Thalassia testudinum seagrass weights from biomass cores collected across the Western Atlantic from March to May 2023 (Tropicalization Seagrass Beds project)

Website: https://www.bco-dmo.org/dataset/917690
Data Type: Other Field Results, experimental
Version: 1
Version Date: 2023-12-28

Project
» Collaborative Research: The tropicalization of Western Atlantic seagrass beds (Tropicalization Seagrass Beds)

Contributors	Affiliation	Role
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Abstract
This dataset includes seagrass (Thalassia testudinum) aboveground and belowground weights from 15cm biomass cores collected in Spring 2019 across the Western Atlantic. Bocas del Toro, Panama; Bonaire; Little Cayman, Cayman Islands; Carrie Bow, Belize; Puerto Morelos, Mexico; Andros, Bahamas; Eleuthera, Bahamas; Corpus Christi, Texas; Galveston, Texas; Naples, Florida; Crystal River, Florida; St. Joes, Florida; and Bermuda.

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Coverage

Temporal Extent: 2019-03-01 - 2019-05-23

Methods & Sampling

50 small seagrass (all comprised of one species, *Thalassia testudinum*) plots (0.25m2) were established at 13 shallow sites in the Western Atlantic. Each plot was assigned to one of ten treatments comprising a factorial manipulation of caging, nutrient supply, and canopy clipping: (1) control (2) partial cage (3) full cage (4) added nutrients (5) added nutrients + partial cage (6) added nutrients + full cage (7) full cage + half canopy clip (8) full cage + full canopy clip (9) full cage + added nutrients + half canopy clip (10) full cage + added nutrients + full canopy clip. After the experiment (approx. 1 year) 15cm diameter biomass cores were taken in each plot. To do this, the core was carefully placed over the seagrass and lowered to the sediment surface. The core was then inserted into the sediment (approx 10cm) using a twisting motion to sever belowground rhizomes. The core was then carefully removed and all captured above and belowground vegetative biomass was placed into a mesh bag and gently rinsed underwater. In the lab, the aboveground green leaf material was separated from the belowground material using a razor blade. Leaf material was also scraped clean of any epiphyte loading. Above and belowground material was dried separately in aluminum tares in a 60C oven. Any additional macroalgae found inside the core was also separately dried.

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Related Publications

Fourqurean, J. W., Campbell, J. E., Rhoades, O. K., Munson, C. J., Krause, J. R., Altieri, A. H., Douglass, J. G., Heck, K. L., Paul, V. J., Armitage, A. R., Barry, S. C., Bethel, E., Christ, L., Christianen, M. J. A., Dodillet, G., Dutton, K., Frazer, T. K., Gaffey, B. M., Glazner, R., … Wilson, S. S. (2023). Seagrass Abundance Predicts Surficial Soil Organic Carbon Stocks Across the Range of Thalassia testudinum in the Western North Atlantic. Estuaries and Coasts, 46(5), 1280–1301. https://doi.org/10.1007/s12237-023-01210-0
Results

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Parameters

Parameters for this dataset have not yet been identified

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Instruments

Dataset-specific Instrument Name	Custom made stainless steel push corer
Generic Instrument Name	Push Corer
Dataset-specific Description	A custom made stainless steel push corer (15cm diameter) was used to collect the seagrass biomass samples.
Generic Instrument Description	Capable of being performed in numerous environments, push coring is just as it sounds. Push coring is simply pushing the core barrel (often an aluminum or polycarbonate tube) into the sediment by hand. A push core is useful in that it causes very little disturbance to the more delicate upper layers of a sub-aqueous sediment. Description obtained from: http://web.whoi.edu/coastal-group/about/how-we-work/field-methods/coring/

Dataset-specific Instrument Name	Analytical balance
Generic Instrument Name	scale or balance
Dataset-specific Description	All samples were weighed on an analytical balance (resolution - 0.001 g).
Generic Instrument Description	Devices that determine the mass or weight of a sample.

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Project Information

Collaborative Research: The tropicalization of Western Atlantic seagrass beds (Tropicalization Seagrass Beds)

Website: https://marinegeo.si.edu/research/research-in-action/underwater-meadows-and-resilient-seas

Coverage: Western Atlantic

NSF Award Abstract:
The warming of temperate marine communities is becoming a global phenomenon, producing new biotic interactions that can result in a series of cascading effects on ecosystem structure. For example, the poleward expansion of herbivore populations can lead to the consumption of habitat-forming vegetation, which alters the ecological services provided by coastal environments (a phenomenon known as tropicalization). Many of the habitats at risk, such as kelp forest and seagrass beds, provide foundational habitat that supports complex food webs. Seagrass meadows along the Gulf of Mexico are currently experiencing an influx of tropical grazers, however a integrated understanding of how these communities might ultimately respond is lacking. This project describes the first experiment to quantify the disruptive effect of tropicalization on the ecology of a widely-distributed seagrass. A major contribution of this project will be the development of a seagrass research collaborative network to serve as a platform for broader scientific inquiry and future collaboration. The collaboration spans a total of 11 institutions, and this network will foster extensive collaborations among junior and senior scientists, as well as many undergraduate and graduate students. Given the geographic scope of this work, the research team will further pursue outreach opportunities across the network by hosting a series of public lectures and science café events promoting topics in marine ecology and conservation.

This study will develop a large-scale manipulative experiment across the Caribbean, premised upon a comparative network of 15 marine sites, which will quantify how temperature and light interact with grazer effects on the dominant tropical seagrass, Thalassia testudinum. Sites have been selected along a latitudinal gradient (from Bermuda to Panama), such that light and temperature vary, allowing the investigators to test for the effects of abiotic factors on the ecological effects of increased grazing (tropicalization simulated via artificial leaf clipping). At each of the 15 marine sites, grazing treatments will be crossed with nutrient manipulations in a factorial design for 18 weeks, after which seagrass structure and functioning will be assessed via measurements of areal productivity, shoot density, aboveground biomass, and carbohydrate storage. Experiments will be conducted both in the summer and winter seasons, when abiotic gradients are at their weakest and strongest, respectively. Emerging statistical techniques in hierarchical mixed modeling and structural equation modeling will further allow for integration of experimental and observational data.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1737247

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