

NOAA CIOERT Cruise Report

South Atlantic MPAs and Deepwater Coral HAPCs: Characterization of Benthic Habitat and Fauna for NOAA Ship *Pisces* Cruise 13-03 UNCW *Super Phantom* ROV July 2-11, 2013

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John Reed, Co-Principal Investigator
Harbor Branch Oceanographic Institute, Florida Atlantic University
Fort Pierce, FL
Email: jreed12@hboi.fau.edu

Stacey Harter, Principal Investigator
NMFS/Southeast Fisheries Science Center (SEFSC)
Panama City, FL
Email: stacey.harter@noaa.gov

Stephanie Farrington, Biological Scientist
Harbor Branch Oceanographic Institute, Florida Atlantic University

Andrew David, Co-Principal Investigator
NMFS/Southeast Fisheries Science Center (SEFSC)
Panama City, FL
Email: andy.david@noaa.gov



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EXECUTIVE SUMMARY

A 12 day research cruise was conducted July 2-11, 2013, on the NOAA Ship *Pisces* with the UNCW *Super Phantom* ROV by NOAA National Marine Fisheries in collaboration with the Cooperative Institute for Ocean Exploration, Research, and Technology (CIOERT) at Harbor Branch Oceanographic Institute, Florida Atlantic University (HBOI-FAU), and other academic and federal partners (including NOAA NCCOS and University of North Carolina at Wilmington).

Recently, the South Atlantic Fishery Management Council (SAFMC) established eight deepwater Marine Protected Areas (MPAs) along the outer continental shelf off the southeastern U.S. This project is one of several research cruises to document and characterize the benthic habitat, benthic biota, and fish populations within and adjacent to these protected areas within the jurisdiction of the SAFMC. This monitoring program for the MPAs will ensure the Council remains well informed of changes within reef fish populations and coral habitats associated with these MPAs.

A Cruise Plan for the 2013 *Pisces* cruise was finalized and approved by the NOAA Office of Marine and Aviation Operations, detailing the operating area, research objectives, personnel, itinerary, equipment, data management, and the methods for each operation including ROV operations, multibeam sonar surveys, and CTD casts.

This Final Cruise Report provides a detailed characterization of the benthic habitat, benthic sessile biota, and fish populations for each ROV dive site. In addition, this report uses analysis of similarity (PRIMER) to compare the fish populations, benthic communities, and habitat types among the various shelf-edge MPA sites, the proposed MPA sites, and other non-protected sites outside of the MPAs. Appendices 1 and 2 provide the complete species list of benthic biota and fish, respectively, observed at each dive site. Appendix 3 provides a SEADESC Level II Report for each dive site, including: cruise and ROV dive metadata, figures showing each ROV dive track and habitat zones overlaid on multibeam sonar maps, dive track data (start and end coordinates and depth), objectives, CTD plots, general description of the habitat and biota, and images of the biota and habitat that characterize the dive site. The SEADESC Level II Report also provides quantitative analyses of each dive site including: 1) CPCe 4.1[®] Coral Point Count analysis of percent cover of benthic biota and substrate types, and 2) densities of fish populations (# individuals/km for each species).

A total of 33 ROV dives were conducted, resulting in a total bottom time of 48.75 hours, covering 56.4 km, at depths from 36 to 156 m. A total of 61 hours of ROV video were recorded and 3,409 *in situ* digital images were taken which included quantitative transect images, general habitat, and species documentation images. Thirteen shipboard CTD casts were made. Ten sites were surveyed with multibeam sonar and covered a total area of 218.1 km². These sites had never been surveyed previously with multibeam sonar. Georeferenced maps were made for each of the sites and were ground-truthed with the ROV dives.

Ultimately these data from the various cruises will be used to characterize and document the habitat, benthic communities, and fish populations within the shelf-edge MPAs along the

southeastern U.S. from North Carolina to south Florida. These data may then be compared to future research cruises to better understand the long-term health and status of these important ecosystems. These data will be of value to the SAFMC, NOAA Fisheries, NOAA DSCRTP, NOAA CRCP, NOAA Mesophotic Reef Ecosystem Program, and NOAA Marine Sanctuaries for management decisions on these habitats and managed key species.

ACKNOWLEDGEMENTS

We gratefully acknowledge funding for research support and ROV operations by the NOAA Coral Reef Conservation Program (CRCP) and the South Atlantic Fishery Management Council (CRCP Fishery Management Council Coral Reef Conservation Cooperative Agreements- Grant #: NA11NMF4410061). We also acknowledge the NOAA Office of Ocean Exploration and Research (OER Grant #: NA09OAR4320073), the NOAA Deep Sea Coral Research and Technology Program (DSCRTP), and the NOAA Office of Marine and Aviation Operations (OMAO) which provided support for ship time.

We thank the NOAA Cooperative Institute for Ocean Exploration, Research, and Technology (CIOERT) at Harbor Branch Oceanographic Institute, Florida Atlantic University (HBOI-FAU), and the Robertson Coral Reef Research and Conservation Program at HBOI. The crews of the NOAA Ship *Pisces* and UNCW ROV are especially thanked for their support and efforts which made this cruise a success.

DELIVERABLES AND DATA MANAGEMENT

This Final Cruise Report and SEADESC Level II Report is a deliverable for this NOAA CRCP/SAFMC grant. To date, all data have been archived as required; these data include shipboard data, raw and processed multibeam sonar data, CTD, ROV navigation data, ROV video and digital images, ROV dive annotations, and HBOI Microsoft Access at-Sea Database (Table 1). A complete set of original data are archived by the Principal Investigators at NOAA Fisheries, Panama City (Stacey Harter) and HBOI-FAU (John Reed).

The NOAA Ship *Pisces* survey department, under the direction of the Operations Officer, has archived all multibeam data at the National Geophysical Data Center. This archive will be conducted in consultation with the Principal Investigator to ensure there is no unintentional release of sensitive data.

Table 1. 2013 NOAA Ship *Pisces* cruise, July 2-11, 2013, data archives (Principal Investigators- Stacey Harter, Andrew David, NOAA NMFS, Panama Lab; John Reed, HBOI-FAU).

Source	Description	Format
Ship	Multibeam (MB) sonar- raw	PDS
Ship	MB- processed files (corrected for tides and sound velocity)	CARIS, HDCS,XYZ (ASCII)
Ship	MB- GeoTIFF	TIFF

Ship	CTD	CSV
ROV	ROV video- digital copies of all ROV dives	External hard drives, DVD
ROV	ROV digital still images	JPEG; External hard drives, DVD
ROV	Event log	CSV
Science	ROV dive track polygons	ArcGIS shapefile
Science	Cruise database	Access MDB

CIOERT/NOAA COLLABORATION

The primary focus of this research cruise is to advance NOAA OER goals while complementing the management objectives of NOAA CRCP, NOAA DSC RTP, NOAA Mesophotic Reef Ecosystem Program, NOAA CIOERT, and the South Atlantic Fishery Management Council.

For this cruise, collaborators included NOAA NMFS (Andrew David, Stacey Harter, Heather Moe, Steven Mathews; Panama City), NOAA NCCOS (Laura Kracker), NOAA CIOERT at HBOI-FAU (John Reed, Stephanie Farrington), and UNCW (Lance Horn, Glenn Taylor).

SCIENTIFIC PARTICIPANTS

Stacey Harter	Chief Scientist, Principal Investigator	NMFS-Panama City Lab
Andrew David	Co-Principal Investigator	NMFS-Panama City Lab
John Reed	Co-Principal Investigator	HBOI-FAU, CIOERT
Stephanie Farrington	Biological Scientist, Data Manager	HBOI-FAU, CIOERT
Laura Kracker	Multibeam Sonar Specialist	NOAA/NCCOS
Steven Matthews	Scientist	NMFS-Panama City Lab
LTJG Heather Moe	Scientist	NMFS-Panama City Lab
Lance Horn	Chief ROV Pilot	UNCW
Glenn Taylor	ROV Pilot	UNCW
Jennifer Petro	Teacher-At-Sea	Teacher-At-Sea
Brian Cousin	Videographer/photographer	HBOI-FAU

PROJECT OVERVIEW

The South Atlantic Fishery Management Council (SAFMC) and Department of Commerce through the Magnuson-Stevens Fishery Management Act has established eight deepwater Marine Protected Areas (MPAs) and five deepwater Coral Habitat Areas of Particular Concern (CHAPCs) in addition to the *Oculina* Coral HAPC along the outer continental shelf off the southeastern U.S. This project proposes to document and characterize the benthic habitat, benthic sessile biota, and fish populations within some of the these protected areas and within the jurisdiction of the SAFMC.

In February 2009, the SAFMC implemented eight Type II MPAs between Cape Hatteras, NC and the Florida Keys to protect seven species of the deepwater snapper-grouper complex. The closures, however, will provide ecosystem-level benefits to the entire complex as well as protect the shelf-edge reef habitat they utilize. These consist of five species of grouper: snowy grouper (*Hyporthodus niveatus*), yellowedge grouper (*H. flavolimbatus*), warsaw grouper (*H. nigritus*), misty grouper (*H. mystacinus*) and speckled hind (*Epinephelus drummondhayi*), and two species of tilefish: golden tilefish (*Lopholatilus chamaeleonticeps*) and blueline tilefish (*Caulolatilus microps*). The deepwater shelf-edge MPAs are known to contain reef habitat exploited by these five species of grouper as well as deep mud banks used by the two tilefish species. These species are considered to be at risk due to currently low stock densities and to life history characteristics which subject them to substantial fishing mortality.

Bottom-tending fishing gear has been shown to have deleterious effects upon reefs and is now prohibited in the MPAs. These sites were designated by the Council to protect spawning grounds of reef fish. As such, decisions to create future area closures will be based upon the efficacy of these areas and the lessons learned during their implementation. Additionally, the MPAs contain extensive areas infested with the invasive lionfish, whose population continues to rapidly expand. Future monitoring will assist in evaluating the effects of this invasion on the ecosystem. Area closures constitute a politically charged issue that is unlikely to retain support without evidence indicating increases in the target species. This project will benefit coral reef ecosystems directly by improving our understanding of the impact of fishing activities on both fish and invertebrate species.

The proposed monitoring program for the MPAs will ensure the Council remains well informed of changes within reef fish populations and coral habitats associated with these MPAs. NOAA NMFS conducted preliminary examinations of five of these potential MPA sites in April-May 2004, June 2006, August 2007 and July 2008. Post-closure data were also collected in November 2009 and May 2010. The MPAs afforded the opportunity to obviate the criticisms of comparing MPAs with adjacent open-to fishing areas by examining the MPAs for four years prior to the closures. Since monitoring began in 2004, this project has produced population density estimates of targeted reef fish species within the boundaries of five of the eight MPAs and adjacent control areas, before and after closure. This Final Cruise Report for the 2012 NOAA *Pisces* cruise will be one of three that are planned for 2012, 2013, and 2014 by NOAA CRCP and SAFMC.

GOALS

The primary goal of the cruise is to gather additional data on habitat and fish assemblages in the South Atlantic MPAs as part of a long term sampling program to document changes in these areas before and after implementation of fishing restrictions. Efficacy testing of this management tool will aid fishery managers in future use of area restrictions for the protection of valuable habitat and fishery resources.

This project is in direct support of Fishery Management Council activities associated with the characterization of protected shelf-edge and deepwater coral ecosystems and the efficacy testing

of existing Marine Protected Areas. It directly addresses the following CRCP National Goals and Objectives: obtain ecological information for coral reef fishes and spawning aggregations. Activities may include: a) studies that identify, map and characterize fisheries habitat (including essential fish habitat, habitat areas of particular concern, and spawning aggregation sites) in U.S. coral reef ecosystems, and assess the condition of the habitat; b) studies associated with coral reef areas that are currently, permanently, or seasonally closed to fishing, or that may merit inclusion in an expanded network of no-take ecological reserves; and c) multi-beam or sidescan sonar mapping and ground-truthing, habitat characterization, and monitoring of such areas, including deeper coral reefs, banks and beds.

Ultimately the primary benefits of these data are to characterize and document the habitat, benthic and fish communities within the shelf-edge MPAs along the southeastern U.S. from North Carolina to south Florida. These data may then be compared to previous and future research cruises and to areas adjacent to the protected areas to better understand the long-term health and status of these important deepwater coral/sponge ecosystems. These data will be of value to the SAFMC, NOAA Fisheries, NOAA DSCRTP, NOAA CRCP, NOAA Mesophotic Reef Ecosystem Program, and NOAA Sanctuaries for management decisions on these habitats and managed key species.

OBJECTIVES

The primary objectives of the three research cruises (2012, 2013, and 2014) are to gather additional data on habitat and fish assemblages in five of the newly designated shelf-edge, South Atlantic Grouper/Tilefish Marine Protected Areas (MPAs) as part of a long-term sampling program to document changes in these areas before and after fishing restrictions were implemented. Efficacy testing of this management tool will aid fishery managers in future use of area restrictions for the protection of valuable habitat and fishery resources. Specific objectives include:

- Conduct remotely operated vehicle (ROV) transect surveys of habitat and fish Assemblages
- Collect bathymetric data with the ME-70 multibeam mapping system on the ship to locate hard-bottom features and potential ROV dive sites
- Conduct total water column Conductivity-Temperature-Depth (CTD) profiles
- Collect midwater fisheries acoustic data with the EK-60 split beam system

OUTREACH AND EDUCATION

The goal of the expedition's education and outreach activities is to promote ocean literacy, knowledge of deep coral ecosystems and challenges of exploring and managing deep ocean frontiers for public and classroom audiences. Related outreach/education activities included: NOAA Teacher-at-Sea and web materials for HBOI CIOERT.

METHODS

The UNCW *Super Phantom S2* ROV, piloted by Lance Horn and Glenn Taylor, was used. ROV transect locations were selected by four methods; analysis of the limited multibeam bathymetric and acoustic backscatter maps produced within the preceding decade, reef locations provided by colleagues, sites found during previous years of this survey, and analysis of areas mapped on the current cruise. ROV dives ranged from 1 to 4 hours in length, covering an average length of 1.5 km. Downward looking still images were taken at regularly timed intervals to provide a randomized dataset of percent cover by habitat type. Both forward looking video and forward and down looking still imagery incorporated paired lasers to allow measurements of targets.

ROV Operations

Surveys were conducted with the UNCW *Super Phantom S2* ROV which was equipped with standard definition digital video and digital still cameras mounted on tilt bar, parallel lasers for scale, and temperature/depth recorder.

