Project ID#: 453-2013 – Annual Progress Report

Title: Assessing reef fish population recovery, SPAGs and lionfish impacts on prey and predator communities in the TER.

Names of PIs and co-PIs: Michael L. Burton, Dr. Roldan Munoz and Dr. J. Chris Taylor.

Duration of Project: Year 2

Project Category:

- Reduce Adverse Impacts of Fishing
- Improve Use and Effectiveness of MPAs

Brief description of activities conducted in FY2013: Annual sampling/monitoring cruise completed in July 2013.

Description of accomplishments & results: We completed a five day research cruise to the Tortugas South Ecological Reserve, July 23-27, 2013. We completed a total of 188 individual research dives. Eighty-six multiple randomly oriented transect visual censuses were completed encompassing all 16 stations in the south reserve (Riley's Hump). Thirty-three lionfish predator-prey transects were completed encompassing all 16 Riley's stations. Habitat characterization was done in conjunction with lionfish transects on all Riley's stations. Sixteen dives were completed on the cubera snapper aggregation off the western edge of Riley's Hump, and four distinct locations where identified were fish were seen in aggregation. We used split beam sonar to characterize the potential cubera snapper spawning aggregation site. Two bottom temperature loggers were deployed.

We continue to document recovery of previously exploited reef fish species since the inception of protection afforded by reserve designation. Numbers of transects on Riley's Hump on which key species were seen and percentage of total transects completed are given below. Mutton snapper – 36 transects – 42 % vs. 40% in 2011. Black grouper – 21 transects - 24% vs. 26% in 2011. Goliath grouper – 4 transects – 5% vs. 2% in 2011. Red grouper – 5 transects – 6% vs. 18 % in 2011. Other groupers (hinds, scamp, yellowmouth, graysby, coney) – 22 transects - 26% vs. 43% in 2009. Analyses are ongoing but preliminary results include increases in percentage of transects on which important species were encountered compared to 2011 for mutton snapper and goliath grouper. There were eight transects (9.3 %) on which five or more black grouper were observed. By comparison, only 6% and 2% of transects in 2003 and 2004, respectively, had five or more black grouper. We had only two transects on which more than 20 mutton snapper were seen, compared to three transects in 2011.

Equally as important as the recovery of reef fish aggregations is our documentation of the apparent successful invasion of lionfish to the Tortugas Ecological Reserves. Our team sighted our first lionfish observation in April 2010. In July 2011 divers observed lionfish on 20 transects, and numbers observed per transect ranged from one to eleven. In 2013

we observed lionfish on 22 transects as well, equating to a 26% encounter rate, with numbers observed per transect ranging from one to twelve.

We documented the occurrence of large sharks on 13of the 86 transects (15%). Sharks observed included bull, lemon, reef, sandbar, and nurse sharks. Large sharks are likely attracted to the increased biomass found at the reserve because of protection from fishing. We have noticed a substantial increase in the number of these large sharks we see compared to the beginning years of our survey. More detailed shark analyses are planned.

We completed 16 dives on the previously discovered cubera snapper aggregation on the western edge of Riley's Hump, in approximately 200 FSW. Divers were able to observe groups of cubera snapper at four different locations. These will be re-surveyed in 2015 to examine site fidelity of cubera snapper.

How project supports goals & objectives of CRCP: This project supports Fishing Impacts National Objective 2.5 – monitoring to assess the effectiveness of MPAs; National Objective 2.4 Work with relevant agencies, offices, and communities to improve the management of MPAs; National Objective F1.3 Obtain essential life history and ecological information on key species or functional groups to support management actions; and National Objective F1.6 Conduct applied research and monitoring to evaluate effectiveness of coral reef ecosystem management actions on key species or groups. The project supports the following Florida objectives and priorities: FL Objective D1.1 Fill monitoring and assessment gaps, including fisheries dependent and independent monitoring, to further understand the effects on other trophic levels; FL Objective D1.2 identify larval sources, spawning areas, and aggregations; FL Coral Reef Priority A1.2 Develop and implement a comprehensive zoning plan for the entire Florida Reef Tract and Ecosystem and implement through place-based entities and management plans within three to five years (potential expansion of MPAs is part of zoning plan consideration currently ongoing in the Florida Keys); and FL Coral Reef Priority Goal A3 Improve understanding of status and linkages of human activities to the condition and trends of the Florida Reef Tract and Ecosystem, Objective 1. Create a full inventory of status, trends and threats to coral reef resources across the entire Florida Reef Tract and Ecosystem within five years. This project aids managers in understanding and demonstrating the benefits of properly managed marine reserves to coral reef resources, from both a habitat and fishery standpoint.

How project supports management of coral reef resources (please include how research plans, progress and accomplishments are articulated to managers):
This project is providing much needed scientific evidence that even severely exploited species, once protected from excessive fishing pressure, may indeed recover. The documentation of mutton snapper spawning aggregation reformation after years of heavy overexploitation should further justify and advance the use of marine protected areas as a viable management tool to protect both coral reef fishes and coral reef habitat. Documentation of the recovery of exploited species once they are protected from fishing benefits coral reef ecosystems (reef fish populations plus the coral reef habitat they use) by showing the effectiveness and utility of using MPAs as a management tool to protect

these ecosystem components. Documentation of the effectiveness of MPAs in recovering exploited fish populations is of great relevance to the fisheries management community (South Atlantic Fishery Management Council, Gulf of Mexico Fishery Management Council) as well as to the Florida Keys National Marine Sanctuary. Findings will be presented to the Fishery Management Councils in the form on non-technical summary reports. These results will be shared with the Caribbean Fishery Management Council, as well as the territorial fishery management agencies where spawning aggregation management is an important issue.

