Aquaria water quality pH and dissolved oxygen measurements from full factorial study of Acropora cervicornis at Mote Marine Laboratory in Nov-Dec 2019

Website: https://www.bco-dmo.org/dataset/873433
Data Type: Other Field Results, experimental
Version: 1
Version Date: 2022-04-22

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
** Please write an abstract to include here ** Water quality pH and dissolved oxygen were monitored as part of a full factorial experiment to determine the survival probability and photochemical efficiency of 25 unique genotypes of Acropora cervicornis in November and December 2019 at Mote Marine Laboratory.

Table of Contents

- Coverage
- Dataset Description
  - Methods & Sampling
- Related Datasets
- Parameters
- Instruments
- Project Information
- Funding

Coverage

Spatial Extent: **Lat**:24.6616 **Lon**:-81.4541
Temporal Extent: 2019-11-26 - 2019-12-05

Methods & Sampling

Water quality was monitored as part of a full factorial experiment to determine the survival probability and photochemical efficiency of 25 unique genotypes of *Acropora cervicornis* in November and December 2019. Coral fragments of *A. cervicornis* were exposed to high temperatures and/or high *p*CO2 treatments in flow-through tanks at Mote Marine Laboratory.

During the exposure period, water quality for each tank was measured daily and color index of the coral fragments was assessed. Treatment tank water quality was monitored using a YSI Professional Plus (Pro Plus) Multi-parameter handheld with a quarto containing a Pro Series Galvanic Dissolved Oxygen Sensor, a Pro Series pH Sensor (calibrated using 4, 7, and 10 buffers), Pro Series temperature and conductivity sensor. The coral health chart/ color index card was provided by CoralWatch.

Details on additional water quality measurements can be found in these datasets:

- Acer Aquaria water quality PAR, https://www.bco-dmo.org/dataset/873446
- Acer Aquaria water quality TA, DIC, and CO2, https://www.bco-dmo.org/dataset/873459

[table of contents | back to top]

Related Datasets

IsContinuedBy

Muller, E. M., Petrik, C. (2022) **Aquaria water quality PAR measurements from full factorial study of Acropora cervicornis at Mote Marine Laboratory in Nov-Dec 2019.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2022-04-22 http://lod.bco-dmo.org/id/dataset/873446 [view at BCO-DMO]
Relationship Description: First of three datasets on aquaria water quality from full-factorial study of Acropora cervicornis

Muller, E. M., Petrik, C. (2022) **Aquaria water quality total alkalinity, DIC, and CO2 measurements from full factorial study of Acropora cervicornis at Mote Marine Laboratory in Nov-Dec 2019.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2022-04-22 http://lod.bco-dmo.org/id/dataset/873459 [view at BCO-DMO]
Relationship Description: Third of three aquaria water quality datasets from full-factorial study of Acropora cervicornis

IsSupplementTo

Muller, E. M., Petrik, C. (2022) **Temperature and pCO2 effects on survivability of 25 genotypes of Acropora cervicornis coral at Mote Marine Laboratory in Nov-Dec 2019.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2022-03-18 http://lod.bco-dmo.org/id/dataset/871765 [view at BCO-DMO]
Relationship Description: Full-factorial study to which the aquaria water quality data relates

[table of contents | back to top]

Parameters

Parameter	Description	Units
Date	Date of measurement	unitless
Latitude	Latitude	decimal degrees
Longitude	Longitude	decimal degrees
Tank	Tank number	unitless
Temperature	Temperature of tank water	degrees Celsius
DO_percent	Percent saturation of dissolved oxygen	percent (%)
Dissolved_oxygen	Dissolved oxygen concentration in weight per volume	milligrams per liter (mg/L)
pH	pH in NBS scale units	unitless
Treatment_Temp	Temperature treatment conditions (Ambient or High)	unitless
Treatment_pCO2	pCO2 treatment conditions (Ambient or High)	unitless

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	tank
Generic Instrument Name	Aquarium
Dataset-specific Description	Aquaria water quality was measured in tanks used for coral treatment experiments
Generic Instrument Description	Aquarium - a vivarium consisting of at least one transparent side in which water-dwelling plants or animals are kept

Dataset-specific Instrument Name	YSI Professional Plus (Pro Plus) Multi-parameter handheld
Generic Instrument Name	YSI Professional Plus Multi-Parameter Probe
Dataset-specific Description	Treatment tank water quality was monitored using a YSI Professional Plus (Pro Plus) Multi-parameter handheld with a quarto containing a Pro Series Galvanic Dissolved Oxygen Sensor, a Pro Series pH Sensor, and a Pro Series temperature and conductivity sensor
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.

[table of contents | back to top]

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.

[table of contents | back to top]

Funding

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

[table of contents | back to top]