ROV Navigation:

The ROV uses an integrated navigation system consisting of Hypack Max software on a Dell 1.6 GHz computer, ORE Offshore 4410C Trackpoint II Underwater Acoustic Tracking System with an ORE Offshore 4377A transponder with depth telemetry, Northstar 951XD differential GPS, and Azimuth 1000 digital compass. This system provides real time tracking of the ROV and ship to the ROV operator and the support vessel's bridge for navigation. Ship and ROV positions are logged and processed after each dive and provided to the scientist in an Excel file. Geo-referenced TIFF files obtained with multibeam sonar can be entered into Hypack as background files to display target sites and features of interest to aid in ROV and support vessel navigation. All data documentation (digital images, video, dive annotations) are geo-referenced to ROV position by matching the time and date to the ROV navigation files.

ROV Survey Protocol:

During each dive the primary objectives were to document benthic habitat, benthic sessile biota, and fish populations, and to conduct photo/video transects which were used for quantitative analyses of the habitat and biota. The general protocol included:

1. During the photo/video transects, we attempted to keep the ROV <1 m off bottom with a speed over ground of ~ $\frac{1}{4}$ knot. Variable, strong currents often made this difficult to impossible.
2. Underwater video was viewed in real time on the support vessel by PIs familiar with the local deep-water fauna; audio annotations describing habitat, benthic biota, and fish were recorded onto the video and transcribed into a Microsoft Access database.
3. Still images were captured with the digital still camera every 1-2 minutes throughout the dive.
4. Field notes and video images were reviewed and summarized to identify habitats and biota. These summaries were compiled in ArcGIS format and used to produce a habitat maps.

5. Still images captured from the photo transects were analyzed using CPCe[®] software to determine relative percent cover of benthic biota and habitat types.
6. Video transects were used for analysis of fish populations.

Fish Surveys

A Sony standard resolution, single-chip color video camera (410x380 pixels; 79° diagonal angle in water) with 12:1 zoom, and auto/manual focus provided video documentation during ROV operations. An On-Screen Display (OSD) video overlay recorded time, date, ROV heading, and ROV depth. The video footage was recorded continuously throughout each dive from surface to surface and recorded to 2 TB hard drives and copies to DVDs. The camera was typically angled down ~30° to view both near and far to the horizon for fish aggregations and habitat. A headset microphone was used for continuous audio annotations by the PIs describing events, habitat, and fauna which were recorded onto the video recordings and transcribed into a Microsoft Access 2010 database. Along with being used as the main “pilot” view, the video was the primary data source for the quantitative analysis of the fish populations. All fish were identified for each ROV dive to species level and counted. The total distance (km) of each dive was used to calculate the density (# individuals/km) of each fish species. The video camera angle precludes an accurate calculation of areal density of the fish (i.e., # km⁻²); however, we estimate that the field of view width was generally about 10 m, and most fish were identified within a 5 m distance. So the densities listed in Appendix 2 could be multiplied by 0.1 to get an estimate of the number of fish km⁻² (based on an average 10-m width field of view).

Benthic Surveys

Geo-referenced digital still images were acquired with an Insite Pacific Inc. Scorpio Plus digital still color camera and strobe. This camera features a 4X zoom lens; internal electronics and imaging device are a Nikon Coolpix 995. In fine resolution setting, the 1 gigabyte, compact flash card can store 664 images in JPG format (approximately 1.0 Mb per image), which were copied to DVD media. Quantitative photo transects were conducted during each ROV dive using the digital still camera pointing straight down (or perpendicular to the substrate as possible) with parallel lasers (10 cm) for scale. In general, digital images were taken every two minutes continuously throughout the dive. Each photo filename was coded with corresponding EDST time and date code (using Stamp 2.8 by Tempest Solutions[®]) which was imported into MS Access and linked to the ROV navigation data for site specific data of coordinates and depth and then imported into ArcGIStm 10.0. Non-transect photos, such as to record a specific species, were not included in the quantitative analyses. Poor and unusable photos (blurred, black, off bottom) or overlapping photos were removed from the quantitative analyses.

Benthic Analyses

Percent cover of substrate type and benthic macro-biota was determined by analyzing the quantitative transect images with Coral Point Count with Excel extensions (CPCe 4.1[®], Kohler and Gill, 2006), and 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.

For this report we used the following terminology: Hard bottom is sometimes referred to as live bottom due to the amount of living organisms attached to these substrates (SAFMC, 1998). Hard bottom provides anchorage for sessile or semi-sessile organisms (e.g., corals, octocorals, anemones, hydroids). Coral is defined by NOAA [Lumsden, S.E., T. Hourigan, A. Bruckner, and G. Dorr, eds., 2007, The State of Deep Coral Ecosystems of the United States. NOAA Technical Memorandum CRCP-3] as hard corals (stony corals- Scleractinia) and other taxa with solid calcareous skeletons (e.g., Stylasteridae), as well as non-accreting taxa such as octocorals (Alcyonacea- “gorgonacea”) and black corals (Antipatharia).

Protocol for Benthic Habitat Characterization

This document defines the habitat categories that 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 data are result of the ROV video observations and multibeam sonar maps where available. These habitat categories are then entered into the HBOI Microsoft Access at-Sea Database for each ROV dive site. These data are used along with the CPCe 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° 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 2). 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 2. 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

Statistical Analyses

Multivariate analyses were used to determine differences in benthic fauna assemblages and fish assemblages among dives. All analyses were conducted in PRIMER 6 and based on guidelines of Clarke and Warwick (2001) and Clarke and Gorley (2006). The dive sites were compared by their Management Status (within the MPA boundaries vs outside the MPAs, i.e., ‘no protection’). For the benthic analysis, images were analyzed using CPCe for percent cover of benthic biota. The CPCe percent cover data were then averaged by location inside and outside the MPAs (e.g., Inside Snowy Wreck MPA and Outside Snowy Wreck MPA). Then these data were square root transformed to reduce the dominate influences of copious species to the similarity matrix.

For the fish analysis, fish species were counted within each transect, summed for the entire transect and then divided by the total distance examined with in each transect. This resulted in the sum of each species per km by transect. The counts were then averaged by site and fourth root transformed to reduce the dominate influences of copious species to the similarity matrix.

Similarities between samples for both fish and benthic biota (separately) were then calculated using S17 Bray-Curtis similarity. A non-metric multidimensional scaling ordination (MDS) plot and a dendrogram with group-average linking were created showing the results of a concurrently run SIMPROF ‘similarities profile’. SIMPER: ‘Similarity Percentages’ was utilized to determine which species contributed to the dissimilarities among group pairs.

Multibeam Sonar Mapping

NOAA acoustic surveys using multibeam sonar (Simrad ME-70) for bathymetric data were conducted at ROV dive sites where multibeam maps were not available. The main objective of the sonar surveys was to provide background maps to guide ROV exploration at dive sites. The ME-70 as configured on the NOAA ship *Pisces* was not intended to be used for bathymetric mapping without the bathymetry software module. A MATLAB routine, developed and provided by Tom Weber (UNH), was applied to these data to detect and extract bottom depths. The output was then imported into Fledermaus 3D visualization software and converted to geoTIFF images. The MB team consisted of the following:

Knuth, Friedrich	College of Charleston
Kracker, Laura	NOAA NOS
Ribera, Martha	Boston University
Weber, Tom	UNH Center for Coastal and Ocean Mapping

RESULTS

Study Areas

The cruise was on the continental shelf edge of the South Atlantic Bight between Jacksonville, FL and Cape Fear, NC. Five shelf-edge MPA sites and adjacent non-protected sites were surveyed (Figs. 1-4).

- Florida MPA: Northwest corner at 30°29' N, 80°14' W; northeast corner at 30°29' N, 80°2' W; southwest corner at 30°19' N, 80°14' W; and southeast corner at 30°19' N, 80°2' W.
- Georgia MPA: Northwest corner at 31°43' N, 79°31' W; northeast corner at 31°43' N, 79°21' W; southwest corner at 31°34' N, 79°39' W; and southeast corner at 31°34' N, 79°29' W.
- Edisto MPA: Northwest corner at 32°24' N, 79°6' W; northeast corner at 32°24' N, 78°54' W, southwest corner at 32°18.5' N, 79°6' W and southeast corner at 32°18.5' N, 78°54' W.
- South Carolina MPA: Northwest corner at 32°53.5' N, 78°16.75' W; northeast corner at 32°53.5' N, 78°4.75' W; southwest corner at 32°48.5' N, 78°16.75' W; and southeast corner at 32°48.5' N, 78°4.75' W.
- Snowy Wreck MPA: Northwest corner at 33°25' N, 77°4.75' W; northeast corner at 33°34.75' N, 76°51.3' W; southwest corner at 33°15.75' N, 77°0' W; and southeast corner at 33°25.5' N, 76°46.5' W.

Cruise Summary

A total of 33 ROV dives were conducted from July 2 to July 11, 2013 on the NOAA Ship *Pisces*, resulting in a total bottom time of 48.75 hours, covering 56.4 km, at depths from 36 to 156 m (Table 3, Figs. 1-4). A total of 61 hours of ROV video were recorded and 3,409 in situ digital images were taken which included quantitative transect images, general habitat, and species documentation images. The ROV dives documented and characterized 33 sites including four inside shelf-edge MPAs and 29 which were outside of the current MPAs but many of these were within areas being proposed as future MPAs (Table 4). Ten sites were surveyed with multibeam sonar by L. Kracker (NOAA) and the *Pisces* survey team and covered a total area of 218.1 km² (Table 5; Figs. 1-4). These sites had never been surveyed previously with multibeam sonar. Georeferenced maps were made for each site and were ground-truthed with the ROV dives. Complete species list with percent cover of macro-benthic biota and densities of fish for each dive site are listed in Appendices 1 and 2. Each individual dive site is mapped and described in the SEADESC report (Appendix 3).

South Atlantic MPAs
NOAA Ship Pisces Cruise 13-03

North Florida Sites
 WGS_1984_UTM_Zone_17N
 Projection: Transverse_Mercator
 Datum: D_WGS_1984

★ 2013 ROV Sites
 — Bathymetry Lines (m)
 □ MPA
 ■ Deep Coral HAPC
 ▨ Proposed MPA 2013
 ■ United States

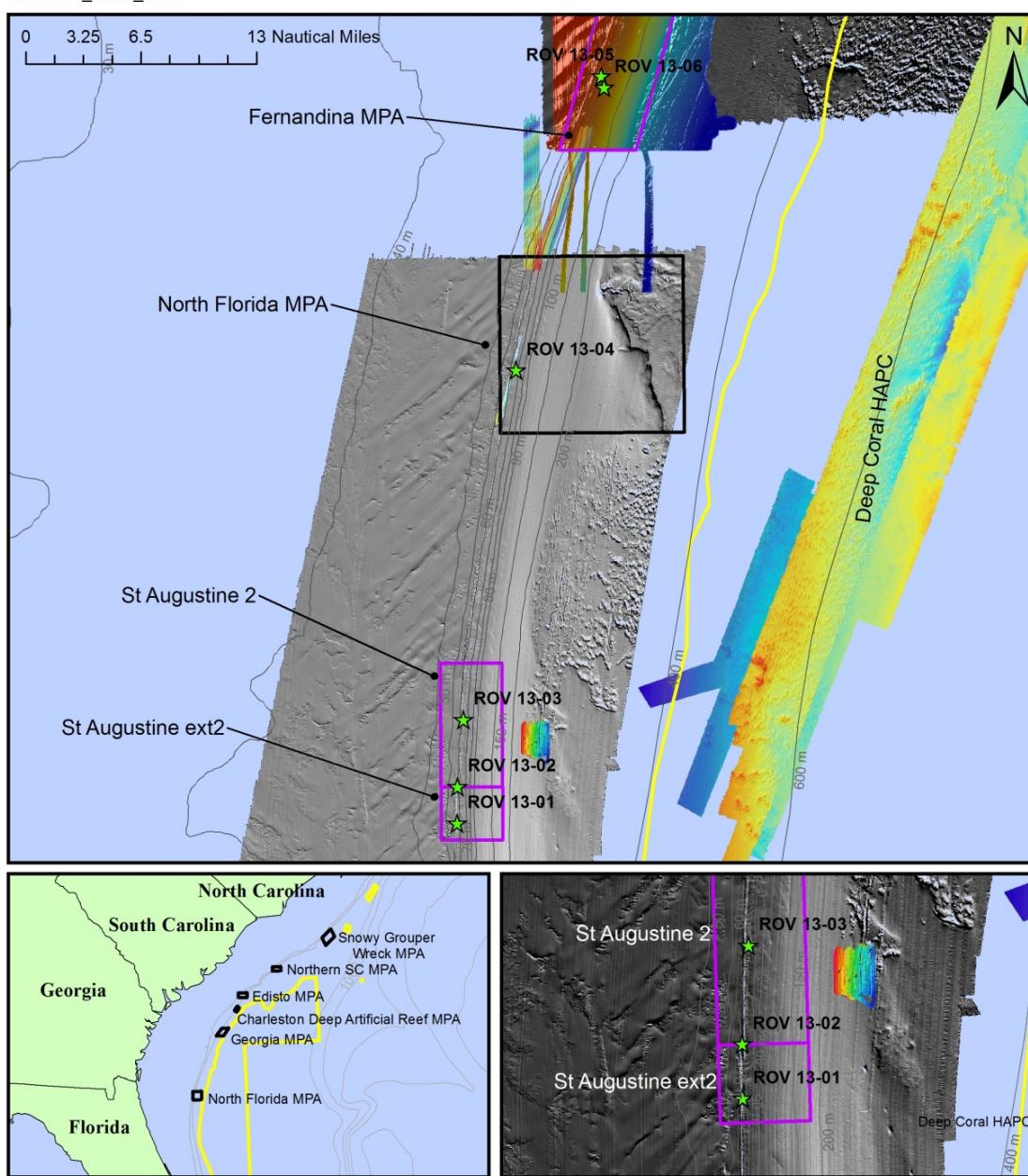


Figure 1. Locations of shelf-edge MPA sites and ROV dive sites off North Florida during 2013 NOAA Ship *Pisces* cruise, July 2 to 11, 2013.

