Edmunds Ecosphere 2019: vital rates over time

Website: https://www.bco-dmo.org/dataset/794014
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Project
» RAPID: Hurricane Irma: Effects of repeated severe storms on shallow Caribbean reefs and their changing ecological resilience (Hurricane Irma and St. John Reefs)

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Related Publications

Edmunds, P. J. (2019). The demography of hurricane effects on two coral populations differing in dynamics. Ecosphere, 10(9). doi:10.1002/ecs2.2836
Results

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Parameters

Parameters for this dataset have not yet been identified

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	Camera
Dataset-specific Description	Nikonos V camera fitted with Kodachrome 64 film prior to 2000, and digital cameras thereafter, with the resolution changing from 3.34 MP to 36.3 MP (2017 onwards).
Generic Instrument Description	All types of photographic equipment including stills, video, film and digital systems.

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Project Information

RAPID: Hurricane Irma: Effects of repeated severe storms on shallow Caribbean reefs and their changing ecological resilience (Hurricane Irma and St. John Reefs)

Website: http://coralreefs.csun.edu

Coverage: St. John, US Virgin Islands

Coral reefs have long been recognized for their diversity, and unique functional roles, but these features have been undermined by decades of disturbances that cast doubt on their ability to survive. Against this backdrop, 2017 brought two hurricanes of unprecedented magnitude to the Caribbean, both of which damaged coral reefs that already were degraded compared to those of a few decades ago. While the impacts of these storms on some of the few coral reefs protected within the US National Park and National Monument systems is particularly unfortunate, it also creates unique opportunities to understand the impacts on coral reefs that have been studied in detail for decades. This project builds on these opportunities by leveraging 31 years of coral reef monitoring research, much of which has been supported by NSF, to describe the impacts of Hurricanes Irma and Maria on coral reefs in St. John, US Virgin Islands. That the analyses will reveal severe destruction is a forgone conclusion, but what remains unknown is how present-day reefs will respond to severe versions of a well-known disturbance (hurricanes), and how these effects will impact their long-term survival. Post-storm surveys and new analyses will be used to determine whether ongoing declines in coral abundance have influenced the way coral reefs respond to storms, notably to enhance post-storm mortality, and reduce the capacity to recover from such event. To achieve these outcomes, a team of researchers from California State University, Northridge, will use a cruise on the R/V Walton Smith to survey the reefs of St. John using photography and in-water counts to generate data that will be analyzed throughout 2018. The benefits of this research will extend beyond scientific discoveries to include leveraged support for other scientists participating in the cruise, evaluation of the status of natural resources in the VI National Park, the delivery of relief supplies from Miami to St. John, and the creation of unique research and training opportunities for graduate students who will participate in all phases of the project.

Coral reefs have undergone dramatic changes in community structure since they were first described in the 1950's, and the current onslaught of threats from rising temperature, declining seawater pH, storms, and numerous other events has cast doubt on their persistence in the Athropocene. With such profound changes underway, time-series analyses of community structure are on the cutting edge of contemporary studies of coral reefs. In the Caribbean, the impact of two category 5 hurricanes underscores why time-series are important, as they are the only means to describe the impact of such events, and critically, create the context for testing hypotheses regarding impacts and consequences of disturbances. This project addresses the impacts of Hurricanes Irma and Maria on the coral reefs of St. John, US Virgin Islands, which have been studied since the 1950's, and for the last 31 years largely with NSF LTREB support. This support provides descriptions of the population dynamics of the important coral, Orbicella annularis, and the coral community dynamics in adjacent habitats. Any study of the effects of these storms will demonstrate that large waves kill corals, but here intellectual merit is acquired through testing of general hypotheses: (1) storm impacts on O. annularis will be colony-density dependent, (2) delayed coral mortality will be accentuated compared to previous storms, (3) the resilience of coral communities to physical disturbances has declined since 1989, and (4) evolutionary rescue will mediate reef recovery for select corals through large initial population sizes, density-dependent population growth, and recruitment. These hypotheses will be tested using a 14 day cruise on the R/V Walton Smith to collect critical time-sensitive data, followed by a year of analysis of new and legacy photographic data.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1801335

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