Soft coral densities counted from photoquadrats collected on St. John, Virgin Islands from 1992-2012 (St. John LTREB project, VI Octocorals project)

Website: https://www.bco-dmo.org/dataset/562570
Version: 2015-08-20

Project
» LTREB Long-term coral reef community dynamics in St. John, USVI: 1987-2019 (St. John LTREB)
» Collaborative research: Ecology and functional biology of octocoral communities (VI Octocorals)

Contributors	Affiliation	Role
Edmunds, Peter J.	California State University Northridge (CSUN)	Principal Investigator
Lasker, Howard	State University of New York at Buffalo (SUNY Buffalo)	Co-Principal Investigator
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Coverage

Spatial Extent: **N**:18.31705 **E**:-64.72132 **S**:18.30702 **W**:-64.73152
Temporal Extent: 1992 - 2012

Dataset Description

Photoquadrats from St. John, USVI, were used to assess the abundance of soft corals from 6 sites on shallow reefs of St. John, USVI from 1992-2012.

Data used in Lenz et al., 2015

Original submitted excel file in data file section.

Methods & Sampling

From Lenz et al (2015) Coral Reefs:

For the local-scale (~5 km) analysis, octocoral densities were measured along the south shore of St. John, in

the Virgin Islands National Park (VINP) and Biosphere Reserve (Rogers and Teytaud 1988; Rogers et al. 2008).Within this area, coral reef community structure has been studied since the 1950s (Randall 1961; Collette and Earle 1972) and in a systematic manner since 1987 (Rogers et al.1991; Rogers and Beets 2001; Miller et al. 2006; Edmunds 2013). Six sites on shallow reefs (7-9 m depth) were selected between Cabritte Horn and White Point in 1992 (Fig. 2a, with sites restricted to hard substrata but otherwise identified based on randomly selected coordinates. These sites have been censused annually to measure the percent cover of macroalgae, scleractinians, and a combined category of crustose coralline algae, algal turf,and bare space (CTB; Edmunds 2013).

At each site, photoquadrats (0.25 m2) were recorded at random positions along a fixed transect each year, with 20-m transects and 17-20 photoquadrats site-1 between 1992 and 1999, and 40-m transects and 40 photoquadrats site-1 from 2000 to present (Edmunds 2002, 2013). Before 2000, photoquadrats were recorded with a NikonosTM V camera (fitted with a 28-mm lens, two Nikonos SB 105 strobes, and Kodachrome 64 film) mounted on a quadrapod that held the camera perpendicular to the seafloor (Edmunds 2002, 2013). In 2000, the method was upgraded to digital images using first a 3.3 megapixel camera (2000-2006, Nikon Coolpix 990) and then a 6.1 megapixel camera (2007-2012, Nikon D70). The camera framer remained unchanged throughout the sampling, and the images allowed objects C10 mm in diameter to be resolved. While photoquadrats from the six sites (archived at http://mcr.lternet.edu/vinp) have been recorded annually,photoquadrats in the present analysis were sampled at 2- to3-yr intervals: 1992, 1994, 1997, 1999, 2002, 2004, 2007,2009, and 2012 (n = 1630 images). Logistical constraints precluded analyzing the photoquadrats every year for octocoral abundance, and by subsampling every 2-3 yr, it was possible to effectively capture temporal trends in octocoral abundance. With this temporal resolution, we completed a coarse-grained analysis of changes over time in octocoral abundance at each site.

For each photoquadrat, octocoral colonies were counted based on the presence of their holdfasts within the framer. In some cases, other organisms, including large octocorals,obscured the holdfasts, or holdfasts were hidden in crevices. Most octocorals could not be distinguished to species in the photographs, in part because taxonomic identification requires inspection of sclerites, and therefore, analyses were constrained to genera [Antillogorgia spp. (formerly Pseudopterogorgia; Williams and Chen 2012), Briareum spp., Eunicea spp., Erythropodium spp., Gorgonia spp., Muricea spp., Muriceopsis spp., Plexaura spp., Plexaurella spp., Pseudoplexaura spp., and Pterogorgia spp.].Encrusting Erythropodium caribaeorum and the encrusting form of Briareum asbestinum were excluded from the analysis, which instead focused on arborescent octocoral(hereafter referenced as octocorals) that dominate octocoral communities in St. John. Of the eleven octocoral genera found on these shallow reefs, Eunicea spp., Plexaurella spp., Pseudoplexaura spp., and Plexaura spp. could not be distinguished from each other in the images when colonies were small (\12 cm tall), and therefore, members of these genera were categorized by their family (i.e., Plexauridae).