South Atlantic MPAs
NOAA Ship Pisces Cruise 13-03
South Carolina Sites

WGS_1984_UTM_Zone_17N
 Projection: Transverse_Mercator
 Datum: D_WGS_1984

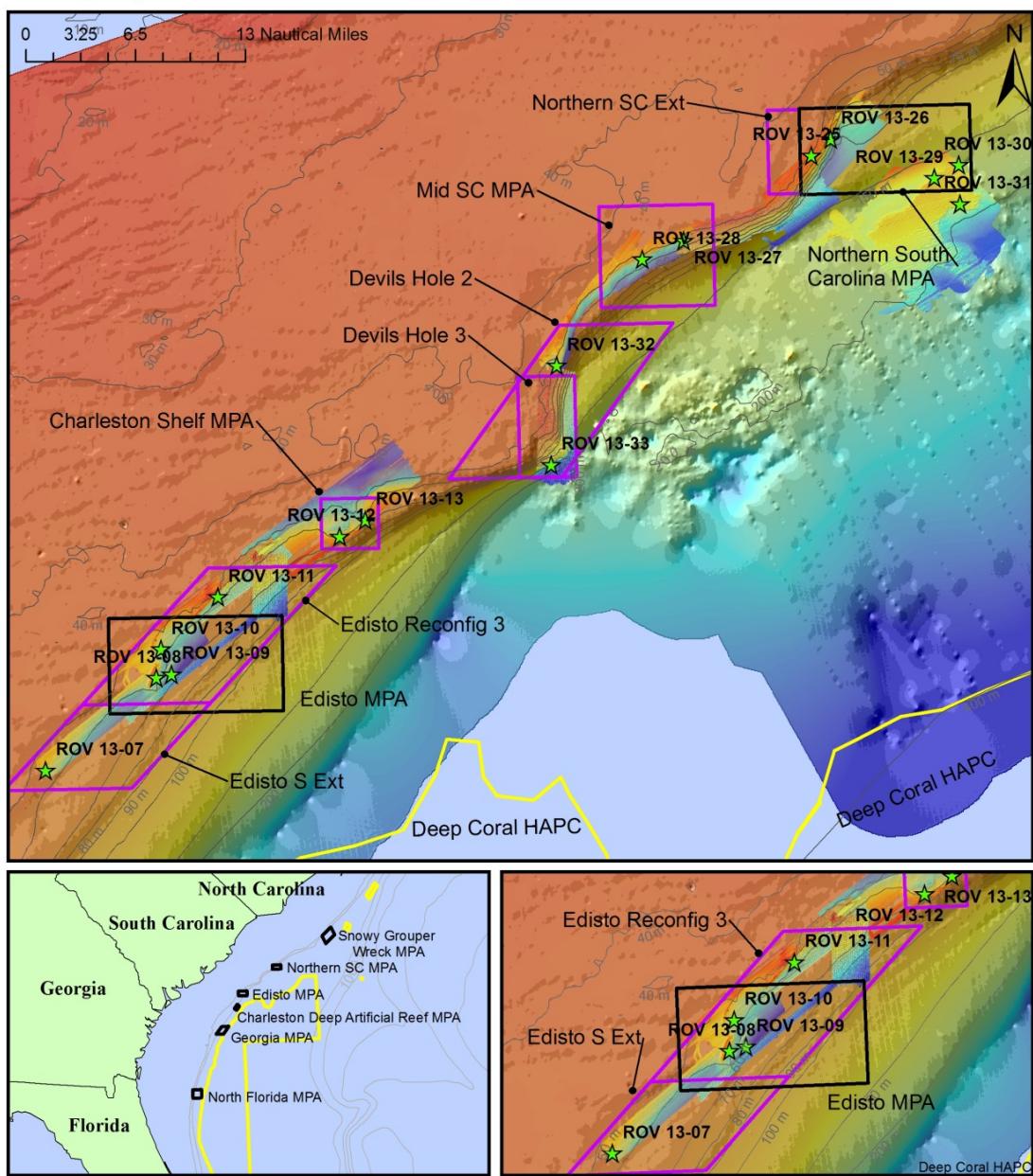


Figure 2. Locations of shelf-edge MPA sites and ROV dive sites off South Carolina during 2013 NOAA Ship *Pisces* cruise, July 2 to 11, 2013.

South Atlantic MPAs

NOAA Ship Pisces Cruise 13-03

Southern North Carolina Sites

WGS_1984_UTM_Zone_17N

Projection: Transverse_Mercator

Datum: D_WGS_1984

- ★ 2013 ROV Sites
- Bathymetry Lines (m)
- MPA
- Yellow Deep Coral HAPC
- Purple Proposed MPA 2013
- Light Green United States

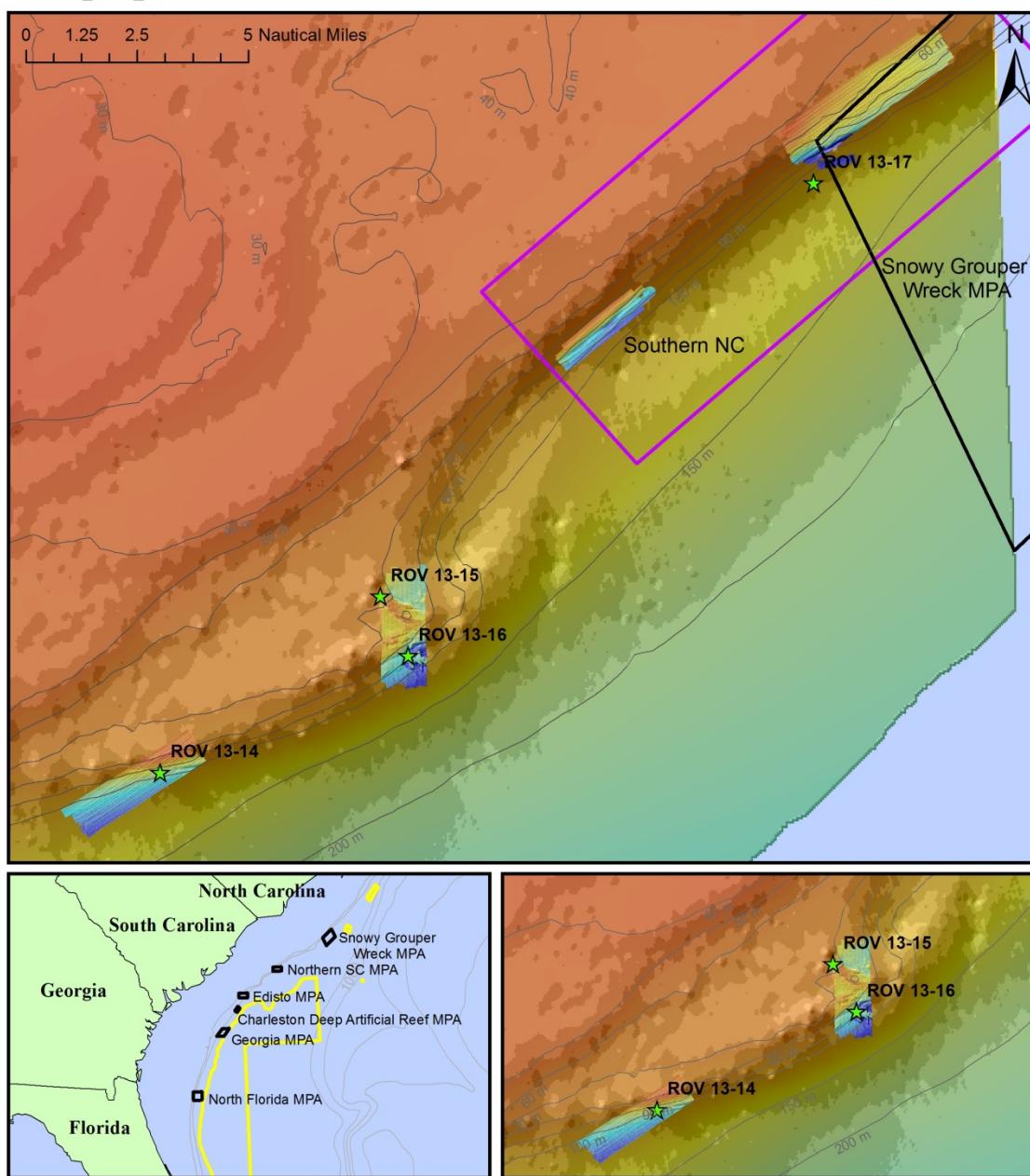


Figure 3. Locations of shelf-edge MPA sites and ROV dive sites off southern North Carolina during 2013 NOAA Ship *Pisces* cruise, July 2 to 11, 2013.

South Atlantic MPAs

NOAA Ship Pisces Cruise 13-03

Northern North Carolina Sites
 WGS_1984_UTM_Zone_17N
 Projection: Transverse_Mercator
 Datum: D_WGS_1984

- ★ 2013 ROV Sites
- Bathymetry Lines (m)
- MPA
- Deep Coral HAPC
- Proposed MPA 2013
- United States

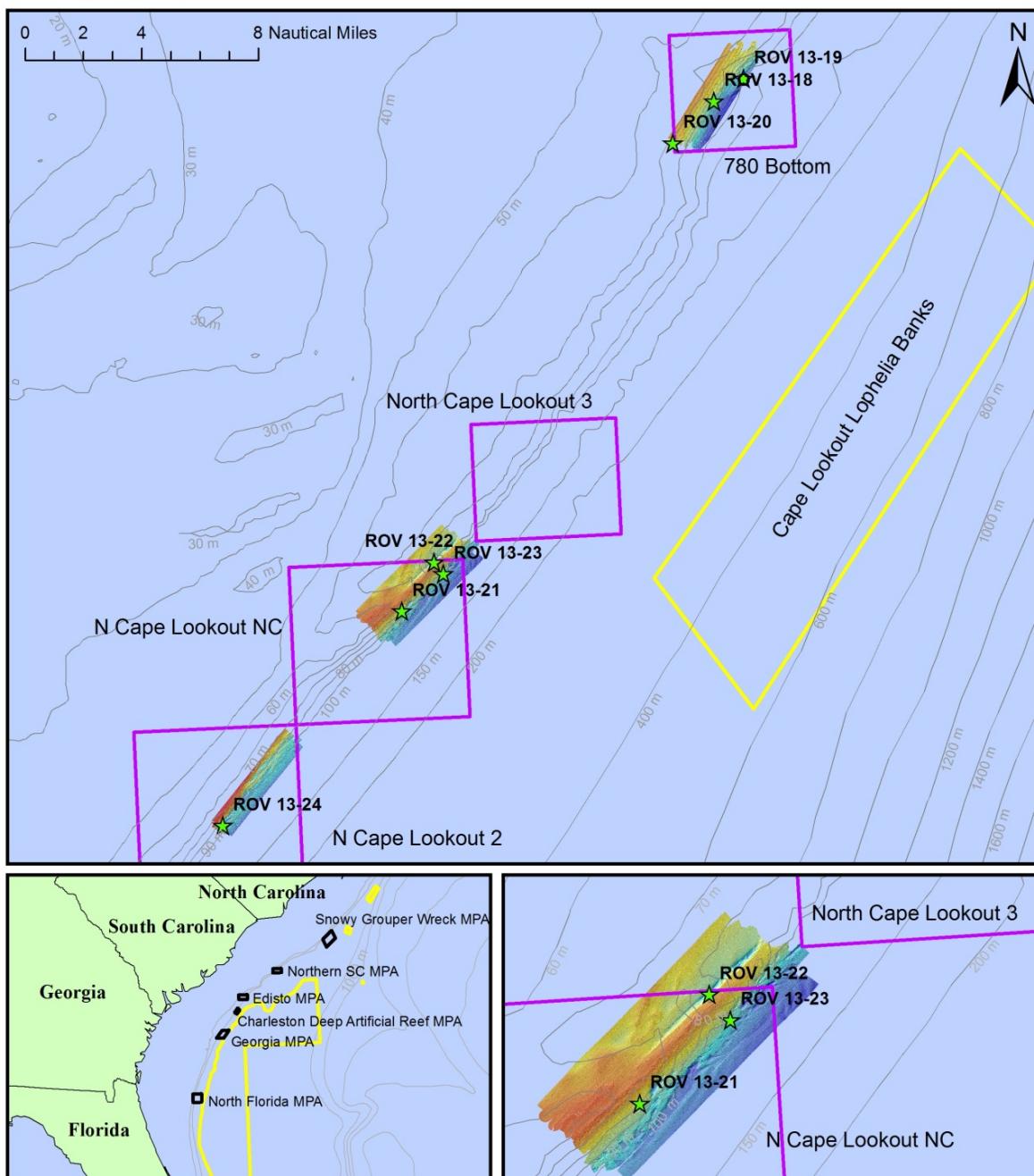


Figure 4. Locations of shelf-edge MPA sites and ROV dive sites off northern North Carolina during 2013 NOAA Ship *Pisces* cruise, July 2 to 11, 2013.

Table 3. ROV dive sites and CTD casts during 2013 NOAA Ship *Pisces* cruise, July 2-11, 2013.
(Site Number= Day-Month-Year-Site).

