



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.

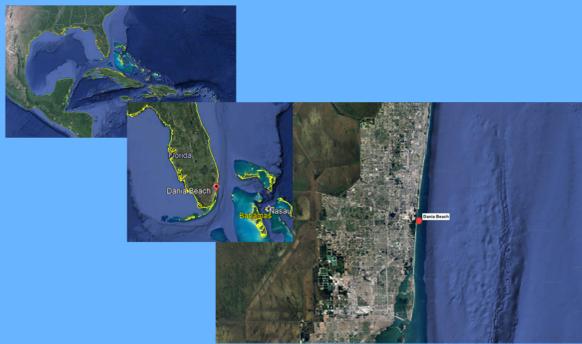


Figure 1: Map showing location of Dania Beach, site of monitoring

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, 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).

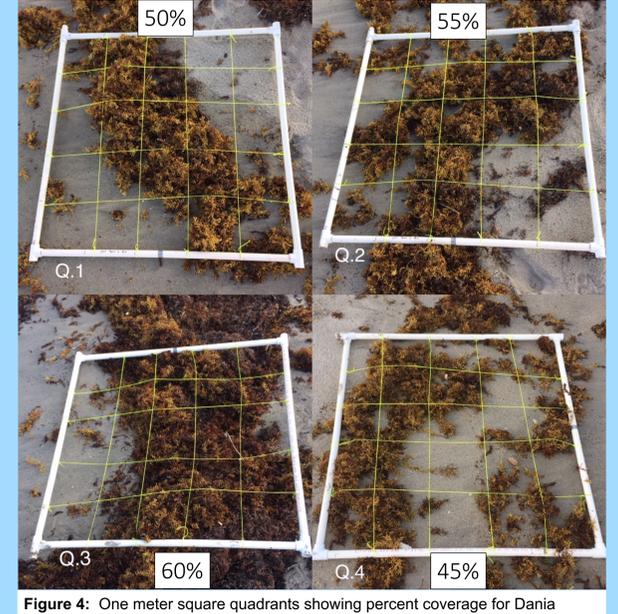


Figure 4: One meter square quadrants showing percent coverage for Dania Beach on October 7, 2018

Results

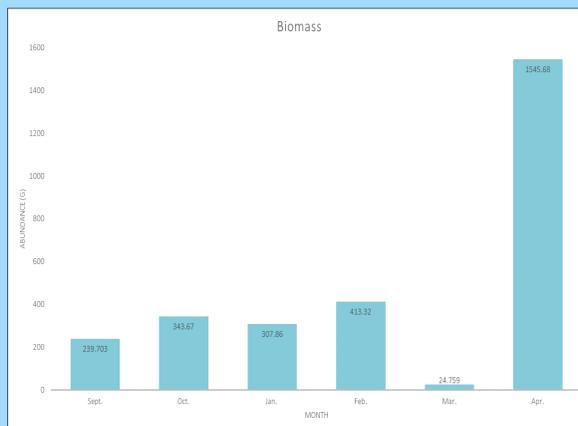


Figure 5: Mean Biomass across seasons, at Dania Beach from September 2018 – April 2019

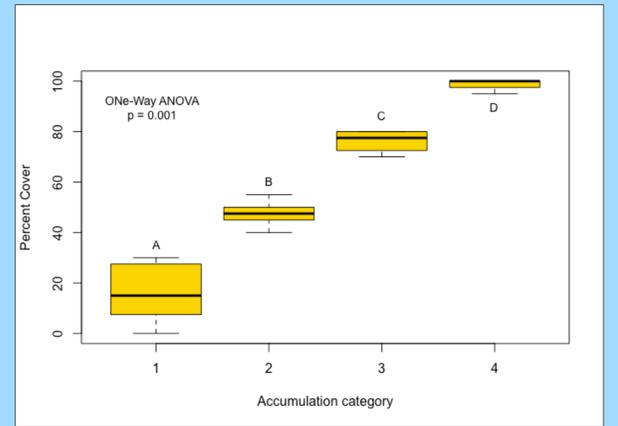


Figure 9: Comparison of percent cover between accumulation categories

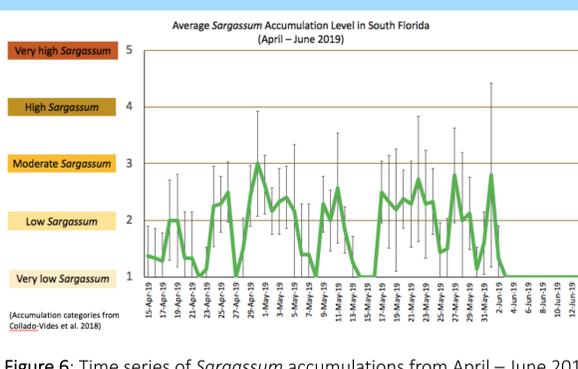


Figure 6: Time series of *Sargassum* accumulations from April – June 2019

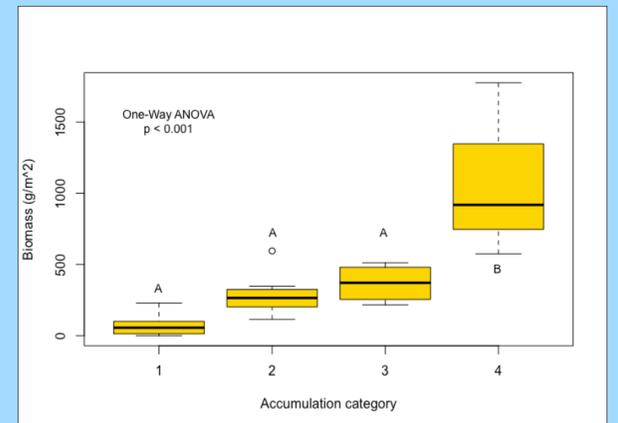


Figure 10: Comparison of biomass between accumulation categories

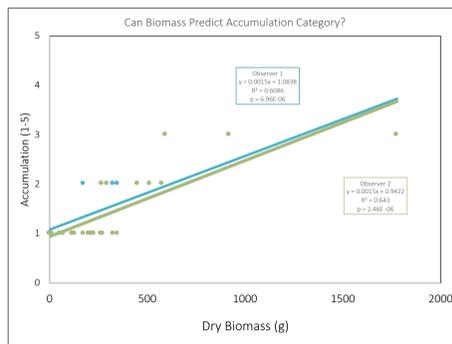


Figure 7: Regression analysis between dry biomass and categorization of *Sargassum* accumulations.

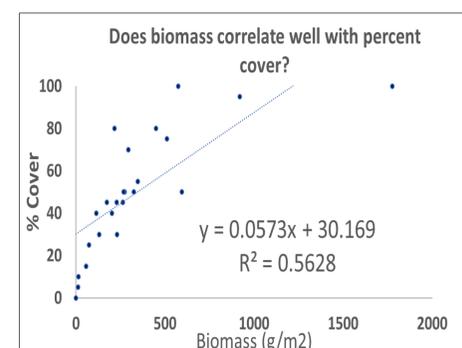


Figure 8: Regression analysis between dry biomass and percent cover of *Sargassum* per quadrat

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

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