Seagrass blade height from fish and seagrass surveys on clusters of artificial reefs at the Abaco Islands, Bahamas in May of 2022

Website: https://www.bco-dmo.org/dataset/922242
Data Type: Other Field Results
Version: 1
Version Date: 2024-03-14

Project
» Using novel ecosystem-scale experiments to quantify drivers of reef productivity in a heavily impacted coastal ecosystem (Reef Production Drivers)

Contributors	Affiliation	Role
Allgeier, Jacob	University of Michigan	Principal Investigator
Munsterman, Katrina	University of Michigan	Student
York, Amber D.	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract
Seagrass blade height from fish and seagrass surveys on clusters of artificial reefs at the Abaco Islands, Bahamas in May of 2022. Data are presented for two different sites: PN, which were constructed in May 2021 at the Bight of Old Robinson, Great Abaco, and CM which were constructed in May 2022 in the waters north of Little Abaco Island. At each site three clusters of nine reefs were constructed. Each cluster was separated by at least 150 m and were constructed at ~3 m depth.

Table of Contents

Coverage

Location: Abaco Islands, The Bahamas
Spatial Extent: **N**:26.91192 **E**:-77.00752 **S**:26.341 **W**:-77.62688
Temporal Extent: 2022-05-14 - 2022-05-26

Dataset Description

See "Related Datasets" section for access to data and metadata from other datasets from the same surveys.

Methods & Sampling

Seagrass surveys were conducted using a 10 x 10 cm quadrat. Specifically, the quadrat was thrown randomly within a larger 1x1m quadrat (used for the Braun Blonquet survyes). For each throw the number of shoots of Thallassia testudinum and Syringodium filiformes were counted and 4 shoots were then measured for max blade height for each species.

BCO-DMO Processing Description

* Sheet 1 of submitted file SeagrassBladeHeight2022_FinalNSF.xlsx (submitted to BCO-DMO 2024-04-18) was imported into the BCO-DMO data system for this dataset.

* Column names adjusted to conform to BCO-DMO naming conventions designed to support broad re-use by a variety of research tools and scripting languages. [Only numbers, letters, and underscores. Can not start with a number]. All column names must be unique so the 5 duplicate tt.bladeheight and sf.bladeheight columns were renamed with suffixes _1 _2 etc.

* Date converted to ISO 8601 format

* Reef cluster site list added from information in related dataset file FishSurveys2022_FinalNSF.xlsx

[table of contents | back to top]

Data Files

File
922242_v1_seagrass-blade-height.csv (Comma Separated Values (.csv), 90.62 KB) MD5:4d381f6788d788de2fe7dac9b2de1585 Primary data file for dataset ID 922242, version 1

[table of contents | back to top]

Supplemental Files

File
Reef Cluster Site List filename: reef_cluster_site_list.csv (Comma Separated Values (.csv), 499 bytes) MD5:c1c109da3d9dd8eec65fca35dcf3f838 Artificial reef cluster site list for fish and invertebrate surveys conducted in 2022. Two different sites: reefs with name PN# were constructed in May 2021, and CM# were constructed in May 2022. At each site three clusters of nine reefs were constructed. Each cluster was separated by at least 150 m and were constructed at ~3 m depth. Column name, description, units: reef_name, Reef cluster identifier lat_dd, site latitude, decimal degrees lon_dd, site longitude, decimal degrees Construction_Month, Month of reef construction (format: %b, .e.g. "May") Construction_Year, Year of reef construction (format: %Y, e.g. "2021") Site_Description, Description of the site location and island.

[table of contents | back to top]

Related Datasets

IsRelatedTo

Allgeier, J., Munsterman, K. (2024) **Fish data from fish and seagrass surveys on clusters of artificial reefs at the Abaco Islands, Bahamas in 2022.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2024-03-14 doi:10.26008/1912/bco-dmo.922228.1 [view at BCO-DMO]
Relationship Description: Datasets part of the same fish and seagrass surveys conducted in 2022 on artificial reef clusters in the Abaco Islands (created in 2021 and 2022).

Allgeier, J., Munsterman, K. (2024) **Invertebrate data from fish and seagrass surveys on clusters of artificial reefs at the Abaco Islands, Bahamas in 2021 and 2022.** Biological and Chemical

Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2024-03-14
doi:10.26008/1912/bco-dmo.922236.1 [view at BCO-DMO]
Relationship Description: Datasets part of the same fish and seagrass surveys conducted in 2022 on artificial reef clusters in the Abaco Islands (created in 2021 and 2022).

Allgeier, J., Munsterman, K. (2024) **Species density from Braun-Blanquet seagrass surveys on clusters of artificial reefs at the Abaco Islands, Bahamas in May of 2022.** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2024-03-14
doi:10.26008/1912/bco-dmo.922248.1 [view at BCO-DMO]
Relationship Description: Datasets part of the same fish and seagrass surveys conducted in 2022 on artificial reef clusters in the Abaco Islands (created in 2021 and 2022).