Site Number	Method	Latitude (on bottom)	Longitude (on bottom)	Latitude (off bottom)	Longitude (off bottom)	Depth Range (m)	Distance (km)
2-VII-13-1	CTD 13-01	29.94	-80.28	29.95°N	-80.28°W	66	
2-VII-13-2	ROV 13-01	29.94	-80.28	29.97°N	-80.28°W	-50.6 to -66.2	2.96
2-VII-13-3	CTD 13-02	29.98	-80.28			51	
2-VII-13-4	ROV 13-02	29.99	-80.28	30.02°N	-80.28°W	-36 to -65.8	3.74
2-VII-13-5	ROV 13-03	30.05	-80.28	30.07°N	-80.28°W	-55.3 to -67	2.06
2-VII-13-6	CTD 13-03	30.08	-80.28				
3-VII-13-1	CTD 13-04	30.37	-80.21			70	
3-VII-13-2	ROV 13-04	30.38	-80.22	30.4°N	-80.21°W	-47.4 to -67.2	2.76
3-VII-13-3	ROV 13-05	30.66	-80.12	30.67°N	-80.13°W	-43.7 to -62	1.77
3-VII-13-4	ROV 13-06	30.65	-80.12	30.67°N	-80.12°W	-48.9 to -62.4	1.96
4-VII-13-1	CTD 13-05	32.25	-79.17			57	
4-VII-13-2	ROV 13-07	32.25	-79.18	32.26°N	-79.17°W	-49.1 to -54.7	1.45
4-VII-13-3	ROV 13-08	32.34	-79.05	32.36°N	-79.05°W	-41.8 to -53.1	1.62
4-VII-13-4	ROV 13-09	32.35	-79.03	32.37°N	-79.02°W	-53.1 to -64.3	2.92
4-VII-13-5	ROV 13-10	32.37	-79.05	32.4°N	-79.03°W	-41.6 to -53.5	3.09
4-VII-13-6	CTD 13-06	32.25	-79.17			46	
5-VII-13-1	CTD 13-07	32.42	-78.97			52	
5-VII-13-2	ROV 13-11	32.42	-78.97	32.44°N	-78.95°W	-40.6 to -58.7	3.03
5-VII-13-3	ROV 13-12	32.48	-78.83	32.5°N	-78.82°W	-41.8 to -58.7	2.48
5-VII-13-4	ROV 13-13	32.50	-78.80	32.5°N	-78.81°W	-44.7 to -57.4	1.2
6-VII-13-1	CTD 13-08	33.21	-77.35			73	
6-VII-13-2	ROV 13-14	33.19	-77.38	33.2°N	-77.37°W	-59.5 to -83	1.21
6-VII-13-3	ROV 13-15	33.26	-77.28	33.25°N	-77.27°W	-55.3 to -86.2	1.2
6-VII-13-4	ROV 13-16	33.23	-77.27	33.23°N	-77.27°W	-64.9 to -97	0.51
6-VII-13-5	ROV 13-17	33.41	-77.08	33.42°N	-77.07°W	-84 to -94	1.24
7-VII-13-1	CTD 13-09	34.44	-75.93			75	
7-VII-13-2	ROV 13-18	34.45	-75.92	34.46°N	-75.91°W	-71.4 to -80.3	1.48
7-VII-13-3	ROV 13-19	34.46	-75.90	34.46°N	-75.89°W	-78 to -85.5	0.93
7-VII-13-4	ROV 13-20	34.42	-75.95	34.43°N	-75.94°W	-65.8 to -71.4	1.27
8-VII-13-1	CTD 13-10	34.16	-76.14			123	
8-VII-13-2	ROV 13-21	34.16	-76.15	34.17°N	-76.13°W	-66.6 to -135.1	2.06
8-VII-13-3	ROV 13-22	34.19	-76.13	34.2°N	-76.12°W	-77.2 to -116.8	1.28
8-VII-13-4	ROV 13-23	34.18	-76.12	34.19°N	-76.11°W	-98.7 to -130.3	1.57
8-VII-13-5	ROV 13-24	34.05	-76.28	34.06°N	-76.27°W	-80.3 to -115.3	1.44
9-VII-13-1	CTD 13-11	32.84	-78.26			60	
9-VII-13-2	ROV 13-25	32.85	-78.27	32.86°N	-78.26°W	-44.5 to -50.6	1.41
9-VII-13-3	ROV 13-26	32.86	-78.24	32.87°N	-78.24°W	-55.8 to -76.4	1.44
9-VII-13-4	ROV 13-27	32.76	-78.42	32.77°N	-78.4°W	-44.7 to -55.3	1.5

9-VII-13-5	ROV 13-28	32.75	-78.47	32.75°N	-78.45°W	-44.5 to -55.5	1.45
10-VII-13-1	CTD 13-12	32.82	-78.14			166	
10-VII-13-2	ROV 13-29	32.82	-78.12	32.81°N	-78.13°W	-159 to -169.2	1.32
10-VII-13-3	ROV 13-30	32.83	-78.10	32.83°N	-78.1°W	-156.1 to -164.2	0.46
10-VII-13-4	ROV 13-31	32.80	-78.09	32.79°N	-78.1°W	-157 to -171.3	0.87
11-VII-13-1	CTD 13-13	32.66	-78.56	°W		50	
11-VII-13-2	ROV 13-32	32.64	-78.57	32.66°N	-78.57°W	-38.7 to -52.2	1.73
11-VII-13-3	ROV 13-33	32.55	-78.58	32.55°N	-78.57°W	-91.4 to -133.4	1.03

Table 4. List of ROV dive sites by state and MPA status (inside MPA, inside Proposed MPA, outside MPA or Proposed MPA).

Site	Dive #	Inside MPA	Proposed MPA	Outside of MPA
FLORIDA (Total Dives)	(6)			
North Florida MPA	4	Y		
Proposed St. Augustine Ext 2 MPA	1,2,3		Y	Y
Proposed Fernandina MPA	5,6		Y	Y
SOUTH CAROLINA (Total Dives)	(16)			
Edisto MPA (and Proposed Edisto Reconfig 3)	8,9,10	Y	Y	Y
Northern SC MPA	25, 26, 29,30	Y		
Outside Northern SC MPA	31			Y
Proposed Edisto Reconfig 3 MPA	11		Y	Y
Proposed Edisto S Ext MPA	7		Y	Y
Proposed Charleston Shelf MPA	12,13		Y	Y
Proposed Mid SC MPA	27,28		Y	Y
Proposed Devil's Hole 2 MPA	32		Y	Y
Proposed Devil's Hole 2 and 3 MPA	33		Y	Y
NORTH CAROLINA (Total Dives)	(11)			
Snowy Grouper MPA (and Proposed Southern NC)	17	Y	Y	Y
Outside NC MPA	14,15,16			Y
Proposed N Cape Lookout NC MPA	21,23		Y	Y
Outside Proposed N Cape Lookout MPA	22			Y
Proposed N Cape Lookout 2 NC MPA	24		Y	Y
Proposed 780 Bottom MPA	18,19,20		Y	Y
TOTAL DIVE SITES	33	4	13	16

Multibeam Sonar

A total of 10 multibeam sonar surveys provided new maps of one MPA site as well as 7 proposed MPA sites covering a total area of 218.1 km², at depths ranging from 43 to 250 m (Table 5). Geotiff maps were used to overlay targeted sites for the next day's ROV dives which were especially helpful in ground-truthing the main geological features of the site.

Table 5. Multibeam sonar surveys conducted during 2013 *Pisces* cruise, July 2-11, 2013 (L. Kracker, NOAA).

Name	Area (mi ²)	Area (km ²)	Min Depth (m)	Max Depth (m)	Features / Description
South of North Florida MPA	6.3	17	52	72	4.5 km x 130 m narrow ridge, N-S oriented, ~10 m in height.
North of North Florida MPA	11.8	30	43	74	10 m ledge oriented SW-NE at bottom of survey; hard bottom with 1 m ledges in lower half of survey.
Edisto New MPA	8.8	23	100	120	Flat sandy area with shallow slope dipping NW-SE over entire survey.
North of Edisto MPA	10	26	50	142	Portion of 60 m narrow ridge oriented SW-NE, ~ 3 m in height, in very NW corner of survey; rest of survey was flat sand.
Snowy Wreck One	1.8	4.8	71	100	Flat sandy area with shallow slope dipping NW-SE over entire survey.
Snowy Wreck Two	3.5	9	62	121	Three (500 m x 70 m) hard rock plateaus, ~20 m in height, oriented SE-NW in southern part of survey.
North Carolina 780	6.1	15.8	66	96	Shallow exposed hard rock slope striking across entire survey SW-NE.
Cape Lookout One	10	27	53	147	Rocky ridge oriented SW-NE with 20 m change in relief; some scour pockets, ~ 500 m x 200 m.
Cape Lookout Two	4.7	12	72	120	Rocky slope oriented SW-NE with 20 m relief.
East Devil's Hole	20.1	53.5	45	250	Hard bottom bathymetry in the mid-western and southern portion of survey; 40 m steep slopes.
Total Area	83.1	218.1			

CTD Operations

A total of 13 shipboard CTD casts were conducted at the multibeam sites and each ROV dive recorded temperature/depth profiles (Table 6; individual CTD plots are presented for each dive site in Appendix 3). Fairly cold-water upwelling was encountered on two of the dives (2 and 3) where bottom temperatures at 60 m recorded a low of 11°C. Bottom temperature at the other 50-60 m depth sites was typically 15-19°C. The deepest site (Dive 31) recorded a bottom temperature of 11.4 at 168 m. Bottom salinity ranged from 33.52 to 36.48 and oxygen was 3.88 to 5.62. Fluorescence was quite variable peaking from 1.3 to 16.3. Sometimes the peak was at the surface, or mid-water, or near the bottom. Most CTD casts were in the morning, but the one day (7/4/14) where a morning and evening cast was made, there was little difference in the depth or the magnitude of the fluorescence peak. Surface thermoclines usually occurred between 10 and 20 m, whereas a second deep thermocline sometimes occurred near the bottom.

Table 6. Summary of shipboard CTD casts at multibeam sites and ROV temperature records at each dive site.

Dive #	Launch	Depth (m)	Surf. Temp (°C)	Bot. Min. Temp (°C)	Bot. Sal. (PSU)	Bot. Oxygen (mg/l)	Peak Fluorescence (depth) (mg/m3)	Thermocline(s) (depth)
CTD 13-01	7/2/2013 8:02	na	na	na	na	na	na	na
CTD 13-02	7/2/2014	55.0	26.64	13.43	33.52	4.88	6.0 (38.7)	20, 48
CTD 13-03	7/2/2014	50.6	26.66	13.33	35.60	4.33	2.0 (39.4)	12, 45
CTD 13-04	7/3/2013 8:48	59.0	26.26	14.22	35.80	4.28	1.3 (surf.)	17.5
CTD 13-05	7/4/2013 7:28	53.0	26.44	18.04	36.20	4.79	3.0 (40.3)	12.4, 40.3
CTD 13-06	7/4/2013 17:41	38.9	26.66	20.09	36.32	5.62	5.0 (31.9)	15, 34
CTD 13-07	7/5/2013 7:32	57.6	26.53	18.44	36.16	5.11	2.1 (37.5)	20.6, 49.7
CTD 13-08	7/6/2013 7:31	68.7	27.91	19.78	36.32	3.88	8.0 (46.4)	20
CTD 13-09	7/7/2013 7:39	68.7	26.89	19.24	36.48	4.71	1.3 (40)	15
CTD 13-10	7/8/2013 7:36	119.1	27.20	14.80	35.61	na	1.8 (52.7)	21.5
CTD 13-11	7/9/2013 7:35	54.7	27.40	18.72	36.32	4.97	16.3 (35.7)	12.2, 37.5
CTD 13-12	7/10/2013 7:47	157.5	28.16	12.12	35.54	na	14.8 (41.3)	13.5, 144.8
CTD 13-13	7/11/2013 7:35	46.1	27.28	16.80	36.16	4.47	7.1 (20.1)	10, 36.2
ROV 1	7/2/2013 8:36	61.3	26.51	15.11				
ROV 2	7/2/2013 13:13	58.3	26.76	11.01				
ROV 3	7/2/2013 15:32	62.8	26.67	11.49				
ROV 4	7/3/2013 11:40	58.3	26.45	13.96				
ROV 5	7/3/2013 15:17	52.5	26.79	16.47				
ROV 6	7/3/2013 16:35	61.9	26.81	14.74				
ROV 7	7/4/2013 8:09	52.8	26.48	18.06				
ROV 8	7/4/2013 11:25	50.3	26.42	19.37				
ROV 9	7/4/2013 13:10	63.3	26.58	19.37				
ROV 10	7/4/2013 15:26	51.5	26.47	19.59				
ROV 11	7/5/2013 7:59	51.2	26.53	19.04				
ROV 12	7/5/2013 11:49	51.5	26.77	19.66				
ROV 13	7/5/2013 14:12	49.4	26.87	18.13				
ROV 14	7/6/2013 8:18	81.1	28.10	19.29				
ROV 15	7/6/2013 11:34	71.7	27.99	19.78				
ROV 16	7/6/2013 13:48	77.7	28.30	20.00				
ROV 17	7/6/2013 15:56	104.9	26.86	19.87				
ROV 18	7/7/2013 8:00	78.7	26.83	19.09				
ROV 19	7/7/2013 10:20	84.4	26.93	19.02				
ROV 20	7/7/2013 12:32	69.7	27.28	19.24				
ROV 21	7/8/2013 8:01	125.4	27.41	14.40				
ROV 22	7/8/2013 10:30	115.6	27.34	19.10				
ROV 23	7/8/2013 12:52	109.6	27.42	14.37				

ROV 24	7/8/2013 16:29	105.0	27.21	14.45				
ROV 25	7/9/2013 8:00	50.0	27.44	18.73				
ROV 26	7/9/2013 10:07	76.2	27.45	18.00				
ROV 27	7/9/2013 13:42	49.2	27.50	18.84				
ROV 28	7/9/2013 15:59	50.4	27.35	18.54				
ROV 29	7/10/2013 8:13	165.5	27.19	11.91				
ROV 30	7/10/2013 10:28	157.9	27.20	12.08				
ROV 31	7/10/2013 12:42	168.6	26.68	11.40				
ROV 32	7/11/2013 8:01	49.8	27.19	16.47				
ROV 33	7/11/2013 11:43	144.6	27.22	10.75				

SEADESC II Report- Characterization of Habitat, Benthic Biota, and Fish Populations

The SEADESC Level II Report (Southeastern United States Deep-Sea Corals) is presented in Appendix 3. This provides the following data for each dive site: cruise and ROV dive metadata, figures showing each ROV dive track and habitat zones overlaid on multibeam sonar maps, dive track data (start and end latitude, longitude, depth), objectives, CTD plots, general description of the habitat and biota, and images of the biota and habitat that characterize the dive site. In addition, this SEADESC Level II Report provides quantitative analyses of each dive site including: 1) CPCe 4.1[©] analysis of percent cover of benthic biota and substrate types, and 2) densities of fish populations (# individuals/km for each species).

Benthic Macrobiota- Species Richness and Percent Cover

Appendix 1 lists all of the benthic macro-invertebrates and algae that were identified from the quantitative photo transects at each dive site and their percent cover based on CPCe Point Count of the photo images. These analyses are also presented for each dive in Appendix 3. Some common taxa could be identified to genus or species level but many could only be identified to a higher level such as family, class, order or even phylum. Sponges, gorgonians, and black coral are especially difficult to identify without a specimen in hand. In these cases a general descriptive taxa was used, e.g., “brown lobate sponge” or “unidentified Demospongiae”, which could consist of numerous species. These designations should not be considered equivalent to species level and should not be used for diversity (H') indices calculations. Many deepwater species in this region look nearly identical, such as fan sponges which are polyphyletic and may actually include different orders or classes.

