# Thalassia testudinum leaf morphometric measurements from experimental plots in the Western Atlantic from Summer 2018 and Winter 2019 (Tropicalization Seagrass Beds project)

**Website**: https://www.bco-dmo.org/dataset/917968
**Data Type**: Other Field Results
**Version**: 1
**Version Date**: 2024-01-09

**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 leaf morphometrics (Thalassia testudinum) from 650 experimental plots distributed across 13 sites in the Western Atlantic. Leaf morphology (average widths) were collected at two timepoints, once at the end of the 2018 summer growing season and again at the end of the 2019 winter season. Leaf width is reported as an average of all leaves across 4-6 harvested seagrass shoots in each experimental plot. Sites include: 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

**Location**: Subtropical Western Atlantic
**Spatial Extent**: **N**:32.2639 **E**:-64.8307 **S**:9.35161 **W**:-97.0348
**Temporal Extent**: 2018-08 - 2019-03

### Methods & Sampling

#### Sampling details

50 small seagrass plots (0.25m2, all comprised of one species, *Thalassia testudinum*) 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. Leaf morphometrics (only leaf width) was measured at two time points (once at the end of summer 2018 and again at the end of winter 2019). The dataset reports average leaf width as measured across all leaves from 4-6 harvested seagrass shoots from each plot.

#### Site location details

ANDR: Andros, Bahamas (24°53'54.3" N, 77°54'25.2" W)

BERM: Bailey's Bay, Bermuda (32°15'49.9" N, 64°49'50.5" W)

BOCA: Bocas Del Toro, Panama (9°21'05.8" N, 82°15'27.8" W)

BONA: Lac Bay, Bonaire (12°06'44.3" N, 68°13'42.0" W)

CARR: Carrie Bow Cay, Belize (16°49'24.8" N, 88°06'16.2" W)

CAYM: Little Cayman, Cayman Islands (19°40'14.6" N, 80°03'21.3" W)

CORP: Corpus Christi, TX (27°55'47.9" N, 97°02'05.2" W)

CRYS: Crystal River, FL (28°42'50.4" N, 82°49'08.4" W)

ELEU: Eleuthera, Bahamas (25°27'53.5" N, 76°37'35.8" W)

GALV: Galveston, TX (29°02'41.8" N, 95°10'15.7" W)

JOES: St. Joe's Bay, FL (29°42'05.0" N, 85°19'34.6" W)

NAPL: Naples, FL (26°29'48.6" N, 82°09'40.0" W)

PUER: Puerto Morelos, Mexico (20°52'04.5" N, 86°51'35.4" W)

#### BCO-DMO Processing Description

- removed units from column headers
- converted latitude and longitude columns from degrees, minutes, seconds to decimal degrees
- latitude and longitude values rounded to 6 degrees of precision
- spaces removed from column names and replaced with underscores ("_")
- special characters removed from column names
- split the season field ("Spring 2019") into two separate fields for season ("Spring") and year ("2019")

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## Related Datasets

#### IsRelatedTo

Campbell, J. (2024) **Thalassia testudinum belowground carbohydrate measurements from experimental plots in the Western Atlantic from Winter 2019 (Tropicalization Seagrass Beds project).** Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2024-01-09 http://lod.bco-dmo.org/id/dataset/917954 [view at BCO-DMO]

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## Parameters

| Parameter | Description | Units |
|---|---|---|
| site | Site name | unitless |
| latitude | Site latitude in degrees, minutes, seconds | degrees, minutes, seconds |
| longitude | Site longitude in degrees, minutes seconds | degrees, minutes, seconds |
| latitude_decimal_degrees | Site latitude in decimal degrees; a positive value indicates a Northern coordinate | decimal degres |
| longitude_decimal_degrees | Site longitude in decimal degrees; a negative value indicates a Western coordinate | decimal degrees |
| season | Season sample collection took place | unitless |
| year | Year sample collection took place | unitless |
| plot | Plot ID number | unitless |
| clipping | Level of seagrass plot canopy clipping; no = no clipping, partial = half canopy removed, full = full canopy removed | unitless |
| nutrients | Level of nutrients; ambient = no added nutrients; enriched = added nutrients | unitless |
| cage | Level of cage; no = no cage; partial = partial 4-sided cage; full = full cage | unitless |
| leaf_width | Average leaf width from plot; measurement made from 4 to 6 randomly selected shoots | millmeters (mm) |

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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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