

Organism counts from photo-transects collected during quantitative benthic surveys in Southwest Puerto Rico at 50 and 70 m during 2018 and 2019

Website: <https://www.bco-dmo.org/dataset/846964>

Data Type: Other Field Results

Version: 1

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Project

» [The impact of Hurricane Maria on the mesophotic reefs of southwest Puerto Rico](#) (Hurricane impacts on deep reefs)

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Abstract

Organism counts from photo-transects collected during quantitative benthic surveys in Southwest Puerto Rico at 50 and 70 m during 2018 and 2019.

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Coverage

Spatial Extent: N:17.8845 E:-67.0222 S:17.8755 W:-67.041

Temporal Extent: 2018-08-21 - 2019-10-31

Methods & Sampling

Location: Caribbean Sea, Southwest Puerto Rico, Lat. 17.8849 Long. -67.01546

Quantitative benthic surveys were made during 2018-2019 at two mesophotic sites El Hoyo (672.460 W, 1752.530 N) and Hole-in-the-Wall (671.330 W, 1753.070N). The two sites are located along the insular slope 11 km south of La Parguera, 44 km to the west. The benthic surveys followed the methodology in Appeldoorn et al. (2015). Diving operations involved a team of three technical divers using closed-circuit rebreathers. Dives

were made to target depths of 50 and 70 m at each site. Upon reaching the target depth, divers conducted a continuous high-resolution benthic phototranssect 10 m long by 40 cm wide. The photo-transect consisted of 16 sequential quadrat photographs, each 40 x 60 cm. For each 40 x 60 cm digital photograph, benthic taxa (e.g. algae and scleractinian corals) were recorded.

For each 40 x 60 cm digital photograph, percent cover was calculated by overlaying 100 random points using Coral Point Count with an Excel extension (CPCe) (Kohler and Gill 2006). Identifications associated with the random points were classified into 29 "taxa" that focused primarily on the algae and scleractinian corals as follows: corals (13 spp.), gorgonians, sponges, algae (12 taxa including cyanobacteria), sand and pavement.

Data Processing Description

BCO-DMO Data Manager Processing Notes:

- * Zip files containing 37 Excel files were unzipped, converted to csv and imported into the BCO-DMO data system. After communication with the submitter the files starting with "Copy of..." were not imported.
- * Columns for site latitude and longitude added from coordinates in the metadata.
- * Columns added to dataset from information in the file names (Site, Direction, Transect, Depth, Date). Inconsistencies between filename information and metadata written inside the files were discussed with the submitter.
- * Data reformatted from 16 Quadrat columns containing cover values to one column for Quadrat number and one column for Cover value (unpivot operation).
- * Statistics calculated below the data table in the Excel files were not imported when the data tables were imported into the BCO-DMO data system. Formulas calculating Total "Mean" and "Standard deviation" of cover for each quadrat were removed.
- * Some date values were corrected after communicating with the submitter and the format made consistent (in ISO 8601 format yyyy-mm-dd).
- * Redundant data from a source file Total_Hoyo_70m_W142_080219(1).xlsx removed from the dataset.
- * Montastrea faveolata in this dataset changed to the accepted synonym Orbicella faveolata which was already used in some files.

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Data Files

File
mesophotic_benthic_counts.csv (Comma Separated Values (.csv), 621.07 KB) MD5:45d0694aef5cea159058af8eba90fa5e
Primary data file for dataset ID 846964

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Related Publications

Appeldoorn, R., Ballantine, D., Bejarano, I., Carlo, M., Nemeth, M., Otero, E., ... Weil, E. (2015). Mesophotic coral ecosystems under anthropogenic stress: a case study at Ponce, Puerto Rico. Coral Reefs, 35(1), 63–75. doi:[10.1007/s00338-015-1360-5](https://doi.org/10.1007/s00338-015-1360-5)