A total of 104 taxa of benthic biota were identified from the quantitative photo transects and were used for CPCe percent cover analyses. These included 30 taxa of Cnidaria which included the following corals: 5- Scleractinia (*Oculina varicosa*, *Madrepora oculata*, *Lophelia pertusa* (?), *Phyllangia americana*, and unidentified solitary Scleractinia); 14- Alcyonacea gorgonians (*Bebryce* sp., *Diodogorgia* sp., *Ellisella* spp., Ellisellidae, *Iciligorgia schrammi*, *Leptogorgia* sp., *Muricea* sp., *Nicella* sp., Plexauridae, Primnoidae, *Swiftia exerta*, *Telesto* sp., and *Titanideum frauenfeldii*); and 4 Antipathidae (unid. spp., *Tanacetipathes hirta*, *Stichopathes lutkeni*). Alcyonian soft corals included *Anthomastus* sp. and *Chironephthya caribaea*. Non-coral Cnidaria included Actiniaria, Corallimorpharia, Zoanthidea, and Hydroidolina (hydroids).

Porifera were most species rich with 33 taxa; the dominant sponges included the Demospongiae: *Agelas* sp., *Aiolochroia crassa*, *Aka* sp., *Aplysina* sp., Astrophorida, *Callyspongia* sp., *Callyspongia vaginalis*, *Chondrilla* sp., *Chondrosia* sp., *Cinachyra* sp./*Cinachyrella* sp., *Clathria* sp., *Cliona* sp., numerous unid. Demospongiae, *Geodia* sp., *Halisarca* sp., *Ircinia campana*, *Ircinia* sp., *Ircinia strobilina*, *Leiodermatium* sp., Lithistida, *Niphates* sp., Poecilosclerida, *Scopalina* sp., Spirastrellidae, and *Zyzya* sp. Other fauna included Annelida, Mollusca, Arthropoda, Bryozoa, Echinodermata, and Ascidiacea. Algae were dominant at many of the sites and included Phaeophyta (dominated by *Dictyota* spp.), Cyanobacteria, Chlorophyta, and Rhodophyta (primarily crustose coralline algae).

CPCe Point Count analysis calculated the percentage cover of bare substrate type and benthic macro-biota (fauna and algae). Table 7 compares the percent cover of substrate and benthic biota for each dive site inside and outside of the MPAs. For all sites, bare hard substrate ranged from 9.83% cover (Dive 27) to 64.25% (Dive 23) and averaged 37.21%. On average, the Florida sites had the greatest percentage of bare hard substrate (46.6%) compared to 32.2% and 39.2% at South and North Carolina, respectively (Fig. 5).

The average cover of benthic macro-biota by state ranged from 31.08% off South Carolina, 25.74% off Florida, to 11.23% off North Carolina, and averaged 24.43% for all sites (Table 7, Fig. 6). The greatest cover of biota occurred at Site 25 of the Northern SC MPA (77.1%) but the lowest also occurred at this MPA at Site 29 (3.4%). These sites were quite different, with Site 25 being a long linear ridge at 50 m, with jumbled high relief boulders and high rugosity, whereas Site 29 was an iceberg scour at a depth of 165 m. Also the Proposed Devil's Hole 2 MPA site (Site 32) had the highest average biota of all proposed MPA sites (65.58%). Sites with low cover of organisms included a site outside the Northern SC MPA (Site 31; 6.13% cover), Snowy Grouper MPA (Site 17, 9.23%), Proposed N Cape Lookout (average 9.24%), and Proposed 780 Bottom (average 9.55%).

Overall, algae (Phaeophyta [Phaeophyceae]- 6.04%, Rhodophyta 4.22%) were the dominate cover (10.95%) followed by Porifera (3.54% cover; dominated by unidentified demosponges- 1.88%, *Chondrilla* sp.- 0.14%, and *Aiolochoria crassa*- 0.06%) (Appendix 1). Hydrozoans were next most common with 3.23% cover. Antipatharia were also common (1.56% cover), along with gorgonians (1.32%; dominated by *Diodogorgia* sp.- 0.3%, *Telesto* sp.- 0.37%, and *Muricea* sp.- 0.1%). The percent cover of algae by state ranged from 18.07% off South Carolina, 6.09% off Florida, to 1.42% off North Carolina (Table 7, Fig. 7). Proposed Devil's Hole 2 and one dive in the Northern SC MPA (Site 25) had the greatest cover of algae (55.64% and 72% cover, respectively). The deeper sites >100 m had no algae. Florida had the greatest cover of sponges (6.35%); whereas, South Carolina had 2.72% and North Carolina had 2.98% cover (Fig. 7).

Figure 8 shows the percent cover of sponge taxa by MPA status (i.e., inside MPA, inside Proposed MPA, outside MPA or Proposed MPA). Percent cover of black coral (Antipatharia) was also greatest at the Florida sites (4.84% average), compared to 0.71% at South Carolina, and 0.72% off North Carolina (Fig 7). Gorgonacean sea fans were relatively low cover at most sites and averaged 1.81% cover off South Carolina, 0.91% off North Carolina and 0.64% off Florida (Table 7, Figs. 7, 9).

Table 7. Fish densities and percent cover of benthic macro-biota and substrate from CPCe Point Count analysis of photographic transects of ROV dives by state and MPA status (i.e., inside MPA, inside Proposed MPA, outside MPA or Proposed MPA) during 2013 NOAA *Pisces* cruise. Coral= Scleractinia, Gorg= gorgonacea, Por= Porifera.

Site	Dive #	% HB	Fish-# spp., Density (#/km)	% Cover-Benthic Biota	% Cover Coral	% Cover Gorg.	% Cover Antip.	% Cover Por.	% Cover Algae
FLORIDA (Total Dives)	(6)	46.62	44, 3687.6	25.74	0.2	0.64	4.84	6.35	6.09
North Florida MPA	4	36.55	38, 919.21	19.09	0.04	0.12	2.01	7.33	1.1
Proposed St. Augustine 2	2,3	52.86	21, 1287.1	30.12	0.12	0.52	5.09	6.26	12.36
Proposed St. Augustine Ext 2	1	45.3	27, 1023.9	25.98	0.52	0.98	7.62	5.82	2.07
Proposed Fernandina	5,6	45.54	26, 457.36	20.52	0	1.38	1.93	6.07	1.2
SOUTH CAROLINA (Total Dives)	(16)	32.38	108, 37461	31.08	0.02	1.81	0.71	2.72	18.07
Edisto MPA (and Proposed Edisto Reconfig 3)	8,9,10	40.47	62, 5433.0	24.76	0.02	1.37	2.04	2.79	10.41
Northern SC MPA	25, 26, 29,30	29.16	80, 8798.0	29.31 (3.4- 77.1)	0	1.19	0.37	1.79	21.2 (0-72)
Outside Northern SC MPA	31	35.96	19, 2457.5	6.13	0.06	0	0	3.32	0
Proposed Edisto Reconfig 3	11	25.75	55, 3934.4	48.85	0	1.58	0.66	3.85	34.3
Proposed Edisto S Ext	7	46.32	42, 3362.5	23.47	0	3.26	1.53	5.21	4.21
Proposed Charleston Shelf	12,13	23.18	63. 4089.3	29.66	0	23.09	0.43	1.73	17.11
Proposed Mid SC	27,28	35.18	56, 1900.4	29.9	0	4.28	0.26	1.34	8.67
Proposed Devil's Hole 2	32	19.02	49, 6409.7	65.58	0	2.22	0.09	3.72	55.64
Proposed Devil's Hole 2/3	33	49.94	25, 1675.8	15.95	0.23	1.05	0	3.91	0
NORTH CAROLINA (Total Dives)	(11)	39.21	71, 10872	11.23	0.52	0.91	0.72	2.98	1.42

Snowy Grouper MPA	17	23.92	N/A	9.23	0	0.92	0.38	1.23	0.69
Outside NC MPA	14,15, 16	21.58	42, 1271.4	7.59	0	0.76	1.7	0.97	1.97
Proposed N Cape Lookout NC	21,23	62.9	34, 7654.2	9.24	0.86	0.08	0.52	3.11	0.21
Outside Proposed N Cape Lookout	22	36.85	30, 1055.0	25.83	2.93	4.82	1.38	11.19	0.17
Proposed N Cape Lookout 2 NC	24	50.22	24, 142.11	15.58	0	0.17	0.17	3.74	1.04
Proposed 780 Bottom	18,19, 20	34.89	37, 749.65	9.55	0	0.45	0.2	1.59	2.72

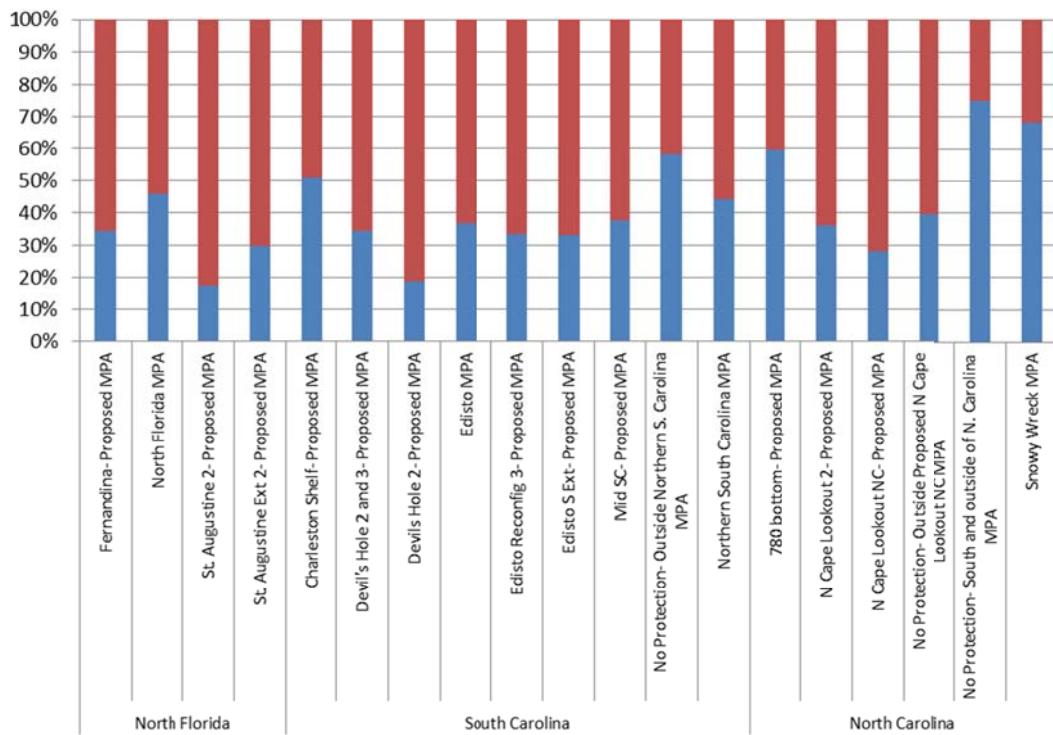


Figure 5. Percent cover of hard bottom (red) vs soft bottom (blue) by state and MPA status from 2013 NOAA Ship *Pisces* cruise. Points on biota were scored as underlying substrate. If more than one dive at a site, the data was averaged.

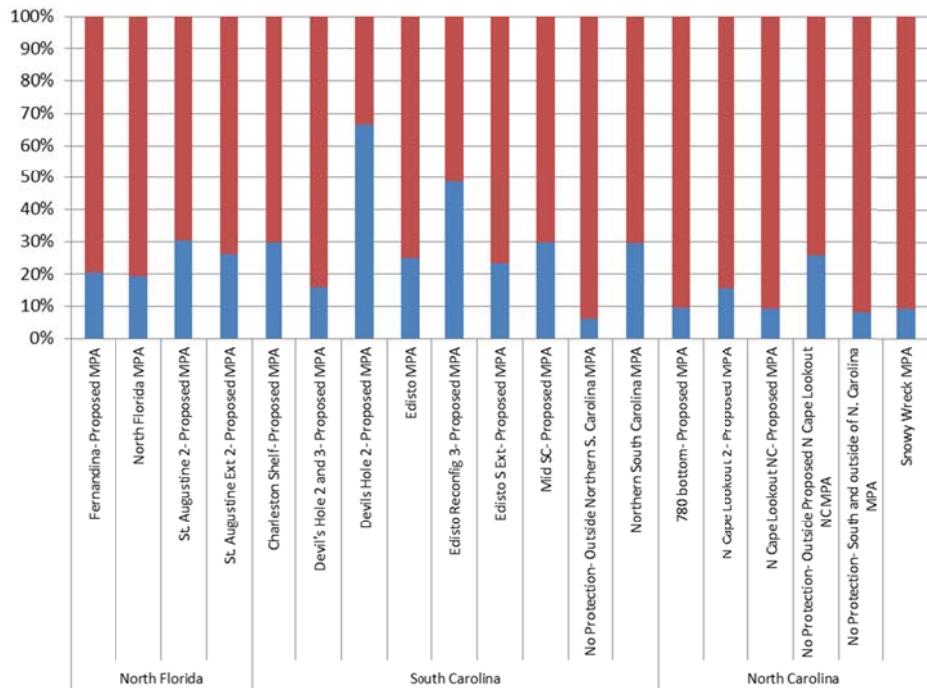


Figure 6. Percent cover of benthic macro-biota (blue) vs bare substrate (red) by state and MPA status from 2013 NOAA Ship *Pisces* cruise.