This project will also supply valuable information to managers about the effect of predation by an invasive species, the lionfish, on native juvenile reef fish populations. We also hope to provide results on the potential for healthy adult reef fish populations, such as those found in a protected reserve area like Riley's Hump, to act as a natural control on invasive populations of lionfish, as compared with the greater Florida Reef Tract, where the number of upper trophic level predators is greatly reduced due to exploitation.

List of project Partners and their roles:
FWC Marathon Laboratory, contacts Alejandro Acosta/John Hunt – partners in research cruises.
NOAA FKNMS – contacts Scott Donahue – partners in research coordination/planning.

NOS/NCCOS/CCFHR – contact Chris Taylor – cruise team participant, conducting split-beam sonar mapping operations.

Communications, media exposure, capacity building, education and outreach activities: Presentation delivered to South Atlantic Fishery Management Council in April 2014 about the effects of marine reserve designation in recovering the exploited reef fish stocks on Riley's Hump.

Submissions to CoRIS: None

Publications during FY2013 (including reports, tech Memos, etc): No publications in 2013. There is currently a peer-reviewed publication in journal review for the grouper acoustics project completed in 2012.

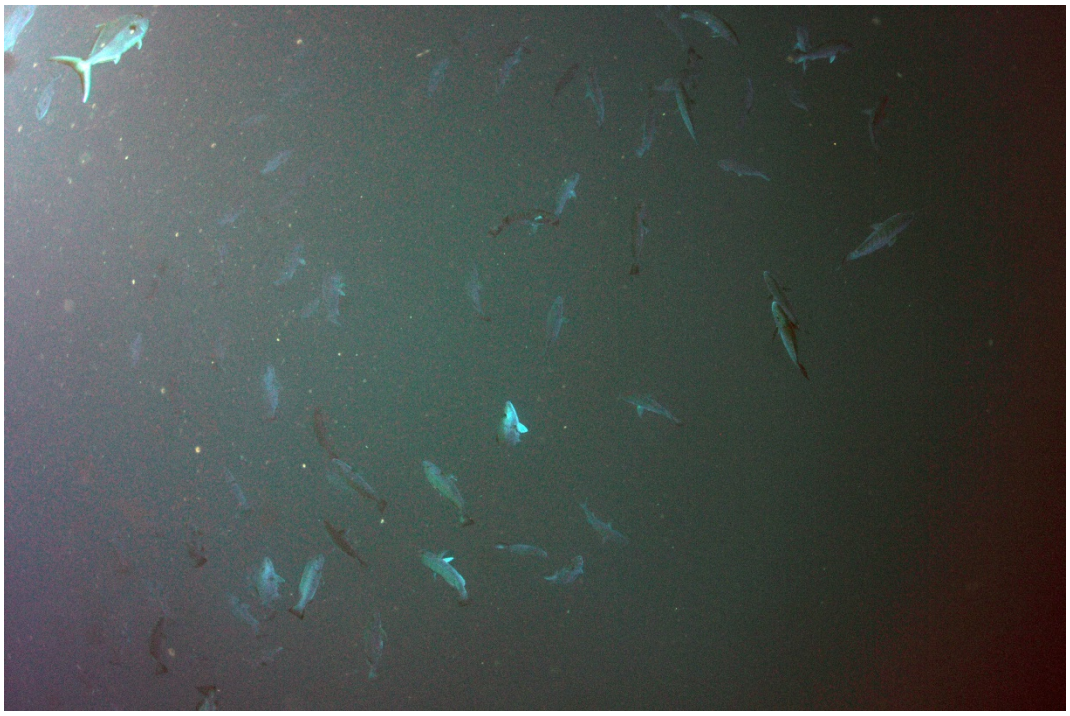
Presentations at professional meetings (oral/posters/moderator/editorial responsibilities etc.):

Setbacks or challenges encountered in FY13: Challenges with contracting process due to somewhat late arrival of funds, but it got done.

Comments on future direction of project (outyear plans and notes on how project (or future projects) will align with new CRCP priorities going forward):

Final year of three year project is 2015. We will conduct our final Riley's Hump monitoring/lionfish cruise in July 2015. I believe continued monitoring of both recovering reef fish populations and the lionfish prey community would be beneficial, to further elucidate the effect of the lionfish invasion on the native fish communities, but this appears to not be a priority of the CRCP going forward. We also feel it would be important to continue to study the function of the cubera aggregation found on the west edge of Riley's Hump, still located in the protected TSER boundary.

Image/Photo - feel free to include a great figure, table, image or photo that best represents your project (optional):



July 2013 Cubera Snapper Aggregation found off western edge of Riley's Hump (credit D. Bryan).