

# Percent cover of benthic functional groups in the Phoenix Islands Protected Area (PIPA) from 2009, 2012, 2015, and 2018

**Website:** <https://www.bco-dmo.org/dataset/863410>

**Data Type:** Other Field Results

**Version:** 1

**Version Date:** 2022-01-11

## Project

» [Skeletal Records of Coral Reef Bleaching in the Central Equatorial Pacific](#) (Coral Bleaching Skeletal Records)

Contributors	Affiliation	Role
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## Abstract

This dataset includes percent cover of benthic functional groups in the Phoenix Islands Protected Area (PIPA). Percent cover of reef-building coral was quantified using photoquadrat transects conducted during 2009, 2012, 2015, and 2018 following standard Pacific coral reef monitoring protocols. Areas of study include: Phoenix Islands, Kiribati. Kanton Island (2.8 S, 171.6 W), Rawaki Island (3.7 S 170.7 W), Nikumaroro Island (4.7 S, 174.5 W), Orona Island (4.5 S, 172.2 W). These data were published in Fox et al., 2021 (DOI: 10.1029/2021GRL094128).

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## Coverage

**Spatial Extent:** N:-2.76065 E:-170.71316 S:-4.69979 W:-174.54745

**Temporal Extent:** 2002 - 2018

## Methods & Sampling

Percent cover of reef-building coral was quantified using photoquadrat transects conducted during 2009, 2012, 2015, and 2018 following standard Pacific coral reef monitoring protocols. Data from 2002 and 2005 were obtained from Obura and Mangubhai, 2011. These data were published in Fox et al. (2021).

## Data Processing Description

### Image/data processing:

There were 2 programs used over the different years. 2009-2015 were analyzed using Photogrid 1.0 and 2018

was analyzed with the more recent (but similar) software, Coralnet ([www.coralnet.ucsd.edu](http://www.coralnet.ucsd.edu)) using manual point identification. In both programs, data were generated using 100 randomly stratified points per image and all points were identified to the lowest possible taxonomic resolution.

### BCO-DMO Processing:

- Adjusted field/parameter names to comply with BCO-DMO naming conventions
- Added a conventional header with dataset name, PI names, version date
- Missing data identifier 'NA' replaced with 'nd' (BCO-DMO's default missing data identifier)

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## Data Files

File
<b>PIPA_benthic.csv</b> (Comma Separated Values (.csv), 7.23 KB) MD5:1f0c84e456322ef22cb57a92b27f651e
Primary data file for dataset ID 863410

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## Related Publications

Fox, M. D., Cohen, A. L., Rotjan, R. D., Mangubhai, S., Sandin, S. A., Smith, J. E., ... Obura, D. (2021). Increasing Coral Reef Resilience Through Successive Marine Heatwaves. *Geophysical Research Letters*, 48(17). doi:10.1029/2021gl094128 <https://doi.org/10.1029/2021GL094128>  
*Results*

Obura, D., & Mangubhai, S. (2011). Coral mortality associated with thermal fluctuations in the Phoenix Islands, 2002–2005. *Coral Reefs*, 30(3), 607–619. doi:[10.1007/s00338-011-0741-7](https://doi.org/10.1007/s00338-011-0741-7)  
*Methods*

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## Parameters

Parameter	Description	Units
Island	name of island	unitless
Year	survey year	unitless
Site	site name	unitless
Site_Num	site code	unitless
Latitude	latitude of site North	decimal degrees
Longitude	longitude of site East (West is negative)	decimal degrees
N_pics	number of images	unitless
Coral	percent coral cover	percent
SD_Coral	standard deviation of coral percent cover	percent
Notes	relevant information	unitless

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## Instruments

<b>Dataset-specific Instrument Name</b>	camera
<b>Generic Instrument Name</b>	Camera
<b>Generic Instrument Description</b>	All types of photographic equipment including stills, video, film and digital systems.

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## Project Information

### **Skeletal Records of Coral Reef Bleaching in the Central Equatorial Pacific (Coral Bleaching Skeletal Records)**

**Coverage:** Central Equatorial Pacific

#### *NSF Award Abstract:*

Ocean warming kills corals and efforts are underway to identify and protect coral reefs that may withstand the projected 21st century rise in tropical ocean temperatures. Coral reefs in the central equatorial Pacific (CEP) have been exposed to episodes of extreme warmth every 3-7 years for centuries, if not millennia, yet remain highly productive ecosystems. Initial data obtained by the investigator from stress signatures archived in the skeletons of long lived coral species, suggests that CEP reefs lose their symbiotic algae or bleach, sometimes severely, during warm episodes. The observation that CEP reefs bleach repetitively yet remain productive implies uncommon resilience to ocean warming. The investigator will use laboratory experiments and field observations to validate skeletal records of historical bleaching. A successful outcome will provide novel and valuable insights into the resilience of the CEP reefs and a new tool with which to identify thermally tolerant coral reef ecosystems across the tropics. Additionally, this project includes mentorship of a postdoc and six undergraduate or high school students, outreach through presentations and media, and expansion of publically available software for coral stress band analysis.

Ocean warming projections indicate severe impacts to coral reefs will occur on an annual basis within the next few decades. Consequently, a coordinated effort is underway to identify reefs that might survive these changes. The investigator will test the hypothesis that such reefs exist at the epicenter of influence of the El Niño-Southern Oscillation (ENSO), where strong inter-annual temperature variability creates conditions conducive for the development of thermal resilience. The project uses laboratory-based bleaching experiments and actual stress signatures accreted by wild corals during the 2015 El Niño to validate signatures of historical bleaching archived in the skeletons of massive reef building corals. In addition the investigator will use new, long cores from the CEP to build a robust dataset of historical bleaching back to the 1800's. A successful outcome will increase confidence in the interpretation of skeletal stress bands as quantitative bleaching proxies and enable the reconstruction of the history of coral reef bleaching and recovery in the CEP.

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## Funding

<b>Funding Source</b>	<b>Award</b>
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1737311</a>

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