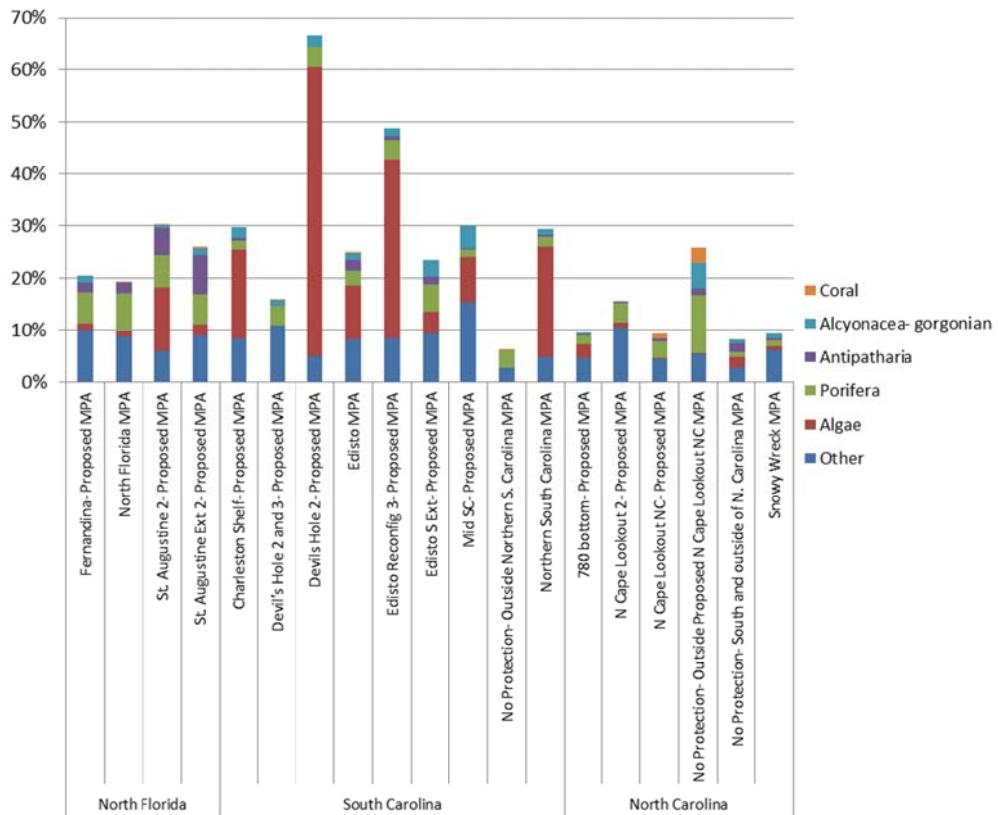


Figure 7. Percent cover of major benthic macro-biota by state and MPA status from 2013 NOAA Ship *Pisces* cruise.

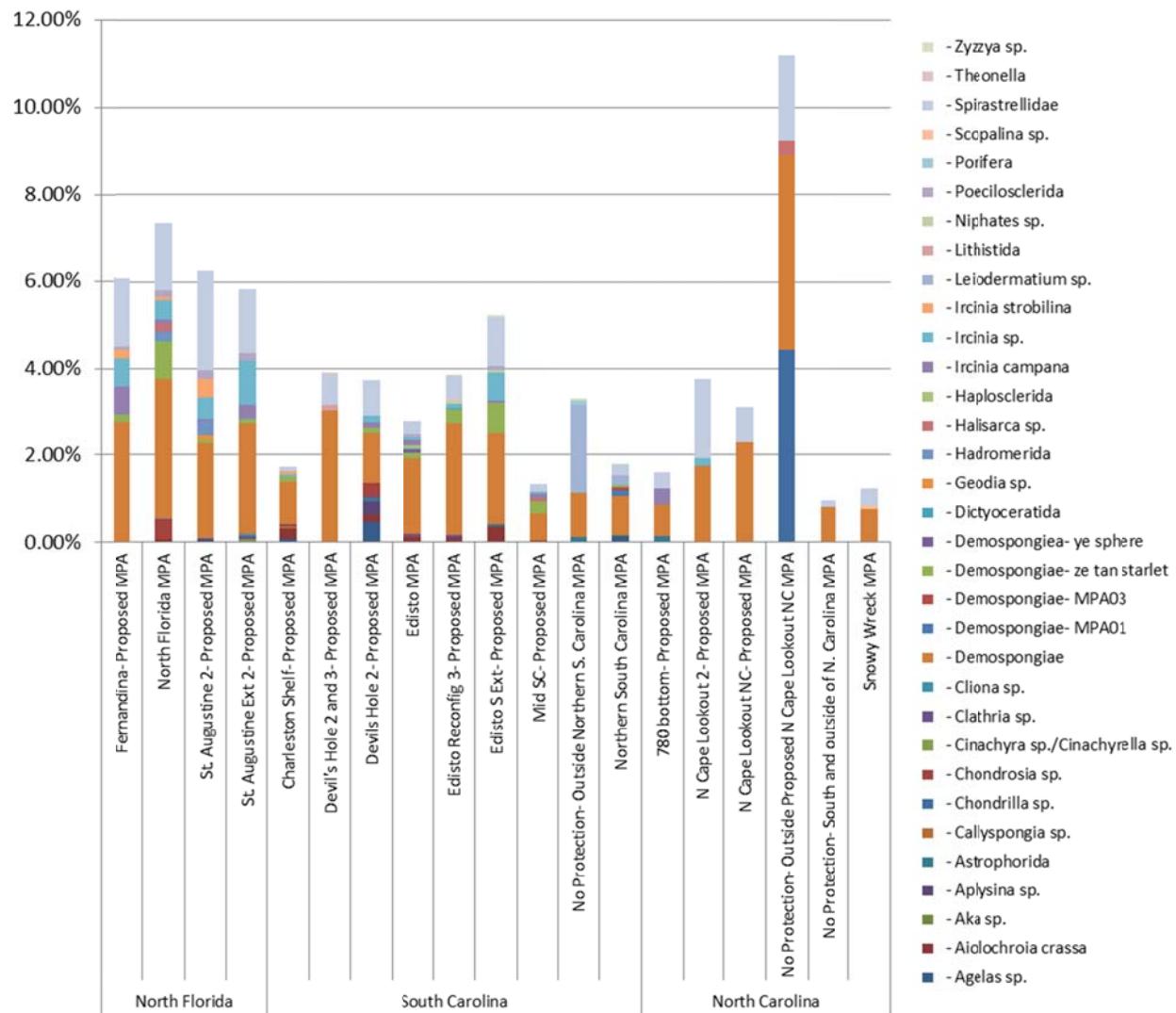


Figure 8. Percent cover of demosponge taxa by state and MPA status from 2013 NOAA Ship *Pisces* cruise.

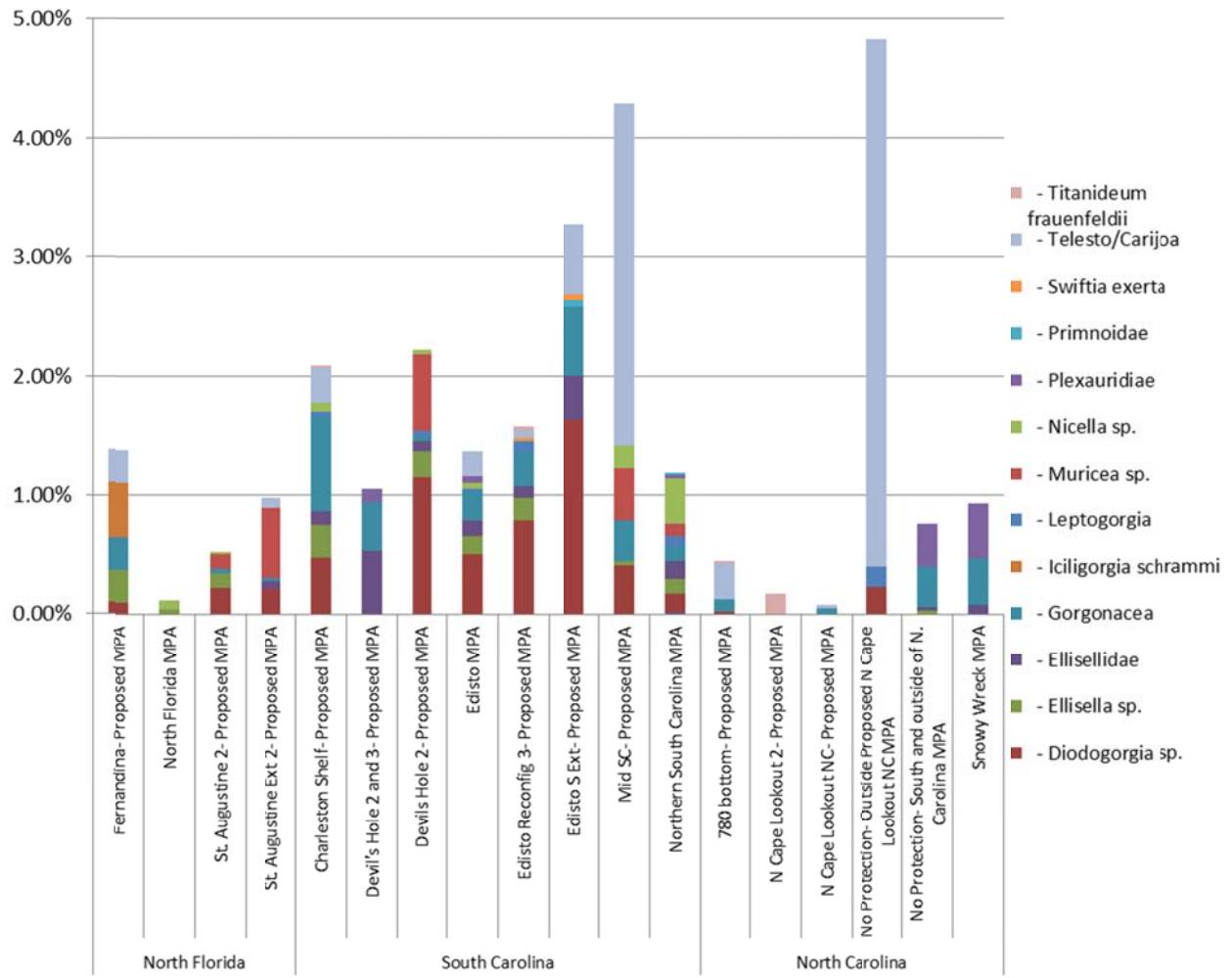


Figure 9. Percent cover gorgonian taxa by state and MPA status from 2013 NOAA Ship *Pisces* cruise.

Hard Coral Cover

Hard corals ranged from 0 to 2.93% cover (Dive 22) and averaged overall at 0.2% (Appendix 1). *Oculina varicosa* was the dominant species (0.13%) and was found at the following sites: Dive 1 (0.49% cover), Dive 3 (0.13%), Dive 21 (0.87%), Dive 22 (1.66%), and Dive 23 (0.39%). The Proposed N Cape Lookout NC MPA site (Dives 21, 23) and adjacent areas (Dive 22) had the most abundant cover of coral of all sites (0.86% cover and 2.93%, respectively; Table 7, Figs. 7,10). At Dive site 21, *Oculina varicosa* was abundant (154 colonies counted) at depths of 91-124 m, on boulders of lower slope. These were all live and white (azooxanthellate), 10-50 cm diameter, with a few 100 cm. At Dive site 22, *Oculina* colonies were also abundant (101 counted) at depths of 76-112; most were 10-25 cm diameter, a few were 50 cm, and some were 1 m diameter. All appeared healthy and white. Dive site 23 also had *O. varicosa* common to abundant on a scour slope, on rugose high-relief rock boulders, and some on flat sediment with rubble and cobble, at depths of 113-125 m.

One area of Dive 21 had numerous 10 cm diameter, white coral colonies at depths of 125-134 m that appeared to be either *Lophelia pertusa* or *Madrepora oculata*. It is possibly *Madrepora*, but

does not look zigzag, and polyps were more flared. Video frame grabs were sent to several deepsea coral specialists (S. Cairns, Smithsonian; S. Brooke, USF; P. Etnoyer, NOAA; C. Messing, NOVA; C. Fisher, Penn State; C. Morrison, USGS; A. Quattrini, Temple) who all suggested that it could be *Lophelia* based on the image but without a specimen it is impossible to be positive. The ROV CTD showed minimum temp of 14°C. Typically *Lophelia* requires temperatures <12°C. If this were to be *Lophelia*, it would be the shallowest recorded in the western Atlantic. Some are known as shallow as 70 m on sills of fjords in Norway. Recently a *Lophelia* mound was discovered at a depth of 200 m off Jacksonville (S. Ross, S. Brooke, J. Reed) where there appears to be an area with fairly persistent cold-water upwelling.

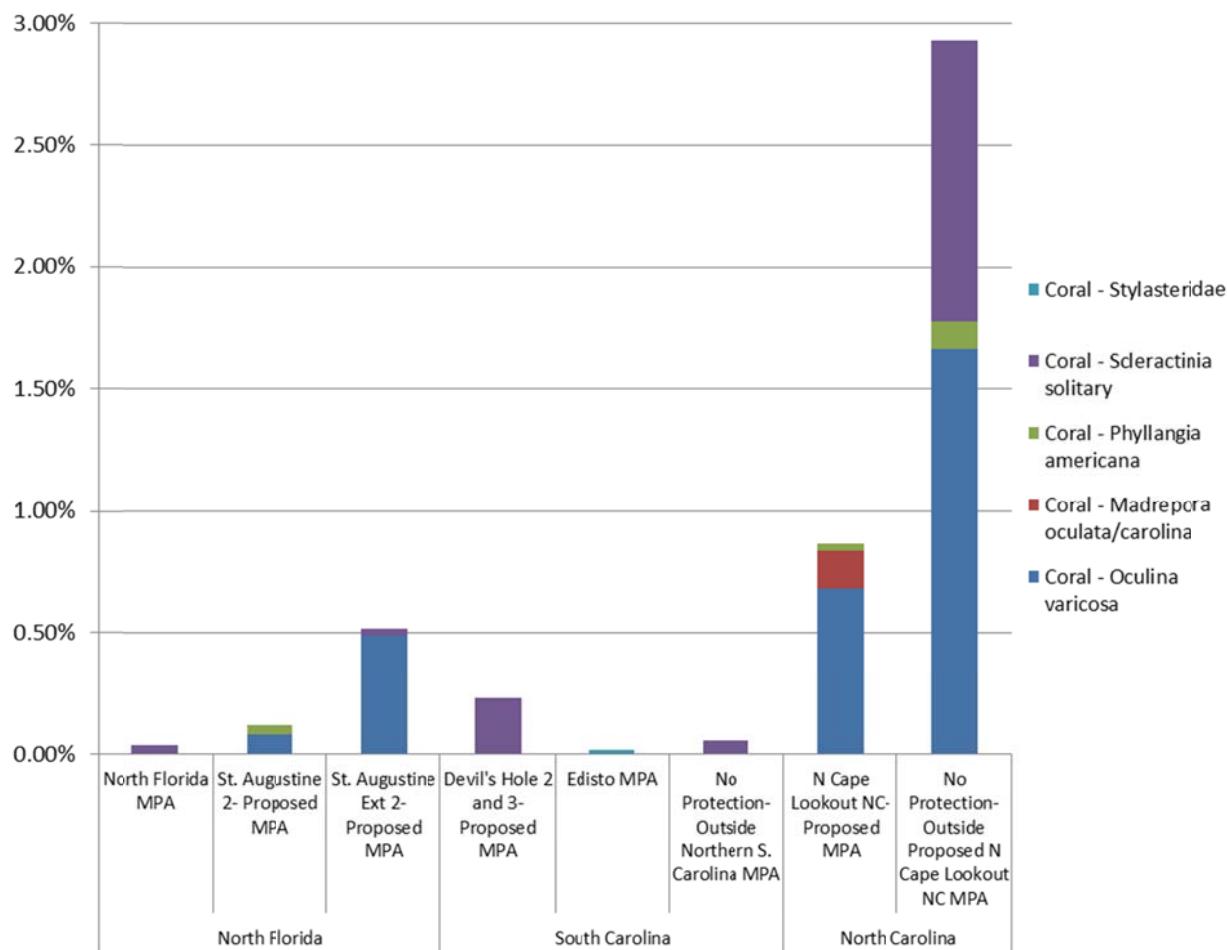


Figure 10. Percent cover of hard corals by state and MPA status from 2013 NOAA Ship *Pisces* cruise.

