Growth of Gorgonia ventalina from 2013-2019, St. John, US Virgin Islands

Website: https://www.bco-dmo.org/dataset/827897
Data Type: Other Field Results
Version: 1
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Project
» RUI-LTREB Renewal: Three decades of coral reef community dynamics in St. John, USVI: 2014-2019 (RUI-LTREB)

Contributors	Affiliation	Role
Edmunds, Peter J.	California State University Northridge (CSUN)	Principal Investigator
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Abstract
Growth of Gorgonia ventalina from 2013-2019, St. John, US Virgin Islands. These data are in support of Edmunds P.J., "High ecological resilience of the sea fan Gorgonia ventalina".

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Coverage

Spatial Extent: **N**:18.3153 **E**:-64.72187 **S**:18.31095 **W**:-64.7257
Temporal Extent: 2013 - 2019

Methods & Sampling

Taken from publication in PeerJ
The study focused on Gorgonia ventalina at Yawzi Point and Tektite within Great Lameshur Bay, and the research was completed under permits issued by the Virgin Islands National Park. These reefs have been monitored from 1987 to present, and the present analysis was superimposed on the same study areas. At each site, three permanent transects were installed in 1987, with each ~ 10 m long, parallel to one another, and ~ 5 m apart. Contiguous photoquadrats (1 × 1 m) have been recorded along each transect to quantify the cover of benthic taxa.

Starting in August 2013, colonies of G. ventalina ± 1 m of each transect were surveyed, with their sizes recorded as height. Each colony was mapped through Cartesian coordinates along each transect, and their height was recorded using a flexible tape measure (± 0.5 cm) as the linear distance from the holdfast to the highest distal portion of living tissue. Fans that were symmetrical or slightly imperfect in shape with small areas of mortality were easily measured, but fans that were torn and were affected by partial mortality (i.e., categorized as "ragged" fans) posed challenges for measurement. The size of ragged fans was recorded as their greatest height, which overestimated their size relative to the amount of G. ventalina tissue. Field logistics prevented finer resolution of tissue area (e.g., through photography, but separate analyses of photoquadrats were used to evaluate the abundance of ragged colonies in each year.

The surveys of G. ventalina were repeated annually in August from 2013 to 2019, and on each occasion colonies were mapped and their sizes recorded as above. Sizes and Cartesian coordinates were compared between consecutive years to identify colonies that were evaluated in both years, colonies that had died between years (lost from the reef or reduced to a horny axis without tissue), or small colonies that recruited between years.

Analyses
Mean densities of G. ventalina were compared among times using repeated measures ANOVA in which transects were repeatedly surveyed over time; a non-parametric Friedman test was used when statistical assumptions were not met. Mean colony sizes were compared over time using one-way ANOVA in which each colony was a replicate. The density of G. ventalina recruits was evaluated from colonies = 5 cm tall, and their densities and heights were compared over time as described above. Colonies were considered to have left the recruiting size class when they were > 5 cm tall. The percentage distribution of colonies among sizes classes over time was evaluated using size (height) classes of 10 cm, with the largest class including colonies between 60 and 100 cm tall. The distribution of colonies among size classes was tested for variation among years using chi-squared contingency tables. Growth was recorded as the change in height between consecutive years for colonies that were located in both years, and growth was compared over time using non-parametric Kruskal-Wallis (three or more groups) or Mann-Whitney U-Tests (two groups).
Density-associated effects were explored through analyses of the relationships between mean height and mean density for self-thinning, and between mean density of recruits and mean density of colonies > 5 cm tall, using transects as statistical replicates. Evidence for self-thinning would be revealed by an inverse relationship size and density, and a slope of the log size versus log density relationship of ~ 1.5. Evidence of density-associated recruitment would be revealed by a linear relationship between the density of recruits and larger colonies, and a linear relationship (either positive or negative) between per-capita recruitment and density of colonies > 5 cm tall. Per capita recruitment was calculated by dividing the density of recruits by the density of colonies > 5 cm tall.

Data Processing Description

BCO-DMO Processing Notes:
- data extracted to .csv from file "Edmunds - Gorgonia paper - sent to bco-dmo.zip/Data in Gorgonia Paper_21_Oct copy.xlsx", sheet "Growth".
- added conventional header with dataset name, PI name, version date
- modified parameter names to conform with BCO-DMO naming conventions
- joined the original table with latitude and longitude positions

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Data Files

File	
Gorgonia_growth.csv	(Comma Separated Values (.csv), 19.42 KB) MD5:2958764ab452136821cf860515de8e01
Primary data file for dataset ID 827897	

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Parameters

Parameter	Description	Units
site	Yawzi Point (9m depth) or Tektite (14 m depth)	unitless
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees
depth	water depth at site	meters
Period	year-long period over which growth was measured	unitless
height_initial	height at the start of the period	millimeters (mm)
height_final	height at the end of the period	millimeters (mm)

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Instruments

Dataset-specific Instrument Name	Optic Stowaway loggers and Hobo Aquapro loggers
Generic Instrument Name	Temperature Logger
Dataset-specific Description	Used to collect seawater temperature.
Generic Instrument Description	Records temperature data over a period of time.

Dataset-specific Instrument Name	Ryan Industries thermistor
Generic Instrument Name	Thermistor
Dataset-specific Description	Used to collect seawater temperature.
Generic Instrument Description	A thermistor is a type of resistor whose resistance varies significantly with temperature, more so than in standard resistors. The word is a portmanteau of thermal and resistor. Thermistors are widely used as inrush current limiters, temperature sensors, self-resetting overcurrent protectors, and self-regulating heating elements. Thermistors differ from resistance temperature detectors (RTD) in that the material used in a thermistor is generally a ceramic or polymer, while RTDs use pure metals. The temperature response is also different; RTDs are useful over larger temperature ranges, while thermistors typically achieve a higher precision within a limited temperature range, typically 90C to 130C.

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Project Information

RUI-LTREB Renewal: Three decades of coral reef community dynamics in St. John, USVI: 2014-2019 (RUI-LTREB)

Website: http://coralreefs.csun.edu/

Coverage: USVI

Describing how ecosystems like coral reefs are changing is at the forefront of efforts to evaluate the biological consequences of global climate change and ocean acidification. Coral reefs have become the poster child of

these efforts. Amid concern that they could become ecologically extinct within a century, describing what has been lost, what is left, and what is at risk, is of paramount importance. This project exploits an unrivalled legacy of information beginning in 1987 to evaluate the form in which reefs will persist, and the extent to which they will be able to resist further onslaughts of environmental challenges. This long-term project continues a 27-year study of Caribbean coral reefs. The diverse data collected will allow the investigators to determine the roles of local and global disturbances in reef degradation. The data will also reveal the structure and function of reefs in a future with more human disturbances, when corals may no longer dominate tropical reefs.

The broad societal impacts of this project include advancing understanding of an ecosystem that has long been held emblematic of the beauty, diversity, and delicacy of the biological world. Proposed research will expose new generations of undergraduate and graduate students to natural history and the quantitative assessment of the ways in which our planet is changing. This training will lead to a more profound understanding of contemporary ecology at the same time that it promotes excellence in STEM careers and supports technology infrastructure in the United States. Partnerships will be established between universities and high schools to bring university faculty and students in contact with k-12 educators and their students, allow teachers to carry out research in inspiring coral reef locations, and motivate children to pursue STEM careers. Open access to decades of legacy data will stimulate further research and teaching.

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Funding

Funding Source	Award
NSF Division of Environmental Biology (NSF DEB)	DEB-1350146
NSF Division of Ocean Sciences (NSF OCE)	OCE-1756678

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