Passive Hydroacoustics Used to Map and Monitor Spawning Aggregations off the West Coast of Puerto Rico

During the months of January through May 2010, CCRI researchers from University of Puerto Rico, Mayagüez surveyed and monitored red hind and yellowfin grouper spawning aggregations at “Abrir La Sierra” and Mona Island. Listening for the distinctive call of male groupers, passive hydrophones were used to locate and map red hind spawning aggregation sites. Long-term audio recorders were also placed at the two sites throughout much of the season, capturing the acoustic behavior of red hind and yellowfin grouper. The results provide insight into the formation of spawning aggregations and the timing of actual spawning relative to environmental cues. A time-saving process was developed to automatically count red hind calls, which will greatly facilitate future work by eliminating time-consuming manual listening and counting. This NOAA-supported work is based on initial CCRI-sponsored research to categorize calls from groupers at spawning aggregations. The timing and intensity of red hind calls is being compared to data from active acoustic and diver surveys as a means for monitoring grouper aggregations. The ultimate goal from these comparisons is to develop automated and efficient methods for assessing grouper stocks that are independent of winter weather conditions and diver availability at the time of spawning.

2010 Coral Bleaching Update: Effects in Puerto Rico

The year 2010 is turning out to be the hottest year on record, hotter than the unprecedented bleaching event in 2005 when most coral reefs in the wider Caribbean suffered some degree of bleaching and mortalities of up to 50% were recorded. Recent surveys in the south-west and eastern coasts of Puerto Rico, and the US Virgin Islands indicate that the 2010 bleaching event started around mid-to-late September in intermediate depths and shallower habitats in several reefs. CCRI researcher, Edwin Hernandez, reported that the most affected localities seem to be in the eastern coast of Puerto Rico where many colonies from a large number of species show different levels of bleaching signs, from paling spots to completely white colonies. In La Parguera, bleaching signs were first observed by CCRI researcher Ernesto Weil in inner- and mid-shelf reefs, from shallow habitats where the zoanthid *Palythoa caribbaeorum* and a few colonies of *Porites porites* and *Millepora* bleached completely. The species complex of *Agaricia agaricites* was the most affected initially down to 15m. By October 15, bleaching signs were spread through several species and habitats and several species showed bleaching signs in reefs at the shelf edge and down to 40 m (in *A. agaricites*). Twenty species of scleractinian corals and *Millepora* have been observed with bleaching signs. However, several weeks of intense rainfall from late September to October reduced both light and ambient temperatures in coastal waters, which may ameliorate stressful conditions and avoid the widespread impacts observed in 2005.

Bleached colony of *Colpophyllia natans* (above-left) and *Montastraea faveolata* (below-left). (Photos by: E. Weil)
In June 2010, CCRI researcher, Clark Sherman, attended the 1st International Technical Scientific Diving Workshop (ITSDW) at the Interuniversity Institute for Marine Sciences (IUI) in Eilat, Israel. Dr. Sherman gave a talk (“Use of Technical Diving to Study Mesophotic Coral Ecosystems (MCEs) in Puerto Rico”) and presented a poster (“Fish Communities of MCEs in La Parguera, PR”), both of which reported results from the NOAA-sponsored Deep Coral Reef Ecosystem Studies (CRES) team. The workshop sought to bring together scientists, students, and technical personnel actively involved in the application of technical diving to marine research. The workshop included both oral presentations by participants as well as hands-on participation in technical diving research projects being conducted by scientists affiliated with IUI.

Talks ranged from those focused on the technical and logistical aspects of using technical diving in marine research to those talks that presented the latest scientific findings from such studies. The IUI is located at the northern tip of the Gulf of Aqaba, Red Sea where fringing reef drops from the shoreline down to mesophotic depths and beyond. Diving operations were conducted from the IUI’s facilities, which is setup to support both open-circuit (OC) and closed-circuit-rebreather (CCR) technical diving. Workshop participants included a mixture of OC and CCR technical divers. Dr. Sherman was able to conduct a rebreather dive and participate in a coring project examining relict fringing reefs at depths of ~60 m at the northern tip of the Gulf of Aqaba. All other diving was conducted directly from shore from the IUI facilities where Dr. Sherman was able to do several other shallow open-circuit dives. Workshop participants from the US included Richard Pyle of the Bishop Museum, Hawaii (and leader of the Hawaii Deep CRES program) and Marc Slattery, University of Mississippi and Michael Lesser, University of New Hampshire, who both work on Atlantic/Caribbean MCEs. Most other participants were working in Israel and affiliated with the IUI. All participants agreed that the workshop was a tremendous success and there is hope that a 2nd International Technical Scientific Diving Workshop will be convened sometime within the next few years.

**New and Improved Websites for CCRI and MCE Research**

A new updated website for CCRI went live recently. The website has been enhanced and expanded to include our Mesophotic Coral Ecosystem (MCE) research program. Among the new changes, we have posted new photos, updates to researchers and their work and links to relevant publications. Check us out at [http://ccri.uprm.edu/](http://ccri.uprm.edu/) and go to Mesophotic Coral Ecosystems for research links, the latest MCE 2009 Cruise Blog, photo gallery and other Mesophotic related information.

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