Semi-Annual Report

South Atlantic Shelf-edge MPAs and Deep-water Coral HAPCs
Summary of Accomplishments to Date (October 1, 2013–March 31, 2014)

Project ID#:	NA11NMF4410061
Title:	**South Atlantic MPAs and Deepwater Coral HAPCs: Characterization of Benthic Habitat and Fauna**
PIs and co-PIs:	Stacey Harter, Andrew David, John Reed
Duration of Project:	3 years

Shelf-edge MPAs

Status of data from 2013 MPA Cruise:

Data collected during this cruise are being analyzed and, once completed, the report will be prepared.
Data sets included:
ROV navigation data
ROV dive log data
Dive metadata
In situ photographs, and transect images for quantitative analysis of benthic habitat and biota.
Transect video for fish analysis
CTD data
Data were entered into our At-sea Access database, and proofed for inaccuracies

Benthic Habitat and Biota Analysis - Poor and unusable photos (e.g., blurred, black, off bottom) or overlapping photos were not included in the analyses. Percent cover of substrate type and benthic macrobiota was determined by analyzing the quantitative transect images with Coral Point Count with Excel extensions (CPCe 4.1©, Kohler and Gill, 2006), following protocols established in part by Vinick et al. (2012) for offshore, deepwater surveys in this region. Random points overlaid on each image were identified as substrate type and benthic taxa. Substrate categories included: soft bottom (unconsolidated sand, mud) and hard bottom which was subdivided into rock (pavement, boulder, ledge), rock rubble/cobble (generally, 5-20 cm), and framework coral (standing coral colonies). All macro-benthic biota (usually >3 cm) were identified to the lowest taxa level possible.

The benthic macrobiota were quantified by analyzing the images for each dive using two methods: 1) species occurrence (presence/absence), 2) percent cover of benthic biota. The photos were linked to the Access database and separated into individual transects that were based on the following habitat categories. We used the same protocol in defining habitat

categories as the 2012 cruise which will be used to define and characterize the benthic habitats for the shelf-edge reefs and MPAs off southeastern U.S. and within the jurisdiction of the South Atlantic Fishery Management Council. These habitat categories are then entered into the HBOI Microsoft Access at-Sea Database for each ROV dive site. These categories are used along with the Coral Point Count data from the photo transects to characterize the benthic habitat and distribution of benthic biota, and also used with the video data for the fish population analyses.

1. *[On/Off Reef]*: "On Reef" or "Off Reef"- Simple designation of when the dive is on some type of hard bottom (=On Reef) vs Soft Bottom (=Off Reef). This designation is not for any individual photo, but for a zonation within the dive.

2. *[Habitat_Zone= Geomorphology]*: This describes the geological feature; e.g., Ridge-West Slope, Ridge- East Slope, Ridge-Top, Soft Bottom. This category is used to plot the percent cover of benthic macro-biota for each habitat zone at each dive site and to plot the dive track overlay on multibeam sonar maps in ArcGIS.

3. [*Relief*]: LR= Low Relief (0- <1.0 m), MR= Moderate Relief (1-3 m), HR= High Relief (>3 m). This is modified from the SEAMAP designations of outer continental shelf benthic habitat. This category is dependent on the distance over which the depth change occurs. We define relief as the relative height of rock ledges, boulders, or rock outcrops. It can also indicate a region where a drop-off or slope of a mound or ridge occurs over a relatively short distance. This distance should be in the range of 10-20 m, which could be within the field of view for observing fish schools. For example, most of the habitat for these shelf-edge MPAs are NE-SW oriented ridges. Typically the top of the ridge is low relief pavement with rubble and sand patches. The east or west slopes tend to be a jumble of eroded rock slabs. The individual slabs and ledges may only be 1 m or less in relief, but if the drop-off of 3-5 m occurs over a short distance of 10-20 m width; this would be designated as HR. In some areas smooth rock mounds or knolls are present. These may be 5 m tall or more, with a relatively steep 30-45^{o} slope over a relatively short horizontal distance, but few or no ledges. These also will be designated HR.

4. [*Rugosity*]: LRu= Low Rugosity, HRu= High Rugosity. Rugosity here is defined as a degree of ruggedness of the rock bottom. This will be relative to the size of rock ledges, holes, crevices, which tend to provide the greatest fish habitat. High Rugosity on these shelf-edge reefs occurs primarily along the edges of the rock ridges where there is a zone of fractured rock slabs, or zones of boulders or rock outcrops. Low Rugosity would be the flat rock pavement typically found top of the ridges or at the base of the mounds and ridges. Low Rugosity would also define the rounded rock mounds and knolls that are devoid of ledges and loose boulders. For the present, this will be an unquantified relative term. Most of our multibeam sonar maps are of relatively low resolution (5-10 m) and cannot be used to quantify rugosity at this scale; high resolution (<0.5 m) contour multibeam maps would be needed to quantify this characteristic in the future.

