

Coupling of Passive and Active Acoustics to Study Grouper Spawning Aggregations in the TER

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Objectives: This project addresses the primary issue of reducing the adverse impacts of fishing by identifying and protecting coral reef fish spawning aggregation sites. Based on diver surveys and bathymetric analyses, we identified three potential spawning aggregation sites on Riley's Hump, in the Tortugas South Ecological Reserve (TSER). Using active, surface deployed split beam sonar, we planned to characterize the habitat and the biomass (target strength) associated with this habitat. Increased numbers of groupers resulting from aggregation behavior should show up as more dominant signals in the sonar returns. We then planned to ground truth the sonar using divers to conduct fish counts using both transects and stationary point counts. We planned to use low-light cameras deployed overnight with hydrophones to record any overnight activity and or spawning/courtship sounds that might be made. Finally, we planned to deploy long term digital spectrum recorders (DSRs) on the three sampling stations. These devices can be deployed for up to a year, and will record at consistent intervals, resulting in a record of the sound environment at each site that could then be analyzed for periodicities in sound production that may be associated with spawning rhythms. We intended to conduct this work over the winter, grouper spawning season for most important groupers found in the Tortugas region. The research plan called for three research cruises in this fiscal year.

Results: Fiscal Year 2010 began October 1, 2010. Our research plan originally called for an initial cruise to deploy equipment and conduct active sonar operations and diver surveys in December 2010, with two more cruises between January 2011 and April 2011. A brief summary in bullet form of cruise activity is given below:

December 2009 cruise – delayed due to lack of funding, unable to charter vessel.

January 2010 cruise – rescheduled from Dec., delayed for same reason.

February 2010 cruise – rescheduled from Jan, delayed for same reason

March 2010 cruise – rescheduled from Feb, funds available, contracting difficulties,
unable to charter vessel in time

April 2010 cruise – Cruise successful – deployed three DSRs as planned. Completed point counts and transects at all three stations as well.

June 2010 cruise – Cruise no.2, retrieved one DSR to download and ensure it was functional. Weather turned too rough to dive for rest of cruise, so dive ops cancelled. No transects or point counts completed.

January 2011 cruise – Cruise no. 3, last of planned FY2010 cruises. Completed

successful 3 day cruise. Recovered and redeployed the two DSRS that had been out overwinter. Redeployed the DSR retrieved in June 2010. Deployed three additional DSRS at additional locations decided upon based on sonar transects and bathymetric analyses. Completed three nights of sonar transects, as well as point counts and transects on original three stations, and two of the new stations. End of FY2010 cruise ops scheduled.

Summary: Cruises had to be delayed in FY2010 due to budgeting constraints. This caused us to not be able to deploy equipment until essentially the very end of grouper spawning season. For this reason we decided to leave the equipment deployed through the next winter, even in the absence of any guaranteed funding for year two, leaving enough money on the vessel contract to ensure one more trip to recover equipment.

We recovered two successfully deployed DSRS that were out from April 2010 until January 2011. These give us data from two potential spawning sites for half of a spawning season. We successfully put in place six DSRS that will remain out now thru the winter of 2011-2012, and will be recovered sometime in the first quarter of 2012, giving us a full spawning season's worth of data from six potential locations. These acoustic data will be analyzed and compared to diver surveys of identified species found on the ground, as well as against the data recorded from the split beam sonar transects.