

Resident Director's Report - 2008
Dr. Peter G. Bushnell and Dr. Ann Grens
Department of Biological Sciences
Indiana University South Bend

Program:

Tropical Marine Biology Field Study in Belize; BIOL-L 342 (3 credits)
May 2-May 11, 2008

Participants: 19

2 instructors (P. Bushnell and A. Grens -IUSB
Biological Sciences)

2 faculty participants (C. Sofhauser and S.
Anderson - IUSB Nursing)

15 undergraduates (all Biological Sciences
majors)



Participants in the 2008 Belize course

Pre-departure Orientation:

The students met as a group six times during the Spring semester. Meetings were 2-3 hours long and were used for trip organization, laboratory exercises on invertebrate identification and water sampling and analysis, and preparation for the group research projects to be conducted in Belize. All students were required to demonstrate swimming and snorkeling proficiency by either 1) passing a snorkeling test given at the YMCA, or 2) holding a valid SCUBA diving card. Students were also required to acquire passports.

Academic Program:

Course curriculum: The Belize Program was a field course in Tropical Marine Biology taught at the Tropical Research and Education Center (TREC) facility in San Pedro, Belize. The facility is a renovated hotel in a residential neighborhood on the outskirts of the San Pedro, Ambergris Caye. All participants lived and ate at the TREC facility. The 9 days spent on-site



Students prepare to enter the water

revolved around three major types of activities: 1) field trips to explore and study various habitats in the marine ecosystem (coral reefs, mangroves, sea grass beds), 2) identification of specimens from these habitats and 3) the execution of group research projects.

Most of the field trips were snorkeling expeditions made on a 35 foot boat in order to explore a variety of sites on or near the Belize barrier reef. Typically excursions to the reef lasted the entire day (9:00 am-4:00 pm or later) as it often took 30-60 minutes to reach the snorkeling site. Depending on the schedule, we would snorkel at a particular site for 1-2 hours, get back on the boat, move to a new site, and get back in

the water. Lunch (sandwiches, chips, etc) was provided on the boat. On a given day we would visit at least two sites, often three, and sometimes four. Following dinner, time was used for lecture, species identification, work on group projects, or additional field trips (night snorkel, beach seining).

Since all the students were required to take the Marine Biology lecture course (Biology L304), they were already familiar with the most important aspects of the ecosystems we were visiting. Therefore, we did not do much formal lecturing in Belize. Each field trip was preceded by a 10-15 minute introduction to the ecology of the specific area, a discussion of what the group would see at the site, safety considerations, and any other information that was deemed relevant to the experience.

While in Belize the class was required to identify a collection of organisms based on a species list of ~100 organisms that was designed to illustrate the broad assemblage of flora and fauna that can be found in various habitats. Since there were no aquarium facilities at the TREC site we attempted to compile a “virtual” collection by having students take pictures of organisms in the field with underwater cameras (4) purchased by the Biology department. At the end of the day pictures were downloaded onto a single computer which also contained a powerpoint template that students were to use to assemble the collection (e.g. post pictures with species identifications). The completeness and accuracy of the "virtual critter collection” was evaluated by the instructors and formed one of the graded assessment activities for the class.



A conch with a marking ribbon attached. Note the squid in the upper right.

one of the subsequent meetings students in each group were required to present to the class an article from the scientific literature that was relevant to the project they were going to do, and outline their proposed experiments. After receiving feedback from the class and the instructors about their planned experiments, they had to prepare and submit a written project proposal similar to a small grant application, which was required to include a comprehensive list of everything they thought they would need to carry out the project in Belize. We have found this to be a very effective mechanism to insure that the students have thought about the project, chosen realistic goals, and planned the activities appropriately. This also allowed the instructors to determine what equipment we needed to collect or purchase in South Bend based on what we knew was and was not available in Belize. While every member of the class

As has been the case on past trips, students were required to carry out group research projects that had been planned during the Spring semester at IUSB. The projects conducted this year were: 1) conch movement, 2) coral reef fish diversity, 3) mangrove invertebrate diversity, 4) seagrass utilization by parrot fish, 5) damsel fish aggression, and 6) coral diversity and health. During the second pre-departure meeting in South Bend, the instructors briefly outlined the general idea of each study, socially engineered the group memberships, assigned each project to a group via a random drawing, and assisted them in developing their particular study. In



Mangrove roots provide substrate for numerous organisms to live on.

participated in collecting data for every project, each group was responsible for planning their experiments, directing the data collection efforts, analyzing the data, and presenting the preliminary results in the form of a short oral presentation given in Belize. Upon their return each group wrote a formal 10-15 page paper similar to a scientific journal article in which they reported and analyzed the data. The pre-trip literature and project presentation, the written project proposal, the oral presentation of the project results and the formal research paper were all used to assess the students' mastery of research techniques, experimental design, data analysis, and the written and oral communication of scientific information.

Other graded assessment activities included an invertebrate species identification quiz, in which the students were required to identify photographs of 40 different marine invertebrates by scientific Phylum and Class, a fish identification quiz in which they were required to identify 39 of the most common fish species (in both their juvenile and adult forms) by common name. Finally, students were asked to keep a journal chronicling their activities and observations over the week in Belize.

In addition to the various aspects of the group research projects listed above (the literature article presentation, the written project proposal, the oral presentation of the results and the formal paper), each member of each group was asked to evaluate his or her own participation and that of the other group members of his/her group, and the average score a student received on this peer evaluation was incorporated as part of their final research project grade. We have found this to be an effective mechanism for preventing any students from "slacking" and failing to do their fair share of the work when requiring them to participate in group projects.



