TIEE
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ISSUES – FIGURE SET

What's Killing the Coral Reefs and Seagrasses?

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Bleaching in coastal Florida
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Figure Set 6: Effects of Habitat Loss on Fish

Purpose: To help students make the connection between deterioration of habitat and reduction in fish biomass.
Teaching Approach: "Informal Groupwork"
Cognitive Skills: (see Bloom's Taxonomy) — knowledge, comprehension, interpretation, application, synthesis
Student Assessment: minute paper

BACKGROUND

Florida Bay is a nursery area for commercial and recreational fish and invertebrates including red drum, spotted seatrout, spiny lobster, and pink shrimp. The seagrass die-off that became obvious in the early 1980's stimulated research on juvenile animals that depend on the seagrass community for feeding and refuge. The study by Thayer et al. (1999) is one of few that directly compares fish and seagrass density over the 1980's and 1990's. The fish that are most abundant in Florida seagrass meadows are not ones that students will likely know (e.g. various killifish, pinfish) but they may be prey to items for larger, "sexier," fish such as grunt or snapper also found there.

In this study, fish were collected with a trawl towed between 2 boats at a constant speed for 2 minutes. Grasses were measured by dividing 3 random 1x1 m quadrats into sixteen 0.062 m2 subsections which were collected by hand; counting was done in the lab.

For images of seagrasses see

http://www.dep.state.fl.us/coastal/seagrass/images/healthy.htm and
http://www.sanctuaries.nos.noaa.gov/pgallery/pgflorida/pgflorida.html.

STUDENT INSTRUCTIONS

Questions for Thought

* Work with your neighbors in small groups of 3-5 on this problem.

* First look at Figure 6A; understand the axes and symbols before you attempt to interpret the pattern you see. The data are density of fish caught in 3 regions of the Florida Bay (see the regions in Figure 6B). The researchers collected fish with nets they towed for 2 minutes at a constant speed. The data in this figure combines samples taken in 5 months throughout the year.

* Now make sense of Figure 6B. Again, learn the meaning of the symbols before you try to interpret this diagram. (Flamingo is a National Park site at the tip of Florida). What are the main changes that you see between the mid 1980's and the mid 1990's? How do you suppose that the scientists collected these data - what might their methods have been?

* How can the data in Figure 6B be used to explain the change in fish density in 6A? How are they related? Why are seagrass beds important to people? How might they function in food chains and as refuges of marine animals?

FIGURES

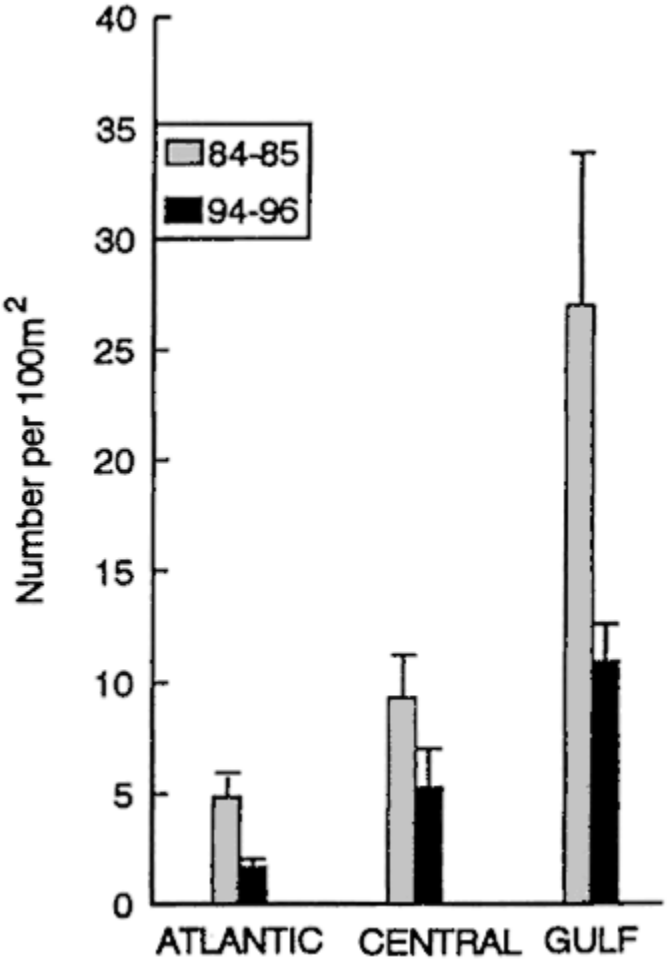

Figure 6A. Comparison between 1984-1985 and 1994-1996 densities of total fishes (excluding 3 fish groups) in 3 areas in Florida Bay (from Thayer, G. W., A. B. Powell, and D. E. Hoss. 1999. Composition of larval, juvenile, and small adult fishes relative to environmental conditions in Florida Bay. Estuaries 22:518-534).

