

Teaching Notes

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Course Information

Department: **Biology**

Level: **Upper Undergraduate**

Course type: **Lecture**

Students: **Majors**

Number of Students: **14**

Module Information

Original Module Name: **Competition under the Sea: Exploring the competitive interaction between native and non-native seagrasses in the Caribbean**

Link to Original: **N/A**

Files associated: **Mini-case study**

Modification Learning Goals:

- Learn about an understudied coastal marine ecosystem: seagrass beds.
- Explore evidence to determine if two overlapping species compete for the same resources and identify if one has traits that may suggest a competitive advantage.
- Evaluate and synthesize empirical data to generate an example recommendation for management action.

Teaching Notes

This is a mini-case study style lecture activity developed while participating in SimBio's Faculty Mentoring Network and was initially designed to be used with the SimUText Chapter on Competition (<http://simbio.com/products-college/simutext-ecology>). The mini-case study is designed to be completed in approximately 30 minutes who have already received an introduction to the ecological concept of competition and Gause's Principle of Competitive Exclusion. Students do not need to have existing familiarity with seagrass beds. A description of seagrasses is included in the Background, however, supplemental discussion of this important ecosystem would help students conceptualize the mini-case study's setting. This mini-case study would be well-suited for a marine biology/ecology course and conservation biology course as well.

This mini-case study draws on real-world research that investigates the recent introduction of the Red Sea seagrass, *Halophila stipulacea*, into a new range, the Caribbean Sea. This introduction is believed to have occurred relatively recently in the early 2000s with new reports

of the seagrass on additional islands each year through the time this exercise was developed in 2019. A citizen-science website www.invasiveseagrass.org provides information on recent reports that may be visited to broaden the classroom discussion.

This mini-case study was developed for and used in an upper division biology course with 14 students (sophomore/junior standing) about 10 weeks into the semester and after a full lecture had been delivered on competition, students had completed the SimUText 'Niche Wars' lab, and had read the associated SimUText chapter. For this activity, students worked in pairs and an introduction of the activity (the first page and half) were given as a pre-lecture reading assignment, then reviewed for ~5 minutes in the beginning of the class. Students were then given 30 minutes to complete the activity, with the instructor roaming the room to check in on student progress and ask guiding questions to advance the students' progress.

After the activity students reported back that they found the activity easy to follow due to the progressive/complementary data that was given sequentially. Some students asked for clarification on what mesocosms were and asked for assistance in interpreting the box plot chart (figure 5) which they were not familiar with. Students requested that percentages by species for the pie charts on page 6, data that is available from the referenced paper by Steiner and Willette 2015. I agree this would be helpful and will incorporate in future versions. If desired, the Management Tie-in prompt could be pulled out to create a separate, yet complementary activity.

Instructor preparation for this activity should include a review of definitions used in the mini-case study (possibly as a quick reference list), having read the activity and included these Teaching Notes. It may be of value to read the abstracts of the referenced papers, specifically Willette and Ambrose 2012 and Steiner and Willette 2015 from which figures were adapted from and where the instructor can find interpretations/conclusions about the figures. Prep time would be approximately 60 minutes, primarily for reading.

Notably, this activity fit into my general ecology course at a time in the semester when we visited a local urban greenspace that had a grassland area where we could observe both native and invasive plants growing in close proximity to one another. Completing this mini-case study before the field trip provided an opportunity to pose questions on competition and experimental design to test the interaction of native and invasive terrestrial grasses. Good luck with the mini-case study, and thank you!