5. [*Seadesc Code= Substrate*]: SEADESC Habitat Categories (Table 1). This is a modified subset of SEADESC Habitat Categories which was developed by the NOAA Deep-Sea Coral Program for use in analysis of deep-sea coral surveys (Partyka et al. 2007). These categories which are useful for characterizing deep coral habitat were modified to make them useful for these shelf-edge habitats. The presence of fauna was not included as it is quantified in the Point Count analyses. In the region of this survey, the habitat types included: rock pavement, pavement with ledges, pavement with sediment veneer, rock ledges and boulders, rubble/cobble, and soft bottom. This category is also used to plot the dive track overlay on the multibeam sonar maps in ArcGIS.

Table 1. SEADESC Benthic Habitat Category Codes (Modified).

ID	Code	Habitat Name	Habitat Description
1	S	Soft Substrate	Unconsolidated sand/mud, unlithified
2	SR	Soft Substrate/Rubble/Rock	Soft substrate (>50% cover) with rubble and/or rock
3	R	Rubble	Rubble/cobble (~5-20 cm sized rock or coral)
4	RL	Rock/Ledges	Rocks and/or ledges
5	P	Pavement	Rock pavement
6	C	Hard Corals	Live and/or dead colonial scleractinian coral; standing individual colonies, bushes, or thickets.
7	TH	Tilefish (blueline or golden; not sand tile)	Soft bottom with visually identifiable burrows
8	A	Artificial Substrate	Any artificial structure that provides habitat for fishes and/or invertebrates

Prior to CPCE Point Count analysis, a photo album was made of all macrobiota taxa and fish that have been photographed on this cruise and the 2012 cruise. This is a PDF document, sorted by taxa, which is useful in identifications of species during the analysis.

Presently about 50% of the dives have been quantified with Point Count.

Fish analysis – Analysis of data for 26 of 33 dives have been completed thus far. ROV dives were divided into transects of similar habitat characteristics and all fish species were identified to the lowest taxon possible and counted for those transects. Habitat categories used in the benthic habitat/biota analysis are also used with the fish analysis. The remaining 7 dives will be finished up in the next few weeks followed by an analysis which will be completed and included in the final cruise report.

A final cruise report with detailed analysis is on schedule to be completed by June 2014.

2014 *Pisces* MPA Cruise:

We are scheduled for ship time on the NOAA R/V *Pisces* from June 16-27 (12 sea days) and are currently in the planning phase for it. The project instructions have been submitted to the ship, the multibeam mapping crew has been established, and a NOAA teacher at sea has been assigned to join us on the cruise.

Meetings/Presentations:

John Reed provided an oral presentation at the February 2014 ASLO meeting entitled, "Mapping, Characterizing, and Interrelationships of Mesophotic Coral/Sponge Habitats and Fish Communities within Shelf-Edge Marine Protected Areas off Southeastern United States." John Reed, Stacey Harter, Stephanie Farrington, Andrew David.

Stacey Harter was invited to give several presentations to the SAFMC Snapper Grouper Committee in December 2013 and the SAFMC Snapper Grouper Advisory Panel in April 2014. The presentations were a summary of what has been accomplished thus far on the Amendment 14 south Atlantic MPAs and what information is known about possible future MPAs under Amendment 17.

Deep Coral HAPCs

In the spring of 2013, PI Reed attended a workshop on Interrelationships between Coral Reefs and Fisheries. An edited book volume is being produced as a result of the workshop and is scheduled to be out in June, 2014.

In March 2014, our manuscript was accepted for publication:
Reed, J.K., Stacey Harter, Stephanie Farrington, Andy David. 2014. Characterization and interrelationships of deepwater coral/sponge habitats and fish communities off Florida, USA. Chapter 5 in "Coral Habitat and Fish Interrelationships", CRC Press, p. 49-80.

This paper was based on our cruise to survey the new Humps Shelf Edge MPA and Pourtales Terrace Deepwater Coral HAPC off the Florida Keys. The paper characterizes these deepwater and mesophotic reef communities and compares the interrelationships of the benthos and the associated fish communities including commercially important species such as snowy grouper, blueline tilefish, queen snapper, blackbelly rosefish, red porgy, amberjack, and silk snapper.