked underwater and the transects were revisited three times within one year. All colonies within each 10m x 1m belt transect were:
-identified to species
-binned into one of six size categories based on the maximum diameter
-examined for lesions, tissue loss, physical damage, based on Raymundo et al. (2008)
-the amount of colony affected (Low, Medium, High) was visually estimated

Data Processing Description

BCO-DMO Processing:
- added conventional header with dataset name, PI name, version date
- renamed parameters to BCO-DMO standard
- replaced spaces with underscores
- added site_code, lat and lon columns
- reformatted date from d-Mon-yy to yyyy-mm-dd
- replaced special characters: ? to _maybe
- replaced blank cells with 'nd' (no data)

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Data Files

File
coral_health.csv (Comma Separated Values (.csv), 93.98 KB) MD5:3553554cfde60f438ba0d749bf2f0171 Primary data file for dataset ID 639879

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Related Publications

Raymundo, L.J., C. Couch, Harvell, C.D. (eds.) (2008) A Coral Disease Handbook: Guidelines for Assessment, Monitoring and Management. Currie Press, Inc. 121 pp
General

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Related Datasets

IsRelatedTo

Kim, K., Baker, D. M., Raymundo, L. J. (2021) **Coral surveys from the nearshore reefs in Guam during 2014 (Reef Resilience in Guam project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2016-03-08 doi:10.26008/1912/bco-dmo.639899.1 [view at BCO-DMO]

IsSupplementedBy

Kim, K., Baker, D. M., Raymundo, L. J. (2021) **List of coral species with codes from nearshore reefs in Guam in 2014 (Reef Resilience in Guam project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2016-06-15 doi:10.26008/1912/bco-dmo.639865.1 [view at BCO-DMO]

Kim, K., Baker, D. M., Raymundo, L. J. (2021) **Visual substrate classification along transects from the nearshore reefs in Guam during 2014 (Reef Resilience in Guam project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 2) Version Date 2016-06-17 doi:10.26008/1912/bco-dmo.640007.2 [view at BCO-DMO]

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Parameters

Parameter	Description	Units
date	survey date	yyyy-mm-dd
site	survey location near Guam Island	unitless
site_code	site code	unitless
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees
data_recorder	initials of person recording data	unitless
taxon_code	taxonomic code of corals. See related dataset https://www.bco-dmo.org/dataset/639865	unitless
size_class	size class of diameter (meters) of colony: 1 = 1 - 10 m 2 = 11 - 30 m 3 = 31 - 60 m 4 = 60 - 100 m 5 = 101 - 200 m 6 = > 200 m	meters

health_impacts	health conditions noted on colony: AI = probably algal overgrowth; ALOG ALG = ALOG; algal overgrowth ALOG = fleshy algal overgrowth BARN = barnacle infestation BBD = black band disease BL = bleaching Blch = bleaching; BL BOAT SCRAPE = physical damage from contact with boat hull BRB = brown band disease Broken tips = physical damage from either fish bites or human contact; branch tips broken off CCA = crustose coralline algae overgrowth Compabr01 = unknown code notation COR = Coralliophila predation COTS = crown of thorns predation CTA = probably crown of thorns predation CYA = cyanobacteria overgrowth DAMS = DMS; damselfish territory DB, DL = unknown code notation DMS = damselfish territory Donut holes + General WC crashing = goby fish predation marks; GBPRED DRP = Drupella predation DRUP = Drupella predation? EF = EFI; endolithic fungal infection EHM = possibly EFI; endolitic fungi FF = unknown code notation GA = growth anomalies GA = Growth anomaly; already listed GBPRED = goby Predation GD = grey death overgrowth syndrom General rash = unknown code notation HPRED_maybe_0resheeting = healing predation; tissue re-sheeting MCS = mucous shedding PALE = slightly bleaching; BL PB = partial bleaching; BL PR = pigmentation response PRD, PRED = predation RF = red filamentous algae overgrowth RFTDP = probably red filamentous algae overgrowth SA = sand abrasion Scrapes = probably same as BOAT SCRAPE SEB = skeletal eroding band SH = unknown code notation SI = silt damage STL = subacute tissue loss TERP = erpios overgrowth TP = Terpios sponge overgrowth VERM = Vermetid snail boring WS = white syndrome	unitless
severity	Percent of colony affected by health impacts or relative severity (low, medium, high). If multiple impacts are listed, the impact of each is shown	unitless
comment	comments pertaining to survey	unitless

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Deployments

Guam_Reef_Surveys_2014

Website	https://www.bco-dmo.org/deployment/639854
Platform	shoreside Guam
Start Date	2014-01-15
End Date	2014-08-15
Description	Coral reef bleaching was surveyed/studied near Guam in 2014 as part of the project "Documenting bleaching susceptibility and resilience in Guam, Micronesia" (NSF OCE-1418673).

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Project Information

Documenting bleaching susceptibility and resilience in Guam, Micronesia (Reef Resilience in Guam)

Coverage: Nearshore waters of Guam (13.5000° N, 144.8000° E)

Note: This project is funded by an NSF RAPID award.