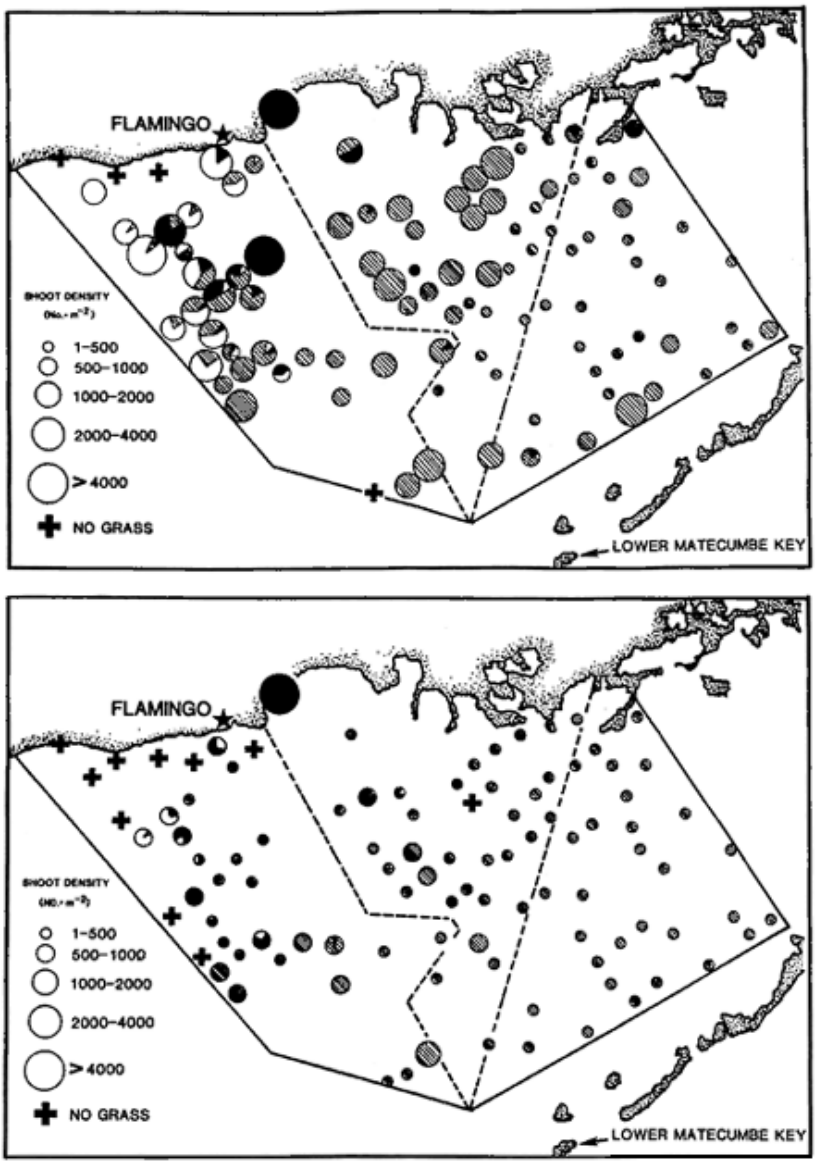

Figure 6B. Distribution of shoot densities in 1984-1985 (upper figure) and 1994-1996 (lower figure) of *Thalassia testudium* (turtle grass; solid), *Halodule wrightii* (shoal grass; open) and *Syringodium filliforme* (manatee grass; cross hatch) in 3 areas in Florida Bay (from Thayer, G. W., A. B. Powell, and D. E. Hoss. 1999. Composition of larval, juvenile, and small adult fishes relative to environmental conditions in Florida Bay. Estuaries 22:518-534).

NOTES TO FACULTY

Ask your students to

1) describe the graphs - including the axes and data points, and then

2) describe and interpret the patterns.

Before this in class you need to discuss how 1) and 2) are different and why it is so important to distinguish between them. Also, at this point you should have practiced doing 1) and 2) with the class with any data set. Most students jump quickly to interpretation before they have taken the time to understand what the data are and they need to practice with this skill.

Figure 6A is pretty straightforward. You may have to explain the standard deviation bars if your students are unfamiliar with statistics. Fig. 6B will be more of a challenge because students are probably not used to seeing data represented this way. It may be helpful to discuss why the authors chose this kind of data presentation and what the grass beds would actually look like if students were snorkeling there in 1984 compared to 1994.

The point of using these 2 figures together is for students to make the connection between loss of seagrass beds and decline in fish densities. Discuss the different ways that this might happen - in other words, how fish use seagrass beds (for refuge from predators, food, mating).

Student Assessment: Minute paper.

In what ways are fish dependent on seagrasses in Florida Bay?

Evaluating an Issue: How do you know whether it is working?

On-going (also called formative) evaluation of the approaches your are using is critical to the success of student-active teaching. Why try out new ideas if you don't know whether or not they are working? This is a brief overview of formative evaluation. For more information, go to the Formative Evaluation essay in the Teaching Section.

Course Goals:

Formative evaluation only works if you have clearly described your course goals - because the purpose of the evaluation is to assess whether a particular technique is helping students reach these goals. For instance, most of us have "learn important ecological concepts and information" as a course goal. If I reviewed the nitrogen cycle in a class, for evaluation I might ask students to sketch out a nitrogen cycle for a particular habitat or system. Each student could work alone in class. Alternatively, I might ask students to work in groups of 3 and give each group a different situation (e.g. a pond receiving nitrate from septic systems, an organic agricultural field, an agricultural field receiving synthetic fertilizer). The students could draw their flows on a large sheet of paper (or an overhead transparency) and present this to the rest of the class.

The Minute Paper:

Minute papers are very useful evaluative tools. If done well they give you good feedback quickly. Minute papers are done at the end of a class. The students are asked to respond anonymously to a short question that you ask. They take a minute or so to write their response in a 3x5 card or a piece of paper. You collect these and learn from common themes. In the next class it is important that you refer to one or two of these points so that students recognize that their input matters to you. The UW - FLAG site (www.wcer.wisc.edu/nise/cl1/flag/) gives a good deal of information about using minute papers including their limitations, how to phrase your question, step-by-step instructions, modifications, and the theory and research behind their use.