

# Coral surveys from the nearshore reefs in Guam during 2014 (Reef Resilience in Guam project)

**Website:** <https://www.bco-dmo.org/dataset/639899>

**Data Type:** Other Field Results

**Version:** 1

**Version Date:** 2016-03-08

## Project

» [Documenting bleaching susceptibility and resilience in Guam, Micronesia](#) (Reef Resilience in Guam)

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## Abstract

Coral surveys from the nearshore reefs in Guam during 2014.

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## Coverage

**Spatial Extent:** N:13.54853 E:144.81 S:13.24061 W:144.63631

**Temporal Extent:** 2014-01-15 - 2014-08-15

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## Dataset Description

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

## Acquisition Description

At each of 15 sites, a 50m transect was laid out along the depth contour. Ten-meter segments were processed, equating to five 10m transects per site. The beginning and end points of transects were marked underwater and the transects were revisited three times within one year.

Colony monitoring was conducted along the same transects as the Coral Health and Line Intercept Substrate Surveys (see related datasets). A total of 20 colonies were tagged, photographed, measured, and visible health impacts, and % colony affected were determined (as described in Coral Health Surveys,

see below). Tagged colonies belonged to four common species identified as bleaching susceptible: *Acropora surculosa*, *A. abrotenoides*, *Pocillopora eydouxi* (now known as *P. grandis*) and *P. damicornis*. Colonies were assessed three times over one year.

## 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; replaced commas with semicolons
- replaced blank cells with 'nd' (no data)
- added site\_code, lat and lon columns
- reformatted date from d-Mon-yy to yyyy-mm-dd

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## Related Datasets

### IsSupplementedBy

Kim, K., Raymundo, L. J., Baker, D. M. (2016) **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 <http://lod.bco-dmo.org/id/dataset/639865> [[view at BCO-DMO](#)]

Kim, K., Raymundo, L. J., Baker, D. M. (2016) **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 1) Version Date 2016-06-17 <http://lod.bco-dmo.org/id/dataset/640007> [[view at BCO-DMO](#)]

### IsRelatedTo

Kim, K., Raymundo, L. J., Baker, D. M. (2021) **Coral health survey 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 2021-01-28 <http://lod.bco-dmo.org/id/dataset/639879> [[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
colony_id	individual colony identification number	unitless
species	taxonomic genus and species name	unitless
transect	transect number	unitless
colony_diam	maximum colony diameter	centimeters
health_impacts	health conditions noted on colony: ALOG; ALG; AI = fleshy algal overgrowth BARN = barnacle Infestation BBD = black band disease BL; Blch = bleaching BOAT SCRAPE; Scrapes = 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 COR = coralliophila predation COTS; CTA(?) = crown of thorns predation CYA = cyanobacteria overgrowth DAMS; DMS = damselfish territory DB = unknown DL = unknown DRP; DRUP = drupella predation EF; EFI; EHM = EFI; endolithic fungal infection FF = unknown GA = growth anomalies GBPRED; Donut holes + General WC crashing = goby fish predation marks; GBPRED GD = grey death overgrowth syndrom General rash = unknown HPRED_maybe_0resheeting = healing predation; tissue resheeting MCS = mucous shedding PALE = slightly bleaching; BL PB = partial bleaching; BL PR = pigmentation response PRD; PRED = yes; predation RF; RFTDP(?) = red filamentous algae overgrowth SA = sand abrasion SEB = skeletal eroding band SH = unknown SI = silt damage STL = subacute tissue loss TERP; TP = Terpios sponge overgrowth VERM = Vermetid snail boring WS = white syndrome	unitless
colony_affected_pcent	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
zone	reef zone: fore reef, reef flat, leeward reef patch, nearshore reef bench	unitless

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## Deployments

### Guam\_Reef\_Surveys\_2014

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/639854">https://www.bco-dmo.org/deployment/639854</a>
<b>Platform</b>	shoreside Guam
<b>Start Date</b>	2014-01-15
<b>End Date</b>	2014-08-15
<b>Description</b>	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 transects (five 10 m transects) with fixed quadrat (0.25 m<sup>2</sup>) 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*

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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](https://doi.org/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
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1418673</a>

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