



Using citizen science photographs and *in situ* sampling to measure abundance of *Sargassum* landings

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Introduction

- Influxes of *Sargassum* are common events in the Caribbean, Gulf of Mexico and Florida, but since 2011 abundance of those landings have increased (Franks et al 2016).
- In order to address this problem, a monitoring program began in September 2018 to quantify frequency and abundance of *Sargassum* landings at Dania Beach, Florida.
- A useful approach to estimate abundance qualitatively is through photographs reported by citizens using apps, for example the citizen science project Sargassum watch conducted at MMRL.
- This approach allows estimation at large geographic scales.
- However, pictures cannot provide quantitative information of *Sargassum* biomass accumulating on the beaches. Quantitative data needs to be collected *in situ* and requires time consuming effort.

Objectives

- Assess the abundance variability of *Sargassum* landings happening in South Florida.
- Compare the variability of abundance through *in-situ* sampling and reports from the citizen's project.
- Explore possible scaling-up of *in situ* abundance to citizen's analysis.

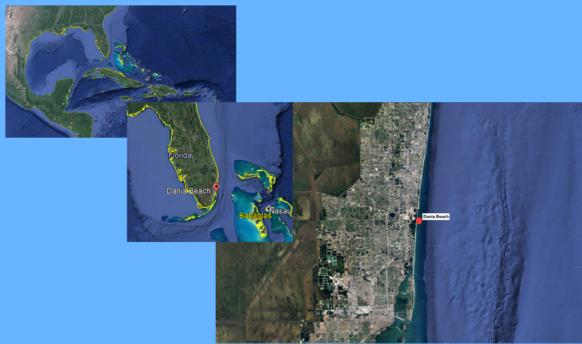


Figure 1: Map showing location of Dania Beach, site of monitoring

Methods

- *Sargassum* was collected using a 1.0 m² quadrat at low tide, to ensure landings collected were the most recent to arrive.
- Four collection points were taken from each location, 250 m apart.
- Identification of the samples were conducted in the laboratory using identification features from Wrinn et al. (2016) and Parr (1939).
- Citizen science data was collected by the smartphone app, Epicollect5 (Ananensen et al. 2009), in collaboration with the Broward County Sea Turtle Conservation Program.
- Photographic geolocated data of the site and species found were collected daily on Dania Beach from April – October 2019.
- Pictures from *in situ* abundance samples were categorized using 2 systems: 1) by categories used in the citizen's project, and 2) by percentage cover.
- Linear regressions were run to test significant differences of biomass as dry weight between categories. ANOVA were used to test differences among categories



Figure 2: Large *Sargassum* landing at Dania Beach, April 2019

Dania Beach Observations



Figure 3: Dania Beach: Oct 2018, Jan 2019 (Top left to right), Feb 2019, Apr 2019 (Bottom left to right).

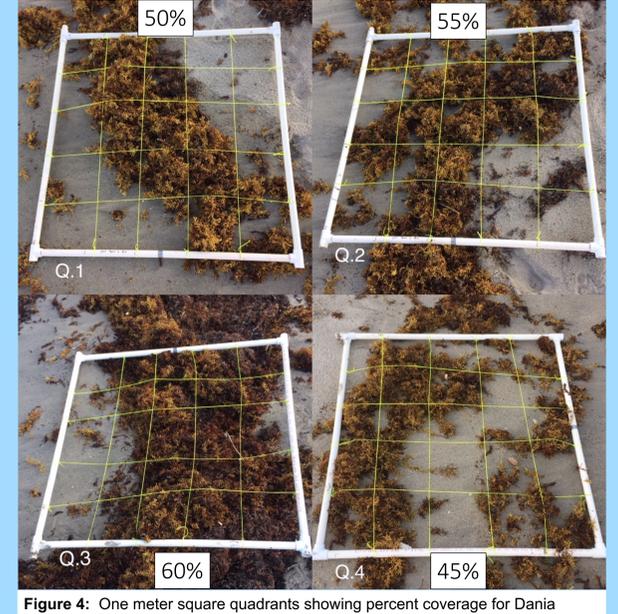


Figure 4: One meter square quadrants showing percent coverage for Dania Beach on October 7, 2018

Results

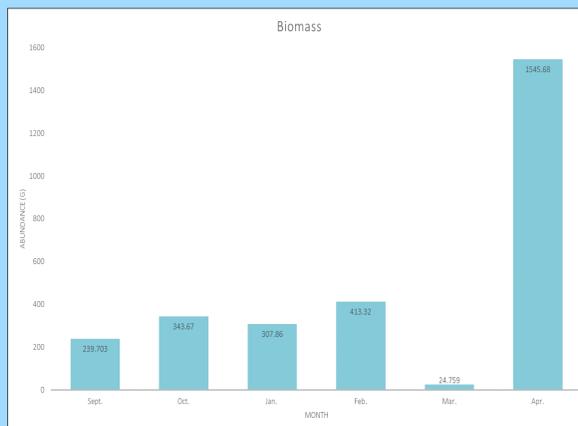


Figure 5: Mean Biomass across seasons, at Dania Beach from September 2018 – April 2019