[table of contents | back to top]

Parameters

Parameter	Description	Units
date	date survey was conducted	unitless
obs	observer	unitless
cluster	unique cluster ID	unitless
cluster_lat	latitude of cluster location	decimal degrees
cluster_lon	longitude of cluster location	decimal degrees
reef	unique reef ID	unitless
transect	Transect identifier (A, B, C, D)	unitless
distance	distance from the reef	meters (m)
subsample	Subsample number (1-4)	unitless
tt_shoot_count	number of T. testudinum per 10x10cm quadrat	per shoot
tt_bladeheight_1	height of 1st randomly sampled T. testudinum blade in 10x10cm quadrat	millimeters (mm)
tt_bladeheight_2	height of 2nd randomly sampled T. testudinum blade in 10x10cm quadrat	millimeters (mm)
tt_bladeheight_3	height of 3rd randomly sampled T. testudinum blade in 10x10cm quadrat	millimeters (mm)
tt_bladeheight_4	height of 4th randomly sampled T. testudinum blade in 10x10cm quadrat	millimeters (mm)
tt_bladeheight_5	height of 5th randomly sampled T. testudinum blade in 10x10cm quadrat	millimeters (mm)
sf_shoot_count	number of Syringodium filiforme shoots per 10x10cm quadrat	per shoot
sf_bladeheight_1	height of 1st random Syringodium filiforme blade in 10x10cm quadrat	millimeters (mm)
sf_bladeheight_2	height of 2nd random Syringodium filiforme blade in 10x10cm quadrat	millimeters (mm)
sf_bladeheight_3	height of 3rd random Syringodium filiforme blade in 10x10cm quadrat	millimeters (mm)
sf_bladeheight_4	height of 4th random Syringodium filiforme blade in 10x10cm quadrat	millimeters (mm)
sf_bladeheight_5	height of 5th random Syringodium filiforme blade in 10x10cm quadrat	millimeters (mm)

[table of contents | back to top]

Project Information

Using novel ecosystem-scale experiments to quantify drivers of reef productivity in a heavily impacted coastal ecosystem (Reef Production Drivers)

Coverage: Caribbean coastal ecosystems

NSF Award Abstract:
Tropical coastal marine ecosystems (e.g., coral reefs, seagrass beds, and mangroves) are among the most productive ecosystems in the world providing important services, such as fisheries, to millions of people. Despite this, they are also among the most impaired ecosystems, necessitating improved understanding of the mechanisms that underpin their productivity. This project seeks to understand the key factors that drive ecosystem production in a degraded coastal ecosystem in Haiti using artificial reefs. Past research has shown that artificial reefs have substantial potential to increase the number and diversity of plants and animals, but the extent to which this can be achieved at scales relevant to society remains unknown. This project is constructing clusters of artificial reefs to test how (1) spatial arrangement and (2) fishing pressure (fished/not fished) influence the productivity of seagrass, coral, and fish over the course of four years. The fishing treatment is being implemented through collaborations with local fishers whereby small-scale no-take zones are created around three of the six artificial reef clusters. A unique aspect of the research is that it capitalizes on the experimental design to simultaneously achieve an important conservation initiative, while testing ecological theory. Community engagement and outreach are integrated directly into the research and local fishers are being surveyed to assess the extent to which fishing occurred on any of the artificial reefs. This research represents a novel effort to integrate experimentation with cutting-edge community-based conservation initiatives in one of the most impoverished regions of the world. The project is improving strategies for conservation and reef management.

Identifying the factors that regulate the structure and function of ecosystems is a fundamental challenge for ecological theory and applied science. This challenge is often framed within the context of Top-Down (TD) versus Bottom-Up (BU) regulation, but the extent to which this framework can predict processes in complex, real-world ecosystems is not fully understood. It is now widely recognized that TD/BU factors do not act in isolation. For example, in many ecosystems, consumers contribute to both TD (via consumption) and BU (via excretion) pathways. Environmental factors, including human-induced change, can further alter the nature of these interactions. Quantifying the strength of TD and BU pathways and the extent to which they regulate the structure and function in highly dynamic ecosystems requires an experimental system that is sufficiently tractable that all its components can be quantified, while still being representative of real ecosystems. To address this challenge, this research project creates a unique ecosystem-scale artificial reef (AR) experiment in Haiti to test how two factors (AR structure, and fishing pressure) alter the strength of independent and interactive TD and BU pathways to regulate the structure and function of real-world reef ecosystems. Over the course of four years, the production of seagrass (surrounding the ARs), coral (transplanted onto the ARs), and fish (in and around the ARs) is being measured, providing a quantitative assessment of ecosystem-level production across the two treatments. Linear and structural equation models are used to measure the independent and interactive strengths TD and BU pathways, and to identify the suite of directional relationships between each trophic level that best predict overall ecosystem production. Harnessing the ability to use ecosystem-scale experiments and quantify production across all trophic levels in a highly complex, real-world system enables an unprecedented test of TD/BU theory.

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.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1948622

[table of contents | back to top]