Density of coral recruits on settlement tiles in St. John, US Virigin Islands between 2007 and 2020

Website: https://www.bco-dmo.org/dataset/854321
Data Type: Other Field Results
Version: 1
Version Date: 2021-06-23

Project
» RUI: Pattern and process in four decades of change on Caribbean reefs (St John Coral Reefs)

Contributors	Affiliation	Role
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Abstract
These data are presented in Figure 1 of Edmunds (2021) and are central to the goals of the paper, and refer to coral recruits found on settlement tiles (15 x 15 x 1 cm) in St. John, US Virgin Islands between 2007 and 2020.

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Coverage

Spatial Extent: **N**:18.317 **E**:-64.623 **S**:18.308 **W**:-64.731
Temporal Extent: 2007 - 2020

Methods & Sampling

Location: St. John, US Virgin Islands. 18.315°N, 64.716°W

Excerpt from publication Biology Letters

Recruitment

Coral settlement was measured using terracotta tiles (15 × 15 × 1 cm) that were individually attached to the reef at ~ 5-m depth at five sites, where the tiles were ~ 2–100 cm apart. The first tiles were deployed in August 2006, immersed for ~ 6 months, and then replaced in 1/2007, 8/2007, 1/2008, and 8/2008. Thereafter, tiles were immersed for ~12 months and replaced in July/August. Ten tiles site-1 were deployed in the first year, with 15 tiles site-1 thereafter. Tiles were seasoned in seawater for 6–12 months before installation, and were attached horizontally with a ~1 cm gap beneath.

Freshly collected tiles were bleached, dried, and inspected for coral recruits at 40 x magnification. Corals were identified to family, and expressed as corals tile-1 (combined surfaces) for all corals (i.e., pooled taxa), Poritidae, Faviidae, Agaricidae, Siderastreidae, Acroporidae, and unidentified. Since tiles were immersed for ~ 6 months over the first 2 y, mean settlement by deployments was summed within year by site, which precluded calculating within-site variability. Tiles were independent in the 12 months deployments, and means (± s.e.)

were calculated by year with sites as replicates (n = 5).

Site List:

Cabritte Horn,18.308,-64.722
West Tektite,18.312,-64.623
Yawzi Point,18.315,-64.726
West Little Lameshur,18.317,-64.728
White Point,18.314,-64.731

Data Processing Description

SYSTAT version 13.0, from Systat Software, Inc., San Jose California USA.

BCO-DMO Data Manager Processing Notes:
* Data table imported into the BCO-DMO data system from source file "Data in Paper 25 May 2021_Table 1.xlsx" Sheet name "Table 1."
* Modified parameter (column) names to conform with BCO-DMO naming conventions (only A-Z,a-z,0-9 and underscores. No spaces).

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Data Files

File
table1_recruit_density.csv (Comma Separated Values (.csv), 15.32 KB) MD5:0dc3e0685b1e6fd832d79234ec68fa5f Primary data file for dataset ID 854321

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Related Publications

Edmunds, P. J. (2021). Recruitment hotspots and bottlenecks mediate the distribution of corals on a Caribbean reef. Biology Letters, 17(7), 20210149. doi:10.1098/rsbl.2021.0149
Results

Systat Software, Inc. (n.d.). SYSTAT - Powerful Statistical Analysis and Graphics Software Available from https://systatsoftware.com/products/systat/.
Software

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Related Datasets

IsRelatedTo

Edmunds, P. J. (2021) **Density of juvenile corals on reef surfaces in St. John, US Virgin Islands from 1994 to 2020.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-06-23 doi:10.26008/1912/bco-dmo.854417.1 [view at BCO-DMO]
Relationship Description: Data from the same location also published in Edmunds (2021).

Edmunds, P. J. (2021) **Juvenile Porites along transects in St. John, US Virigin Islands between 1994 and 2020.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-06-23 doi:10.26008/1912/bco-dmo.854447.1 [view at BCO-DMO]
Relationship Description: Data from the same location also published in Edmunds (2021).

Edmunds, P. J. (2021) **Survival of juvenile corals in St. John, US Virigin Islands, annual mortality from 1996 to 2020.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-06-23 doi:10.26008/1912/bco-dmo.854455.1 [view at BCO-DMO]
Relationship Description: Data from the same location also published in Edmunds (2021).

