Fish Community Structure Following Disturbance on Patch Reefs in San Salvador, Bahamas

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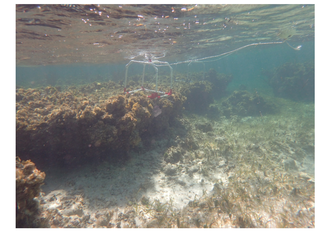

Introduction

- Assessment of coral reefs is critical due to their worldwide decline associated with:
  - Ongoing global temperature rise, fishing pressure, and coral diseases (Peckol et al., 2003).
- Coral reef systems are experiencing a phase shift
  - Coral dominance → an increase in macroalgal dominance (Bruno et al. 2009)
- Research question:
  - Will there be a change in fish species diversity, abundance, and overall community structure following an experimental disturbance event on a patch reef

Materials and Methods

- Location: shallow patch reefs located at Dump Reef on San Salvador Island, Bahamas
- Five pairs of control and experimental plots established in January
  - Control: undisturbed
  - Experimental: macroalgae removed (~50-60%)
- GoPro cameras deployed in January and May of 2019
  - Trouble locating Plot 2 in May → video not recorded
- Videos assessed using BORIS (Behavioral Observation Research Interactive Software) to quantify fish community composition.
- Statistical analyses conducted using NCSS and PRIMER software

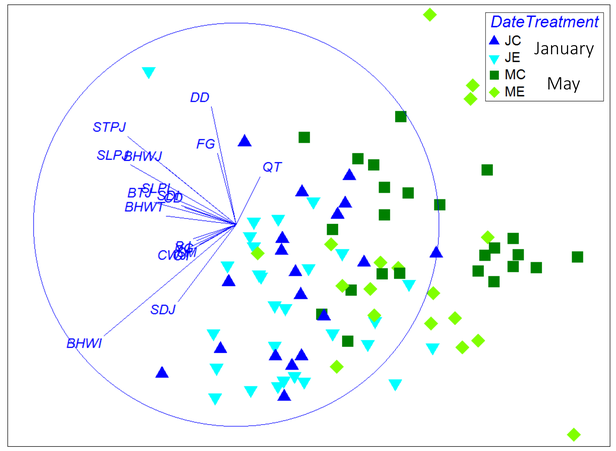

Fig 1. Results of a non-metric multidimensional scaling analysis showing variation in fish community structure among treatments. The Bray Curtis similarity index was used on untransformed data.

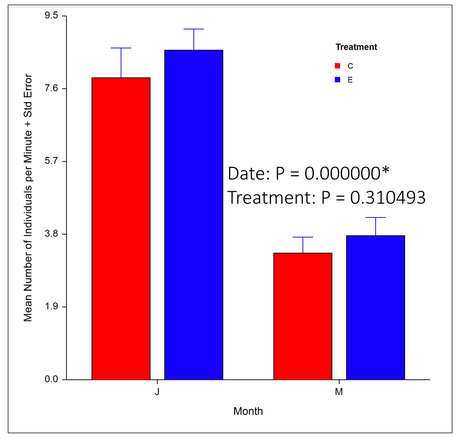

Fig 2. Mean Species Abundance

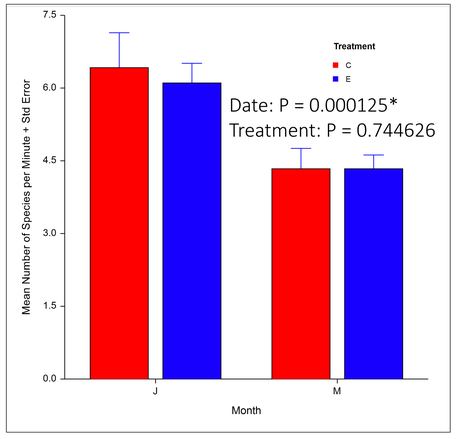

Fig 3. Mean Species Richness

Results

- Distinct seasonal change with respect to community structure but no difference among control and experimental plots (Figure 1)
- More variability regarding community structure in May experimental plots compared to the control plots
- Mean species abundance and richness decreased from January to May, reflecting the seasonal fluctuations
- Two most abundant species overall: initial phase bluehead wrasse and juvenile phase striped parrotfish

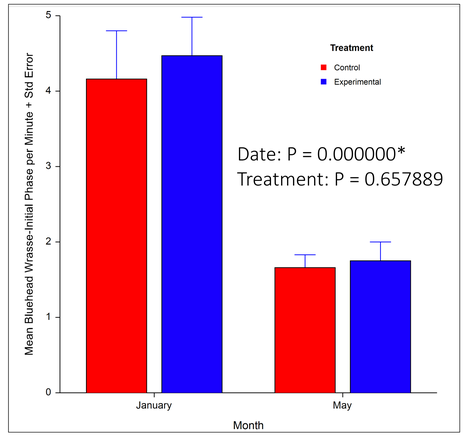

Fig 3. Mean Bluehead Wrasse-Initial Phase

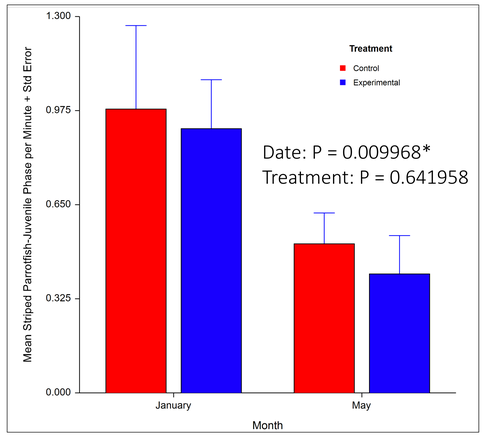

Fig. 4 Mean Striped Parrotfish-Juvenile Phase

Discussion and Conclusion

- Seasonality affected fish community structure much more than disturbance/algal removal
- Unclear if a longer-term removal experiment with more frequent data collection would yield clearer relationship with respect to fish community structure and macroalgal communities in Bahamian patch reefs
- Further research, potentially involving a larger scale removal experiment could serve as a model for how a fish community may be affected by more severe disturbance events

Acknowledgements

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References

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Peckol, P. M., A. Curran, B. J. Greenstein, E. Y. Floyd, and M. L. Robbart. 2003. Assessment of coral reefs off San Salvador Island, Bahamas (stony corals, algae and fish populations). Atoll Research Bulletin 496:124-145.