Methods

Kohler, K. E., & Gill, S. M. (2006). Coral Point Count with Excel extensions (CPCe): A Visual Basic program for the determination of coral and substrate coverage using random point count methodology. Computers & Geosciences, 32(9), 1259–1269. doi:[10.1016/j.cageo.2005.11.009](https://doi.org/10.1016/j.cageo.2005.11.009)

Software

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Parameters

Parameter	Description	Units
Site	description	units
Direction	Description	unitless
Transect	Transect	unitless
Depth	Depth	Meters
Date	Date in ISO8601 format yyyy-mm-dd	unitless
Lat	Latitude for the general area of the site.	decimal degrees
Lon	Longitude for the general area of the site.	decimal degrees
Quadrat	Quadrat	unitless
Categories	Categories of substrate	unitless
Cover	Percentage of categories	Percent (%)

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Underwater Camera
Generic Instrument Description	All types of photographic equipment that may be deployed underwater including stills, video, film and digital systems.

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Project Information

The impact of Hurricane Maria on the mesophotic reefs of southwest Puerto Rico (Hurricane impacts on deep reefs)

Website: <http://www.schizaslab.com/nsf-rapid>

Coverage: Caribbean Sea, Southwest Puerto Rico, Lat. 17.8849 Long. -67.01546

NSF Award Abstract:

Major Hurricane Maria, on 20 September 2017, delivered a devastating blow to the island of Puerto Rico. Both terrestrial and marine ecosystems were heavily impacted. This powerful and rare weather event provides an opportunity to examine the effects of extreme physical forces on coral reefs. The research team will concentrate on the mesophotic reefs or "twilight zone reefs", which rival shallow water coral reefs in diversity and beauty. Mesophotic coral ecosystems are reefs found between 30 and 100 m depth, and are thought to serve as refugia for the declining shallow water coral reefs because they are further removed from anthropogenic and natural disturbances. Hurricane Maria is one of those rare, high-magnitude disturbance events that could affect even those deeper, mesophotic reefs. The investigators are positioned with pre-deployed oceanographic instruments and previously-collected ecological data to measure the effects of Hurricane Maria on the presumably sheltered, mesophotic reefs. The investigators will document the hurricane effects on the reef communities by comparing photographic data from pre-established transects at shallow and mesophotic reefs. Displaced corals will be used to test the capacity of extreme weather events to shape the population connectivity of key species. Radioisotope analysis will be used to identify the origin of sediments collected from the mesophotic reefs. The investigators will interpret all data described above in light of the physical conditions that were recorded before, during, and after the passage of Hurricane Maria. The project will involve the collaboration of an interdisciplinary team of five researchers and a graduate student from a Hispanic-serving Institution. The investigators will disseminate the results to Natural Resources Management Agencies and will use local media outlets and organize outreach events to inform local communities about the effects of hurricanes on coral reefs.

The landfall of major Hurricane Maria on the south coast of Puerto Rico provides a unique opportunity to examine its impacts on an insular shelf margin reef ecosystem (~25 to 70-80 m depth). The powerful weather system likely triggered major off-shelf transport of sediments, turbidity, terrigenous material and benthic organisms, affecting entire shelf margin benthic ecosystems. It also constitutes a unprecedented natural experiment where coral colonies were likely dislodged and transplanted to deeper areas, allowing to test various hypotheses related the deep refugia model and connectivity between shallow and mesophotic coral reefs. The investigators will assess the ecosystem stability that underlies the deep-reef refuge hypothesis of the insular-slope mesophotic reefs by: a) repeating high resolution photo-transects at pre-established sites at shallow and mesophotic stations, b) documenting the type and extent of displaced/damaged benthic taxa, c) examining the possibility of hurricane-assisted vertical connectivity through the displacement of shallow corals to deeper depths, d) measuring the potential recent input of terrigenous material to mesophotic depths by radioisotope analysis of sediment samples and, e) relating all the above observations to actual physical conditions, which were measured in situ before, during, and after Hurricane Maria.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1809878

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