This retrospective analysis was augmented with in situ surveys in July and August 2013 that were used to quantify the accuracy and precision of the octocoral population census conducted using photoquadrats. Given the challenges of quantifying arborescent colonies in planar images, we did not expect perfect concordance between methods, but expected to detect a strong correlation between the approaches and quantify the underestimation associated with the photographic technique. To compare these census methods, octocorals at the six sites were censused with 0.25 m 217 -2 quadrats placed along the same40-m transect as was used for the photoquadrats (n = 40 site 219 -1). Photoquadrats were recorded, and in situ counts completed at each site within 5 d of each other. Quadrats for counts were placed at the same location where photoquadrats were recorded, but underwater logistics prevented perfect concordance between sampling areas. Densities of octocorals from the in situ counts and photoquadrats were tested for association and concordance (see Lenz et al, 2015) using site-specific means (n = 6).

Octocorals were also surveyed in 2012 and 2013 at Booby Rock, 1.3 km east of Cabritte Horn (Fig. 2a) where octocorals were very abundant (Fig. 1). Data from this site provided insight into the upper range of octocoral densities that occur along the south shore of St. John. At this location, octocorals were censused in situ using 20 quadrats (1.0 9 1.0 m) placed at random points along a 40-m transect running along the 7-9 m depth contour. As there were no historic data for Booby Rock, octocoral densities were not used in the contrast of octocoral abundances over time in St. John, although they were included in the regional-scale assessment.

Data Processing Description

BCO-DMO Processing Notes:

- original file: 'Lenzetal_CR_MetaDataSTJ2015 copy.xls'; sheet: 'St. John USVI'

- added conventional header with dataset name, PI name, version date
- renamed parameters to BCO-DMO standard
- replaced spaces with underscores
- reformatted data from columns to rows to conform with database practices
- added lat/lon columns

Version 2015-08-20: replaced W.Tektite lat/lon: from 18.312376/-64.722916 to 18.31137/-64.72280
Version 2015-07-17: original

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Data Files

File	
Lenzetal_CR_MetaDataSTJ2015_BCODMO_2015-07-15 filename: Lenzetal_CR_MetaDataSTJ2015_BCODMO_2015-07-15.xls	(Octet Stream, 217.00 KB) MD5:b95db7f49fd93fd69e4ab75b0083597e
Original excel file for dataset 562570,562595, 562618. File has also been reworked and put in the bco-dmo system.	
octocoral_densities.csv	(Comma Separated Values (.csv), 361.13 KB) MD5:8ee67bbf57ee0018d30a9b0a11c3c7b1
Primary data file for dataset ID 562570	

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Related Publications

Lenz, E. A., Bramanti, L., Lasker, H. R., & Edmunds, P. J. (2015). Long-term variation of octocoral populations in St. John, US Virgin Islands. Coral Reefs, 34(4), 1099–1109. doi:10.1007/s00338-015-1315-x
Results

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Related Datasets

IsRelatedTo

Edmunds, P. J., Lasker, H., Bramanti, L. (2015) **Soft coral counts from photoquadrats and in situ observations collected on St. John, Virgin Islands from 1992-2012 (St. John LTREB project, VI Octocorals project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 2015-08-20) Version Date 2015-08-20 http://lod.bco-dmo.org/id/dataset/562595 [view at BCO-DMO]
Relationship Description: Soft coral counts from photoquadrats and in situ observations collected on St. John, Virgin Islands from 1992-2012

Edmunds, P. J., Lasker, H., Bramanti, L. (2015) **Soft coral literature review on species observed in St. John, US Virgin Island from 1992-2012 (St. John LTREB project, VI Octocorals project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 2015-07-17) Version Date 2015-07-17 http://lod.bco-dmo.org/id/dataset/562618 [view at BCO-DMO]
Relationship Description: Soft coral literature review on species observed in St. John, US Virgin Island from 1992-2012

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Parameters

Parameter	Description	Units
group	type of octocoral	unitless
year	year of survey	yyyy
site	sampling location	unitless
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees
abundance	density of octocoral in quadrat	corals/m^2

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Instruments

Dataset-specific Instrument Name	camera
Generic Instrument Name	Camera
Dataset-specific Description	1992-1999: Nikonos V film camera using Kodachrome 64 film 2000-2006: Nikon Coolpix 990 - 3.3 megapixel digital camera 2007-2012: Nikon D70 - 6.1 megapixel digital camera The camera framer remained the same throughout the study.
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

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Deployments

Edmunds_VINP

Website	https://www.bco-dmo.org/deployment/523357
Platform	Virgin Islands National Park
Start Date	1987-01-01
End Date	2016-09-01
Description	Studies of corals and hermit crabs

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Project Information

LTREB Long-term coral reef community dynamics in St. John, USVI: 1987-2019 (St. John LTREB)

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

Coverage: St. John, U.S. Virgin Islands; California State University Northridge

Long Term Research in Environmental Biology (LTREB) in US Virgin Islands:

From the NSF award abstract:
In an era of growing human pressures on natural resources, there is a critical need to understand how major ecosystems will respond, the extent to which resource management can lessen the implications of these responses, and the likely state of these ecosystems in the future. Time-series analyses of community structure provide a vital tool in meeting these needs and promise a profound understanding of community change. This study focuses on coral reef ecosystems; an existing time-series analysis of the coral community structure on the reefs of St. John, US Virgin Islands, will be expanded to 27 years of continuous data in annual increments. Expansion of the core time-series data will be used to address five questions: (1) To what extent is the ecology at a small spatial scale (1-2 km) representative of regional scale events (10's of km)? (2) What are the effects of declining coral cover in modifying the genetic population structure of the coral host and its algal symbionts? (3) What are the roles of pre- versus post-settlement events in determining the population dynamics of small corals? (4) What role do physical forcing agents (other than temperature) play in driving the population dynamics of juvenile corals? and (5) How are populations of other, non-coral invertebrates responding to decadal-scale declines in coral cover? Ecological methods identical to those used over the last two decades will be supplemented by molecular genetic tools to understand the extent to which declining coral cover is affecting the genetic diversity of the corals remaining. An information management program will be implemented to create broad access by the scientific community to the entire data set.

The importance of this study lies in the extreme longevity of the data describing coral reefs in a unique ecological context, and the immense potential that these data possess for understanding both the patterns of comprehensive community change (i.e., involving corals, other invertebrates, and genetic diversity), and the processes driving them. Importantly, as this project is closely integrated with resource management within the VI National Park, as well as larger efforts to study coral reefs in the US through the NSF Moorea Coral Reef LTER, it has a strong potential to have scientific and management implications that extend further than the location of the study.

Collaborative research: Ecology and functional biology of octocoral communities (VI Octocorals)

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

Coverage: St. John, US Virgin Islands: 18.3185, 64.7242

The recent past has not been good for coral reefs, and journals have been filled with examples of declining coral cover, crashing fish populations, rising cover of macroalgae, and a future potentially filled with slime. However, reefs are more than the corals and fishes for which they are known best, and their biodiversity is affected strongly by other groups of organisms. The non-coral fauna of reefs is being neglected in the rush to evaluate the loss of corals and fishes, and this project will add on to an on-going long term ecological study by studying soft corals. This project will be focused on the ecology of soft corals on reefs in St. John, USVI to understand the Past, Present and the Future community structure of soft corals in a changing world. For the Past, the principal investigators will complete a retrospective analysis of octocoral abundance in St. John between 1992 and the present, as well as Caribbean-wide since the 1960's. For the Present, they will: (i) evaluate spatio-temporal changes between soft corals and corals, (ii) test for the role of competition with macroalgae and between soft corals and corals as processes driving the rising abundance of soft corals, and (iii) explore the role of soft corals as "animal forests" in modifying physical conditions beneath their canopy, thereby modulating recruitment dynamics. For the Future the project will conduct demographic analyses on key soft corals to evaluate annual variation in population processes and project populations into a future impacted by global climate change.

This project was funded to provide and independent "overlay" to the ongoing LTREB award (DEB-1350146, co-funded by OCE, PI Edmunds) focused on the long-term dynamics of coral reefs in St. John.

Note: This project is closely associated with the project "RAPID: Resilience of Caribbean octocorals following Hurricanes Irma and Maria". See: https://www.bco-dmo.org/project/749653.

The following publications and data resulted from this project:
2017 Tsounis, G., and P. J. Edmunds. Three decades of coral reef community dynamics in St. John, USVI: a contrast of scleractinians and octocorals. Ecosphere 8(1):e01646. DOI: 10.1002/ecs2.1646
Rainfall and temperature data
Coral and macroalgae abundance and distribution
Descriptions of hurricanes affecting St. John

2016 Gambrel, B. and Lasker, H.R. Marine Ecology Progress Series 546: 85–95, DOI: 10.3354/meps11670
Colony to colony interactions
Eunicea flexuosa interactions
Gorgonia ventalina asymmetry
Nearest neighbor surveys

2015 Lenz EA, Bramanti L, Lasker HR, Edmunds PJ. Long-term variation of octocoral populations in St. John, US Virgin Islands. Coral Reefs DOI 10.1007/s00338-015-1315-x
octocoral survey - densities
octocoral counts - photoquadrats vs. insitu survey
octocoral literature review
Download complete data for this publication (Excel file)

2015 Privitera-Johnson, K., et al., Density-associated recruitment in octocoral communities in St. John, US Virgin Islands, J.Exp. Mar. Biol. Ecol. DOI: 10.1016/j.jembe.2015.08.006
octocoral density dependence
Download complete data for this publication (Excel file)

Other datasets related to this project:
octocoral transects - adult colony height

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Funding

Funding Source	Award
NSF Division of Environmental Biology (NSF DEB)	DEB-0841441
NSF Division of Environmental Biology (NSF DEB)	DEB-0343570
NSF Division of Ocean Sciences (NSF OCE)	OCE-1332915
NSF Division of Ocean Sciences (NSF OCE)	OCE-1334052
NSF Division of Environmental Biology (NSF DEB)	DEB-1350146

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