Benthic Biota and Habitat Relationships

Dive sites within and outside of each of the MPAs were compared using a multi-dimensional scaling plot of Bray-Curtis Similarity (with square root transformation) for benthic macro-biota densities (Fig. 11). The SIMPROF dendrogram shows the similarity of dive sites by MPA status and state (Fig. 12); the red lines in the dendrogram plot show statistically different groups

(SIMPROF, $p<0.05$). These plots clearly show the greatest similarity of sites is by region; i.e., Florida, South Carolina and North Carolina each formed clusters that were significantly different with the exception of SC Site #31, SC, Devil's Hole 2 & 3 which split from the rest of the sites at about 30% similarity and SC Edisto S Ext which groups with all of the Florida Sites. NC Site #14, 15 & 16 groups with NC- Snowy Wreck MPA separate from the NC Site. The dives sites inside and outside the MPAs were generally similar. For example, all the Florida sites, both inside and outside the MPAs, were 60% similar, and the South Carolina sites were 40% similar, except for the outliers at Devils Hole and SC Site #31. However, the North Carolina MPA site (Snowy Wreck) was quite distinct from the proposed MPA sites in North Carolina.

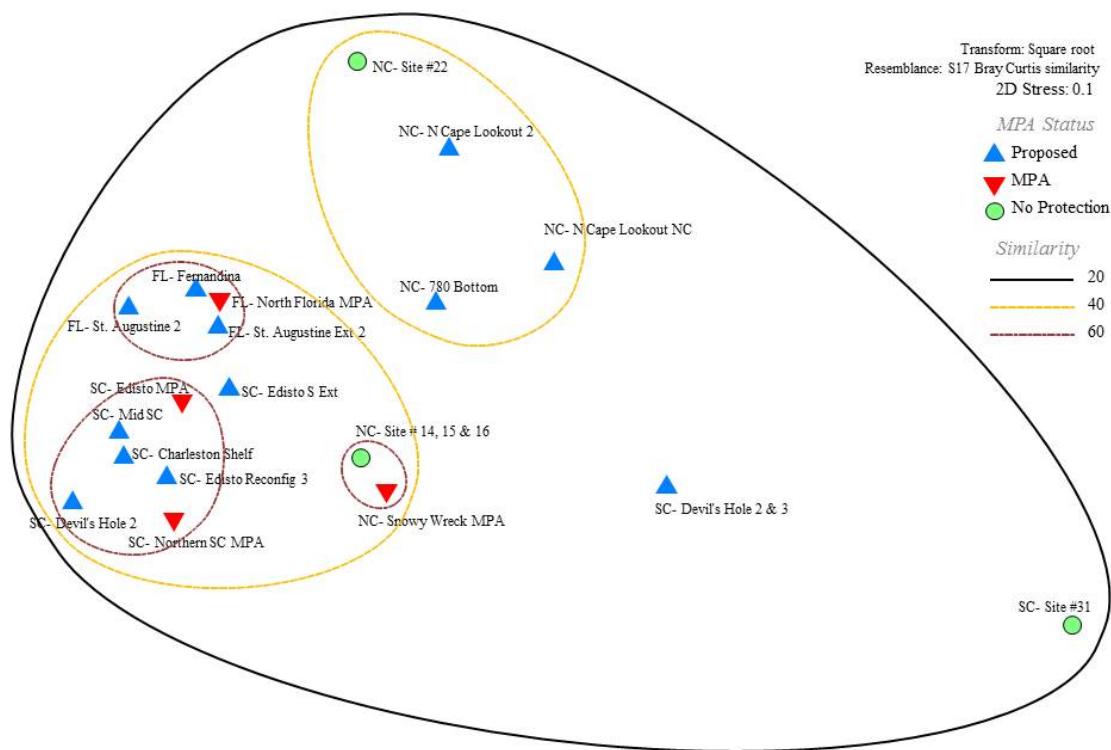


Figure 11. Multi-dimensional scaling (MDS) plot of ROV dive for MPAs, Proposed MPAs and no Protection sites based on Bray-Curtis similarity matrix calculated from square root transformation of benthic biota percent cover for the 2013 NOAA Ship *Pisces* cruise. Assemblage similarity at 20-60% are indicated.

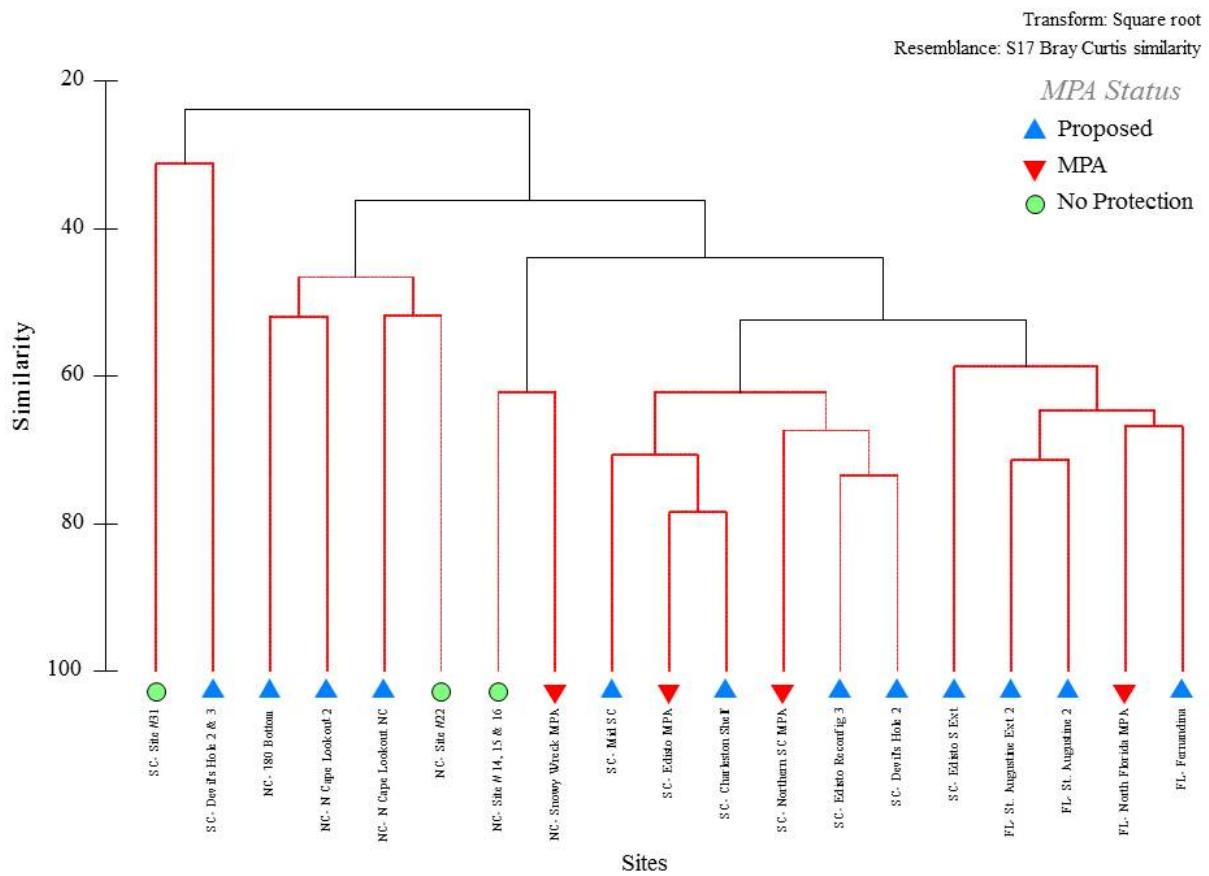


Figure 12. SIMPROF dendrogram showing Bray-Curtis similarity of percent cover of benthic biota for MPAs, Proposed MPAs and no Protection sites for the 2013 NOAA Ship *Pisces* cruise. Statistically different groups (SIMPROF, $p<0.05$) are indicated red bars.

Analysis of Fish Video Surveys

Appendix 2 lists all of the fish that were identified from the quantitative video transects at each dive site and their densities (#/km). A total of 113 different species were observed. Dives 5, 16, and 17 were excluded from all analyses. Dives 5 and 16 were aborted after only a few minutes on bottom due to a lack of ROV and ship control due to bad weather conditions (i.e., wind and current). ROV tracking was not functioning on Dive 17, so densities could not be calculated. Dive sites inside and outside each MPA were compared using a multi-dimensional scaling (MDS) plot of Bray-Curtis Similarities using fourth root transformed data of fish species (Figure 13; PRIMER 6.0).

Four statistically different groups resulted from the SIMPROF test ($p<0.05$). The letters in the figure indicate statistically significant groups. Dive sites were more similar by geographic region than they were by level of protection (inside vs. outside). For example, fish assemblages were more similar inside and outside North Florida MPA compared to all other sites. The North Carolina sites clustered together at 60%, separate from all other sites indicating a distinct assemblage of fish species in that region. The Northern South Carolina MPA sites clustered

together with the Edisto MPA sites at 60% similarity, but the SIMPROF test indicated that the fish assemblages were statistically different from one another.

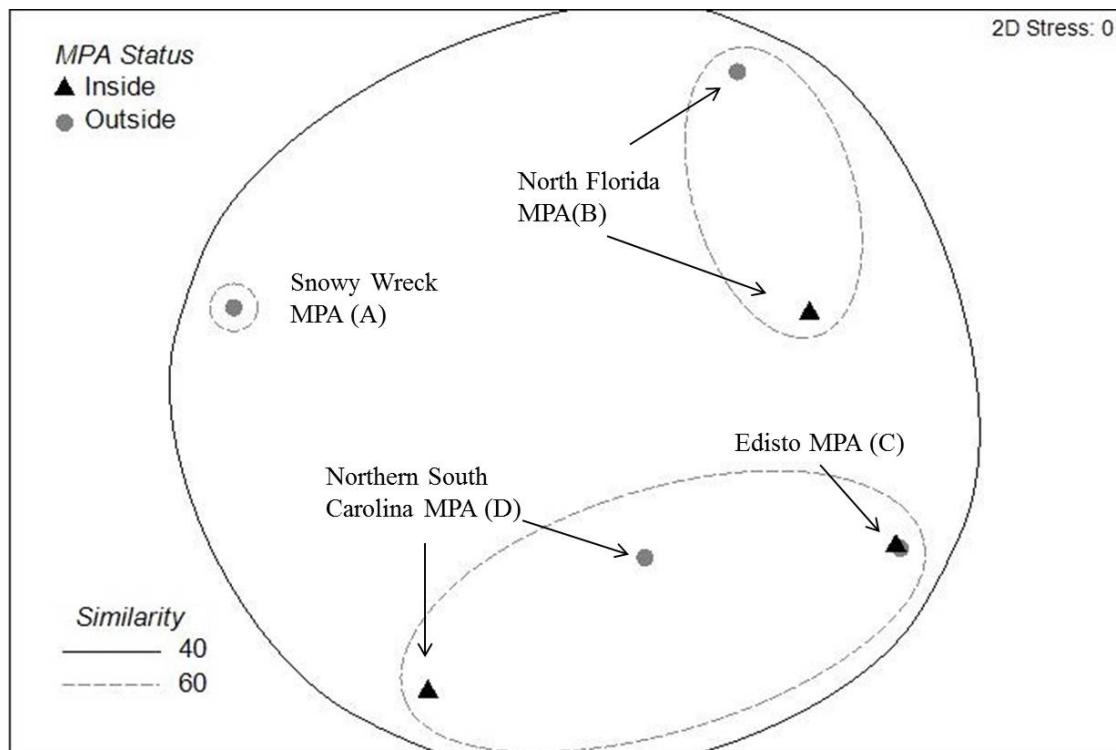


Figure 13. Multi-dimensional scaling (MDS) plot of ROV dive sites within and outside of the protected management areas (MPAs) based on Bray-Curtis similarity matrix calculated using fourth root transformed data of fish species. Assemblage similarity at 40 and 60% are indicated. Statistically different groups (SIMPROF, $p < 0.05$) are indicated by letters.

Densities for fish species in the snapper-grouper complex were compared inside and outside for each of the MPAs (Table 8). Only 1 dive was completed inside the North Carolina (Snowy Wreck) MPA, but ROV tracking wasn't working so densities could not be calculated to be compared to dives outside the MPA. Blueline tilefish, speckled hind, and red porgy densities were all higher inside the Northern South Carolina MPA. Red porgy, gag grouper, and white grunt densities were higher inside the Edisto MPA. Speckled hind, gag grouper, scamp, red porgy, and warsaw grouper were all more abundant inside the North Florida MPA. At this point, analyses have not been conducted on this data to determine if these differences are statistically significant. They are based strictly on raw densities.

Table 8. Densities for species of the snapper-grouper complex inside and outside each MPA. MPA names are abbreviated (NC= North Carolina or Snowy Wreck MPA, SC= Northern South Carolina MPA, FL= North Florida MPA). An "X" indicates a species had a higher density inside compared to outside the MPA. N/A indicates that species was not observed at that MPA.