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Parameters

Parameter	Description	Units
Site	site at which the recruits were measured: White Point, Little Lameshur Bay, Yawzi Point, West Tektite, Cabritte Horn (See Fig. 1A in Edmunds (2021))	unitless
Year	Year of brecovery of settlement tiles in July/August (see thods for departures from this time for 2007 and 2008). Year in format yyyy.	unitless
Family	Family of coral recruits scored on tiles: Poritidae, Agaricidae, Faviidae, Siderastreidae, Acroporidae, or unidentified. The sum of the six groups gives All Corals" (as in Fig. 1B in Edmunds (2021))."	unitless
Recruits_per_tile	Number pf recruits (top + bottom + sides of tiles) at sites	number per tile

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Project Information

RUI: Pattern and process in four decades of change on Caribbean reefs (St John Coral Reefs)

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

Coverage: United States Virgin Islands, St. John: 18.318, -64.7253

NSF Award Abstract:
The coral reef crisis refers to the high rates of death affecting tropical reef-building corals throughout the world, and the strong likelihood that coral reefs will become functionally extinct within the current century. Knowledge of these trends comes from the monitoring of coral reefs to evaluate their health over time, with the most informative projects providing high-resolution information extending over decades. Such projects describe both how reefs are changing, and answer questions addressing the causes of the changes and the form in which reefs will persist in the future. This project focuses on coral reefs in United States waters, specifically around St. John in the US Virgin Islands. These reefs are protected within the Virgin Islands National Park, and have been studied more consistently and in greater detail than most reefs anywhere in the world. Building from 33 years of research, this project extends monitoring of these habitats by another five years, and uses the emerging base of knowledge, and the biological laboratory created by the reefs of St. John, to address the causes and consequences of the bottleneck preventing baby corals from repopulating the reefs. The work is accomplished with annual expeditions, staffed by faculty, graduate students, undergraduates, and teachers, coupled with analyses of samples at California State University, Northridge, and Florida State University, Tallahassee. The students and teachers assist with the research goals at the center of this project, but also engage in independent study and integrate with the rich and diverse societal context and natural history of the Caribbean. The scope of the science agenda extends to schools in California, where students are introduced to the roles played by marine animals in ecosystem health, concepts of long-term change in the biological world, and the role of science engagement in promoting positive environmental outcomes. In addition to generating a wide spectrum of project deliverables focusing on scientific discovery, the project promotes

STEM careers and train globally aware scientists and educators capable of supporting the science agenda of the United States in the 21st Century.

This project leverages one of the longest time-series analyses of Caribbean coral reefs to extend the time-series from 33 to 38 years, and it tests hypotheses addressing the causes and consequences of changing coral reef community structure. The project focuses on reefs within the Virgin Islands National Park (VINP) and along the shore of St. John, US Virgin Islands, and is integrated with stakeholders working in conservation (VINP) and local academia (University of the Virgin Islands). Beginning in 1987, the project has addressed detail-oriented analyses within a small spatial area that complements the large-scale analyses conducted by the VINP. The results of these efforts create an unrivaled context within which ecologically relevant hypotheses can be tested to elucidate mechanisms driving ecological change. Building from image- and survey- based analyses, 33 years of data reveal the extent to which these reefs have transitioned to a low-abundance coral state, and the importance of the bottleneck preventing coral recruits from contributing to adult size classes. The intellectual merits of this project leverage these discoveries to address eight hypotheses: (H1) long-term changes are defining a cryptic regime change, with the low coral abundance reinforced by, (H2) enhanced community resilience, (H3) low post-settlement success, (H4) negative effects of peyssonnelid algal crusts (PAC) on juvenile corals, (H5) inability of juvenile corals to match their phenotypes to future conditions, (H6) impaired population growth caused by reduced genetic diversity, (H7) the premium placed on PAC-free halos around Diadema sea urchins for coral recruitment, and (H8) biotic homogenization occurring on a landscape-scale.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

Related Projects:

- Affiliated with MCR-LTER - https://www.bco-dmo.org/project/2222
- Serves as a new project that builds on NSF DEB-1350146 - RUI-LTREB Renewal: Three decades of coral reef community dynamics in St. John, USVI: 2014-2019 - https://www.bco-dmo.org/project/734983
- Overlaps with OCE 17-56678 (which focuses on soft corals with H. Lasker) - Collaborative Research: Pattern and process in the abundance and recruitment of Caribbean octocorals - https://www.bco-dmo.org/project/752508
- LTREB Long-term coral reef community dynamics in St. John, USVI: 1987-2019 - https://www.bco-dmo.org/project/2272
- RUI: Pattern and process in four decades of change on Caribbean reefs - https://www.bco-dmo.org/project/835192
- RAPID: Hurricane Irma: Effects of repeated severe storms on shallow Caribbean reefs and their changing ecological resilience - https://www.bco-dmo.org/project/722163

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-2019992

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