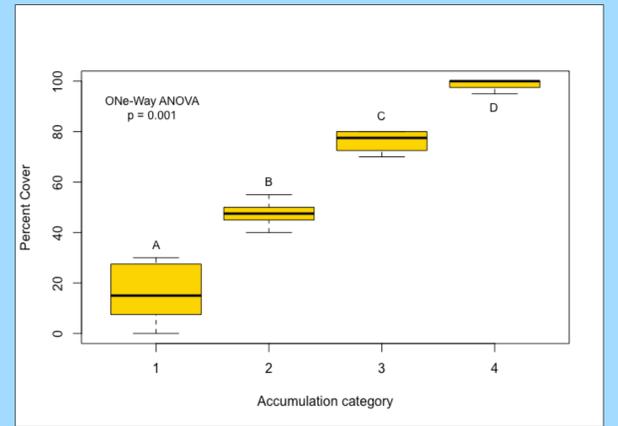


Figure 9: Comparison of percent cover between accumulation categories

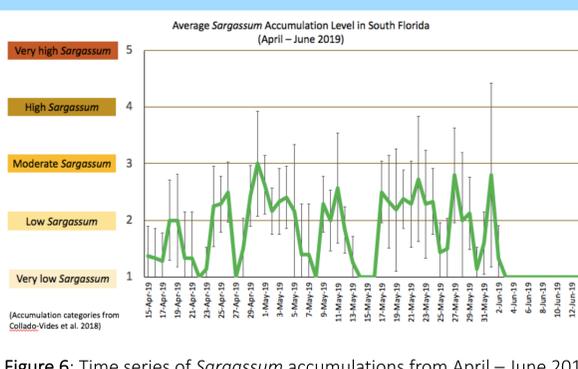


Figure 6: Time series of *Sargassum* accumulations from April – June 2019

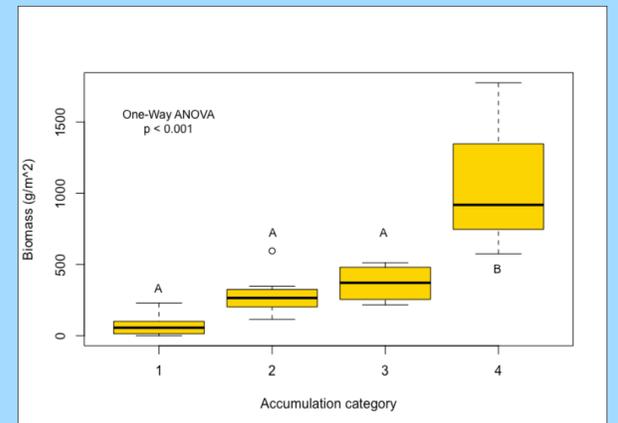


Figure 10: Comparison of biomass between accumulation categories

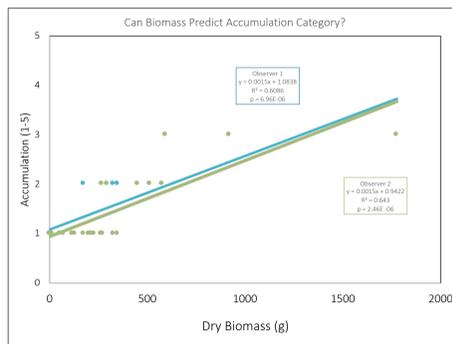


Figure 7: Regression analysis between dry biomass and categorization of *Sargassum* accumulations.

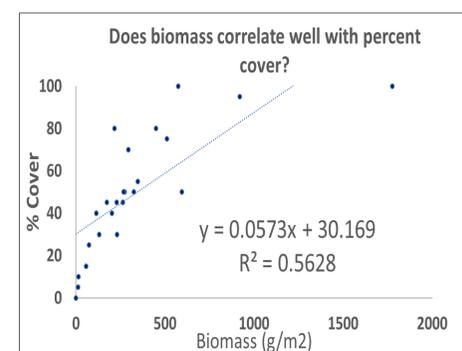


Figure 8: Regression analysis between dry biomass and percent cover of *Sargassum* per quadrat

Conclusions

- There is daily variation in the accumulation of *Sargassum*, as observed from the citizen science data. This is especially shown from April – June 2019.
- Abundance of *Sargassum* was much greater during April than the previous months sampled.
- Biomass and percent cover are suitable variables for scaling up *in situ* abundance with citizen science data, but more samples need to be collected to see differences in those variables between accumulation levels.
- Citizen science contributions can be increased geographically and through time, but we still need to continue *in-situ* sampling to further estimate biomass and percent cover.

Acknowledgments

This material is based upon work supported by the National Science Foundation under Grant No. HRD-1547798. This NSF Grant was awarded to Florida International University as part of the Centers of Research Excellence in Science and Technology (CREST) Program. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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