Description from NSF award abstract:
Coral reef ecosystems are experiencing unprecedented levels of environmental stress. Guam, Micronesia is currently experiencing an island-wide coral bleaching event unprecedented in recent decades. The available evidence suggests that the severity and extent of this event is linked to extended high sea surface temperature and a delay in the onset of the rainy season. Initial surveys of coral reefs around the island indicate that the impacts are broad in both geographic extent and the number of coral species affected. This project will support a quantitative examination of the patterns of mortality and recovery of corals from this event in the context of reef resilience, or their ability to recover. Specifically, the project will examine whether: (a) exposure differences between the east and west sides of the island result in differential recovery, and (b) do sites that showed lower bleaching severity during initial surveys show higher recovery post-bleaching? It is predicted that differential bleaching is due, in part, to genetic differences in both the coral host and its symbiotic algae and identifying unique host-symbiont combinations that are less sensitive to extreme temperature anomalies will be a primary goal of this project. These hypotheses and predictions will be addressed by returning to a select subset of reef sites over time by a rapid response team using survey methods as employed at the NSF funded Moorea Coral Reef Long Term Ecological Research (LTER) site which includes permanent transects and fixed quadrats, and computer software to document changes in the percent cover of corals over time. Additionally, long-term monitoring of tagged colonies in the genera Acropora and Pocillopora, specifically for their recovery, and for detailed genetic analyses to examine host and symbiont genetic diversity, will help determine which combinations of host-symbiont genotypes are exhibiting recovery versus mortality.

The proposed work will reveal which specific sites, environmental conditions, and genotypes are associated with resilience to coral bleaching and will allow establishment of a system whereby long-term recovery can be documented and also compared to the Moorea LTER data on coral reef resilience. Such data sets are rare or non-existent in Micronesia and the ability to identify resilient populations can provide information to help prioritize management efforts and evaluate the performance of existing marine parks and preserves.

Further description from PI:

Survey Methods: The investigators will address these hypotheses and predictions by returning to a select subset of sites visited by the rapid response team and using survey methods as employed at the Moorea Coral Reef LTER (i.e., http://mcr.lternet.edu). On each coast, the investigators will select reef sites that have shown high (n=2) and low (n=2) levels of bleaching for a total of 8 sites. At each of the sites, they will establish permanent transacts (five 10 m transects) with fixed quadrat (0.25 m2) locations (n=40 total) for quarterly photomonitoring (see Edmunds 2013). The investigators will also deploy temperature loggers along the

transects for the duration of the proposed study. Photographed quadrats will be analyzed using CPCe software as described in Adam et al (2011) to document changes in benthic cover.

To examine individual colony responses more closely, a subset of colonies from specific genera will be tagged at each site and re-assessed periodically for one year. At present, the investigators are considering *Acropora* spp and *Pocillopora* spp, as these are ecologically important, highly impacted by this event, and common to many of the sites being surveyed at present. The tagged colonies will be identified to species, and their health status documented: i.e., bleached, fully pigmented, re-sheeting, partial mortality, full mortality. The investigators will also look for signs of disease at the same time.

Genetic Analyses: The species selected above will be sampled for genetic analysis, to identify zooxanthellae clades present in each colony (see Gates 2011), examine host genetic diversity (e.g., Combosch & Voller 2011), and determine which combinations of host-symbiont genotypes are exhibiting recovery vs. mortality. As the event is coming to a close, and the investigators are already seeing mortality in certain species, they may be unable to sample certain highly susceptible colonies, but they will work under the assumption that surviving colonies represent the most resilient host-symbiont genotypes and certain colonies with partial mortality will allow sampling of remaining tissue.

The investigators will determine if there are associations between resilient genotypes and site-specific environmental conditions, obtaining secondary data on sea surface temperatures along the east vs. west coasts, rainfall, and wave height from NOAA and the National Weather Service. They will also document degree of exposure and distance to point sources of terrestrial inputs at each site.

Bibliography

Adam, T.C., Schmitt, R.J., Holbrook, S.J., Brooks, A.J., Edmunds, P.J., Carpenter, R.C., Bernardi, G., 2011. Herbivory, Connectivity, and Ecosystem Resilience: Response of a Coral Reef to a Large-Scale Perturbation. Plos One 6. DOI: 10.1371/journal.pone.0023717

Combosch, D.J., Vollmer, S.V., 2011. Population Genetics of an Ecosystem-Defining Reef Coral *Pocillopora damicornis* in the Tropical Eastern Pacific. Plos One 6. DOI: 10.1371/journal.pone.0021200

Edmunds, P of Moorea Coral Reef LTER. 2013. MCR LTER: Coral Reef: Long-term Population and Community Dynamics: Corals. knb-lter-mcr.4.29 (http://metacat.lternet.edu/knb/metacat/knb-lter-mcr.4.29/lter).

Gates, R of Moorea Coral Reef LTER. 2011. MCR LTER: Coral Reef: Population Dynamics: Time-series of *Symbiodinium* populations in corals of Moorea. knb-lter-mcr.15.11 (http://metacat.lternet.edu/knb/metacat/knb-lter-mcr.15.11/lter).

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1418673

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