Acropora cervicornis growth rates under different pH and temperature treatments from experiments at Summerland Key, Florida in September of 2016

Website: https://www.bco-dmo.org/dataset/712367
Data Type: experimental
Version: 1
Version Date: 2017-08-08

Project
» CAREER: Applying phenotypic variability to identify resilient Acropora cervicornis genotypes in the Florida Keys (Resilient Acerv)

Contributors	Affiliation	Role
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Abstract
This dataset contains Acropora cervicornis buoyant weight measurements from different pH and temperature treatments. The experiments were conducted in tanks at Summerland Key, Florida (24.6616,-81.4538) with corals from a nursery located near Looe Key Reef (24.5636, -81.2786). Experiments were conducted from July to September of 2016.

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Coverage

Spatial Extent: **N**:24.661603 **E**:-81.2786 **S**:24.5636 **W**:-81.453789
Temporal Extent: 2016-06 - 2016-09

Dataset Description

This dataset contains Acropora cervicornis buoyant weight measurements from different pH and temperature treatments. The experiments were conducted in tanks at Summerland Key, Florida (24.6616,-81.4538) with corals from a nursery located near Looe Key Reef (24.5636, -81.2786). Experiments were conducted from July to September of 2016.

Methods & Sampling

A 5 gallon aquaria was filled with treatment water conditions and an analytical balance was suspended over the aquaria using a solid wooden board with a hole cut through the middle. Corals were placed on a suspended structure that was attached underneath an analytical balance and held until the total buoyant weight was stable. The data was recorded each month for each fragment. Photographs were also taken to determine the surface area of the coral using ImageJ analysis.

Data Processing Description

No data processing has taken place.

BCO-DMO Data Manager Processing Notes:
* added a conventional header with dataset name, PI name, version date
* modified parameter names to conform with BCO-DMO naming conventions
* rounded mass values to three decimal places
* periods in variable names changed to underscores

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Data Files

File
weight.csv (Comma Separated Values (.csv), 8.57 KB) MD5:3c74026aba41e08f80d95727a7e73a1e Primary data file for dataset ID 712367

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Parameters

Parameter	Description	Units
tank	Tank number that held the particular coral fragment	unitless
pH	Treatment pH level; ambient = 8.1 pH; hCO2 = 7.7 pH	unitless
Temp	Treatment temperature level	Celsius
genotype	Genotype number of the coral animal for each fragment	unitless
July_mass	Buoyant weight of the coral fragment in July 2016	grams
August_mass	Buoyant weight of the coral fragment in August 2016	grams
September_mass	Buoyant weight of the coral fragment in September 2016	grams

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Instruments

Dataset-specific Instrument Name	Mettler Toledo SevenGo Pro
Generic Instrument Name	pH Sensor
Generic Instrument Description	An instrument that measures the hydrogen ion activity in solutions. The overall concentration of hydrogen ions is inversely related to its pH. The pH scale ranges from 0 to 14 and indicates whether acidic (more H+) or basic (less H+).

Dataset-specific Instrument Name	YSI Pro 2030
Generic Instrument Name	YSI Professional Plus Multi-Parameter Probe
Dataset-specific Description	temperature measured with YSI Pro 2030
Generic Instrument Description	The YSI Professional Plus handheld multiparameter meter provides for the measurement of a variety of combinations for dissolved oxygen, conductivity, specific conductance, salinity, resistivity, total dissolved solids (TDS), pH, ORP, pH/ORP combination, ammonium (ammonia), nitrate, chloride and temperature. More information from the manufacturer.

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Deployments

Muller_Looe_Key_Reef_Acropora

Website	https://www.bco-dmo.org/deployment/716319
Platform	Mote Offshore Coral Nursery
Start Date	2016-07-01
End Date	2017-09-30
Description	approximate dates of coral sample collection

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Project Information

CAREER: Applying phenotypic variability to identify resilient Acropora cervicornis genotypes in the Florida Keys (Resilient Acerv)

Coverage: Florida Keys, Summerland Key, FL 24.563595°, -81.278572°

NSF Award Abstract:
Caribbean staghorn coral was one of the most common corals within reefs of the Florida Keys several decades ago. Over the last 40 years disease, bleaching, overfishing and habitat degradation caused a 95% reduction of the population. Staghorn coral is now listed as threatened under the U.S. Endangered Species Act of 1973. Within the past few years, millions of dollars have been invested for the purpose of restoring the population of

staghorn coral within Florida and the U.S. Virgin Islands. Significant effort has been placed on maintaining and propagating corals of known genotypes within coral nurseries for the purpose of outplanting. However, little is known about the individual genotypes that are currently being outplanted from nurseries onto coral reefs. Are the genotypes being used for outplanting resilient enough to survive the three major stressors affecting the population in the Florida Keys: disease, high water temperatures, and ocean acidification? The research within the present study will be the first step in answering this critically important question. The funded project will additionally develop a research-based afterschool program with K-12 students in the Florida Keys and U.S. Virgin Islands that emphasizes an inquiry-based curriculum, STEM research activities, and peer-to-peer mentoring. The information from the present study will help scientists predict the likelihood of species persistence within the lower Florida Keys under future climate-change and ocean-acidification scenarios. Results of this research will also help guide restoration efforts throughout Florida and the Caribbean, and lead to more informative, science-based restoration activities.

Acropora cervicornis dominated shallow-water reefs within the Florida Keys for at least the last half a million years, but the population has recently declined due to multiple stressors. Understanding the current population level of resilience to three major threats - disease outbreaks, high water temperatures, and ocean acidification conditions - is critical for the preservation of this threatened species. Results from the present study will answer the primary research question: will representative genotypes from the lower Florida Keys provide enough phenotypic variation for this threatened species to survive in the future? The present proposal will couple controlled laboratory challenge experiments with field data and modeling applications, and collaborate with local educators to fulfill five objectives: 1) identify *A. cervicornis* genotypes resistant to disease, 2) identify *A. cervicornis* genotypes resilient to high water temperature and ocean acidification conditions, 3) quantify how high water temperature and ocean acidification conditions impact disease dynamics on *A. cervicornis*; 4) determine tradeoffs in life-history traits because of resilience factors; and 5) apply a trait-based model, which will predict genotypic structure of a population under different environmental scenarios.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1452538

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