Students contemplate the climb

As can be seen from the attached syllabus, the schedule was deliberately set up to keep the students engaged in their studies but with some time to relax, buy souvenirs, and see tourist attractions. We also had the opportunity to spend a day traveling to and exploring the Mayan ruins at Lamanai. The trip to the ruins began at 7:00 a.m. with a two hour boat trip to the mainland and up the Northern river to the town of Bomba. The trip up the river, through mangroves and tropical forest, gave the students a chance to experience some of the terrestrial biology of Belize. In Bomba, a town of 50, we boarded a very old school bus for a one and a half hour trip to the New river, where we boarded another boat for a one hour ride through the rainforest to Lamanai. The boat captain served as our guide (and lunch caterer) for the two hour tour exploring the

extensive Mayan ruins. On our way to and from Lamanai, we made frequent stops to observe flora and fauna along the river and learn about the different cultures found in Belize and their relationship to the rivers on which we were traveling. We also collected water samples and took data regarding water temperature, depth, dissolved oxygen content, etc, which allowed the students to observe changes in the aquatic environment as we moved from the ocean through an estuary and up the river, as well as to see the impacts of human habitation.

Course strengths and weaknesses: Overall the trip was a great success and there is little that we would change. Ken and Maureen Mattes, the owner/operators of TREC, were very knowledgeable, friendly and helpful. They accompanied us on all of our snorkeling trips, briefed us on what we would see at each site, discussed any potential safety issues (prevailing currents,

dangerous organisms, etc), and then swam with us to point out organisms of interest. We were all appreciative of their efforts, patience, and good humor.

Once again we were fortunate to have an exceptionally well-behaved and enthusiastic group of students who made conducting the course a real pleasure. The students worked hard on their group projects, gained valuable experience in how field biology never goes as planned, and were enthusiastic participants throughout the trip.

If there is any weakness in this course it may be the lack of “dry” time; that is days where we are not snorkeling. After three or four days the students are ready for a change of pace which is why we schedule the trip to Lamanai sometime in the middle of the trip. The next time we offer the course we may seek another activity to insert which will be educational, fun, and partially dry (e.g. rainforest hike, cave tubing, Belize zoo).

Recommended changes: Everything went largely as expected and planned, although our attempt to generate a "virtual collection" of identified marine organisms encountered technical problems that left a number of students frustrated and annoyed. We have already discussed how we might change this and feel confident that we have developed an alternative approach that will be more successful next time. As usual, some of the group projects worked better than others, which is not a surprise; all of the projects did result in data for the students to analyze, and we anticipate using many of the same basic project ideas in future trips. In short, there is some “tweaking” that can be done, but no major changes are necessary.

Assessment and Final Grade Distribution:

Course grades were based on: attendance and "enthusiastic participation" in all class activities, both in South Bend and in Belize; individual contributions to identifying species from the "virtual collection" list; a fish species identification quiz; an invertebrate identification quiz; the students' journals; the group project preview and journal article presentation; the written project proposal; the oral presentations of project results given in Belize; a peer evaluation of group participation; and the final written project report. In general the students worked very hard on their group projects, and all of them earned very high marks on the species identification exercises (the **average** score on the fish identification quiz was a 98%, and the invertebrate identification quiz, for which they had to provide the scientific genus and species names for 40 different organisms, was a 92%!) and on their presentations. Many of the projects did not work out as originally anticipated. While this was viewed by some of the students as a major problem, we were not too concerned, as they were forced to think on their feet, modify their experiments, and make the best out of whatever situation was presented to them. This in itself was an important insight into the vastly different worlds of laboratory-based experiments versus field-based studies. The final grade distribution was 4 A grades, 4 A-, 2 B+, 3 B, and 1 B- (the Nursing faculty were not graded).

Student Housing and Meals:



Students are housed in 3-4 person rooms adjacent to the pool.

Students were housed on site at TREC in triple or quad occupancy rooms with private baths. Morning and evening meals were prepared by the resident cooks and served buffet style in the large eating area. The menu consisted of Belizean and American cuisine (grilled chicken, spaghetti, etc). Water and juice were available all of the time, both at the TREC facility

and on the boat. Sandwiches, fruit and cookies were provided on board the boat for lunch. We heard no complaints about the food, and our group endeared themselves to the cooks by eating voraciously.

Health and Safety:

Over the course of the trip a few people were stung by mildly venomous invertebrates that are commonly found in the tropical oceans, scraped by coral, or slightly sunburned. No injuries were severe enough to require medical attention beyond treatment at the TREC facility by the two nursing faculty (Cyndi Sofhauser and Sue Anderson) who were also participants in the course. Since virtually all activities were done as a group, safety was never an issue. On the occasions when a group of students went into town (San Pedro), they were accompanied by an instructor who carried a two-way radio to remain in contact with those at the TREC lab. We are very militant about knowing where everybody is at all times, both in and out of the water, and while the students initially resent it, we believe they respect the reasons and eventually come to appreciate it.

Overall Recommendations:

Based on the feedback we've received, it appears that both the students and the instructors were very pleased with the course as it was run and have no substantive recommendations to make. While we will probably run the next trip to the TREC lab, we are also going to explore other field sites. As always price, facilities, and safety will be important determinants which will impact any decision to change sites.

Next Program Date:

Due to the limited student pool here at IUSB, we offer this course only every other year. It will be offered again in Summer Session I of 2010.

Issues raised by the Advisory committee during approval process: none.