Species Name	Outside NC	Inside SC	Outside SC	Higher Inside SC	Inside ED	Outside ED	Higher Inside ED	Inside FL	Outside FL	Higher Inside FL
Balistes capriscus	5.71	0.61	0.57	X	1.74	2.93		1.25	0.53	X

Balistes sp.	0.00	0.00	0.00	N/A	0.15	0.16		0.00	0.00	N/A
Balistes vetula	0.00	0.12	0.00	X	0.55	0.32	X	0.00	0.00	N/A
Calamus sp.	0.61	7.71	8.45		6.95	13.45		0.00	0.44	
Caulolatilus microps	0.17	0.82	0.78	X	0.00	0.00	N/A	0.00	0.00	N/A
Epinephelus adscensionis	0.12	0.35	0.10	X	0.15	0.45		0.00	0.00	N/A
Epinephelus cruentatus	0.04	1.55	1.31	X	1.89	1.34	X	0.00	0.00	N/A
Epinephelus drummondhayi	0.07	0.46	0.08	X	0.00	0.07		0.50	0.00	X
Epinephelus morio	0.13	0.12	0.00	X	0.00	0.00	N/A	0.00	0.00	N/A
Epinephelus sp.	0.00	0.00	0.00	N/A	0.00	0.08		0.00	0.00	N/A
Haemulon aurolineatum	93.66	1368	1213	X	1408	2103		368	222	X
Haemulon melanurum	0.00	0.00	0.00	N/A	0.00	0.06		0.00	0.00	N/A
Haemulon plumieri	0.00	20.28	1.95	X	0.72	0.33	X	0.00	0.00	N/A
Haemulon sp.	0.00	0.00	0.00	N/A	0.00	5.64		0.00	0.00	N/A
Haemulon striatum	0.00	38.74	39.28		33.13	58.53		14.79	0.00	X
Hyporthodus flavolimbatus	0.11	0.16	0.00	X	0.00	0.00	N/A	0.00	0.00	N/A
Hyporthodus nigritus	0.00	0.00	0.00	N/A	0.00	0.00	N/A	0.25	0.00	X
Hyporthodus niveatus	0.06	6.58	11.71		0.00	0.00	N/A	0.00	0.00	N/A
Lachnolaimus maximus	0.14	1.78	1.96		1.09	0.95	X	0.00	0.14	
Lutjanus buccanella	0.00	0.00	0.00	N/A	0.00	0.07		0.00	0.00	N/A
Lutjanus griseus	0.00	0.00	0.48		0.09	0.00	X	0.00	0.00	N/A
Lutjanus sp.	0.04	0.00	0.25		0.00	0.00	N/A	0.00	0.00	N/A
Mycteroperca interstitialis	0.04	0.00	0.08		0.00	0.07		0.00	0.00	N/A
Mycteroperca microlepis	0.11	1.41	1.67		1.44	0.76	X	1.00	0.00	X
Mycteroperca phenax	2.34	8.05	14.18		6.01	9.55		4.01	0.38	X
Mycteroperca sp.	0.04	0.12	0.00		0.24	0.51		0.00	0.00	N/A
Pagrus pagrus	1.91	74.63	25.60	X	20.70	9.74	X	11.03	1.12	X
Rhomboplites aurorubens	0.00	6.24	65.35		32.24	236.44		349	347.47	X
Seriola dumerili	0.24	0.47	2.71		0.27	1.42		0.50	0.31	X
Seriola rivoliana	0.84	0.71	0.25	X	0.91	4.34		1.25	0.06	X
Seriola sp.	4.07	8.63	4.94	X	1.69	3.63		0.50	1.48	
Sparidae	0.17	0.51	1.08		2.41	6.74		0.00	0.07	

Lionfish Populations

Lionfish continue to have a strong presence in and around the south Atlantic MPAs. Densities inside and outside each MPA are presented in Figure 14. Densities were highest off South Carolina, with the greatest concentration located outside the Northern South Carolina MPA. Densities were lowest at Florida, both inside and outside the MPA, as well as outside the North Carolina MPA. An ANOVA was run to compare densities inside and outside with all MPAs combined which was not significant ($P=0.69$, Fig. 14). MPA names were abbreviated (FL=North Florida, ED=Edisto, SC=Northern South Carolina, and NC=North Carolina or Snowy Wreck MPA) When an ANOVA was run comparing each MPA, however, statistically significant differences ($P=0.001$) were observed (Fig. 15).

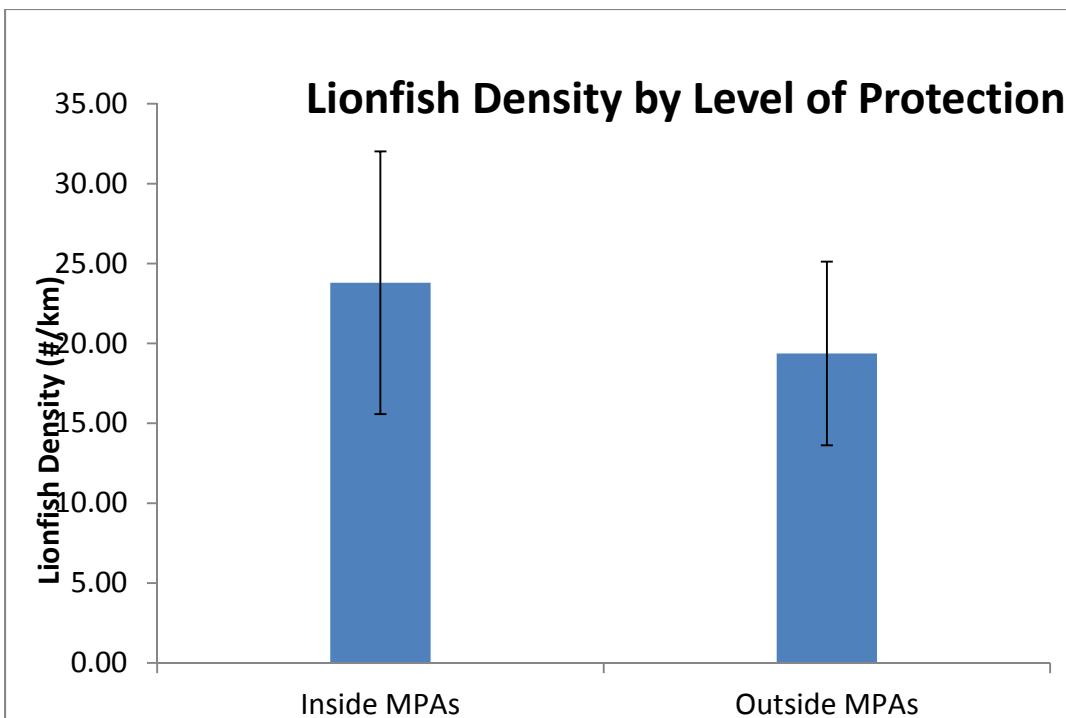


Figure 14. Lionfish densities based on quantitative ROV video transects summarized by all dives within and outside of the shelf-edge MPA sites during 2013 NOAA Ship *Pisces* cruise.

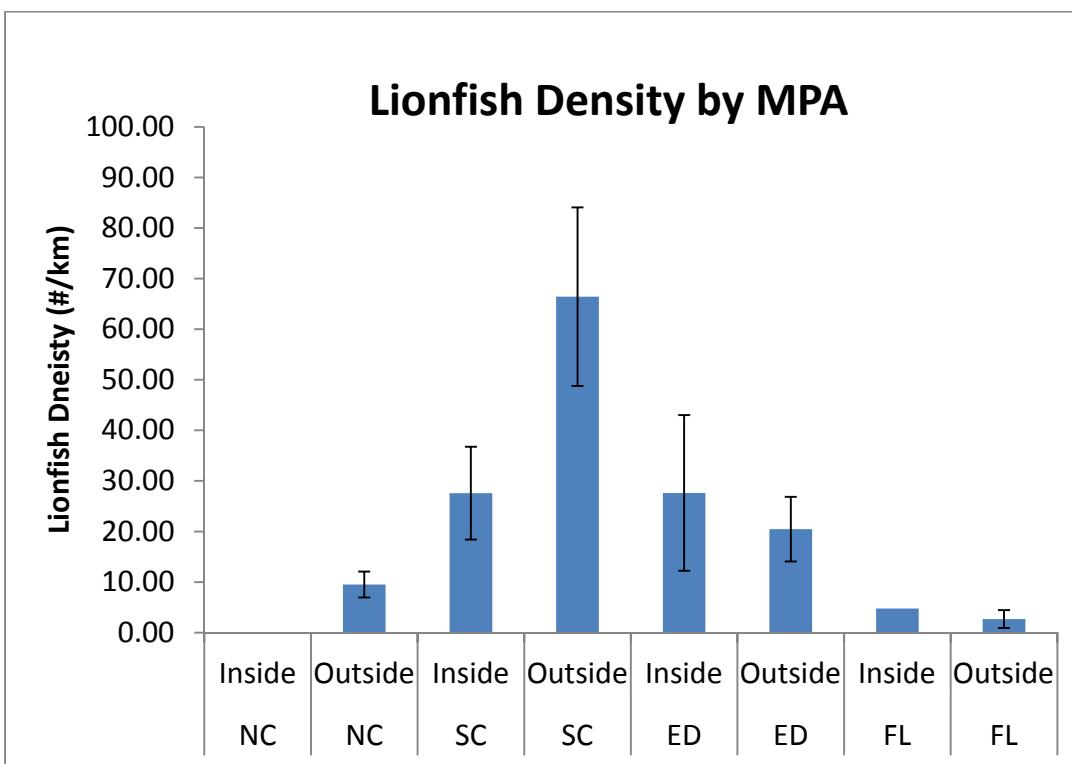


Figure 15. Density of lionfish from quantitative ROV video transects during 2013 NOAA Ship *Pisces* cruise at sites inside and outside of shelf-edge MPA boundaries.

Human Debris

CPCe Point Count of the quantitative ROV photo transects was used to plot the amount of human debris at each dive site (Fig. 16). By far, the largest amount of fishing gear was found No Protection- South and outside of N. Carolina MPA. Fishing gear was also present within the Northern South Carolina MPA (Site 25 & 26), Snowy Wreck MPA (Site 17), Edisto MPA (Sites 8, 9 & 10) as well as North Florida MPA (Site 4).

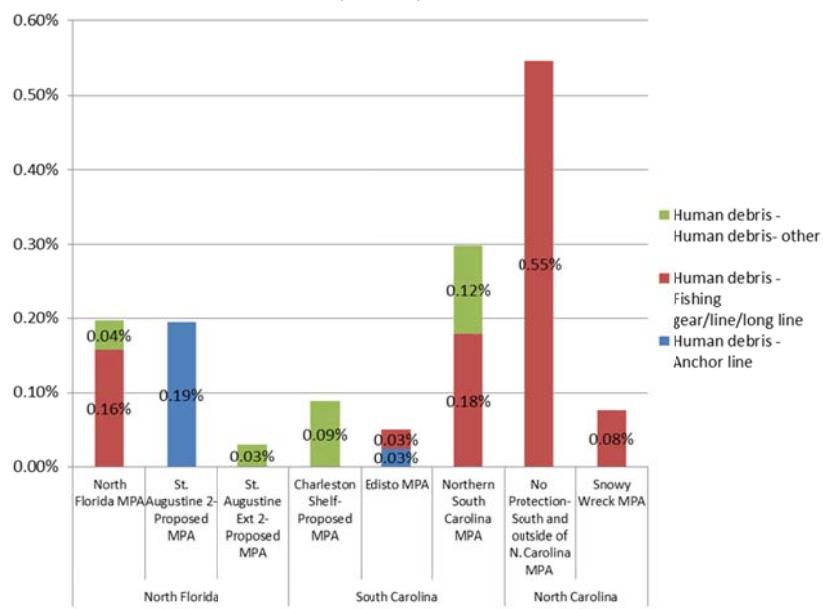


Figure 16. Percent cover of human debris calculated from the quantitative ROV photo transects by state and MPA status from 2013 NOAA Ship *Pisces* cruise.

FUTURE WORK AND CONCLUSIONS

This cruise and research has resulted in a rich set of new data discovering and characterizing deepwater MPA sites and fish populations off the southeastern United States within the jurisdiction of the South Atlantic Fishery Management Council. New sonar maps, ground-truthed by ROV dives, and CTD casts have provided data for characterizing these newly designated shelf-edge MPA sites and adjacent areas. The new multibeam maps provide a wealth of information for future ROV dives within the current MPA sites as well as proposed MPA sites. These data will be important for managers and scientists with NOAA Fisheries, the South Atlantic Fishery Management Council, NOAA DSCRTP, NOAA CRCP, and NOAA Mesophotic Reef Ecosystem Program. These data may then be compared to previous and future research cruises and to areas adjacent to the protected areas to better understand the long-term health and status of these important deepwater coral/sponge ecosystems.

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APPENDIX 1

Species List and Percent Cover of Benthic Macro-Biota

Species list of the benthic macro-invertebrates and algae that were identified from quantitative photo transects for each dive. Still images captured from the photo transects were analyzed using CPCe[©] software to determine relative percent cover of benthic biota and habitat types.

Group/Major/Minor Categories	ROV 13-01	ROV 13-02	ROV 13-03	ROV 13-04	ROV 13-06	ROV 13-07	ROV 13-08	ROV 13-09	ROV 13-10	ROV 13-11	ROV 13-12	ROV 13-13	ROV 13-14	ROV 13-15	ROV 13-17	ROV 13-18	ROV 13-19	ROV 13-20	ROV 13-21	ROV 13-22	ROV 13-23	ROV 13-24	ROV 13-25	ROV 13-26	ROV 13-27	ROV 13-28	ROV 13-29	ROV 13-30	ROV 13-31	ROV 13-32	ROV 13-33	Grand Total
Gonister tessellatus	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
Holothuria lentigenosa enodis	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
Luidia alternata	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
Narcine trigonaria	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%		
Ophioderidae	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
Ophioderidae	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
Paracolochirus mysticus	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
Stylocidaris sp.	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		
Chordata	1.46%	0.75%	1.94%	1.42%	0.55%	0.63%	1.29%	0.44%	0.84%	0.67%	0.06%	0.32%	0.31%	0.38%	0.52%	0.55%	0.26%	0.11%	0.13%	0.00%	1.19%	1.17%	0.82%	2.46%	0.18%	0.00%	0.06%	0.47%	0.29%	0.77%		
Ascidiae	0.30%	0.00%	0.13%	0.71%	0.18%	0.26%	0.64%	0.50%	0.46%	0.13%	0.33%	0.27%	0.00%	0.00%	0.05%	0.00%	0.14%	0.00%	0.00%	0.00%	0.05%	0.73%	0.00%	0.69%	0.00%	0.00%	0.13%	0.00%	0.20%			
Didemnidae	0.82%	0.64%	0.26%	0.39%	0.18%	0.21%	0.43%	0.00%	0.36%	0.09%	0.42%	0.04%	0.00%	0.00%	0.08%	0.00%	0.07%	0.00%	0.04%	0.49%	0.29%	1.58%	0.00%	0.00%	0.00%	0.17%	0.06%	0.25%				
Fish	0.34%	0.11%	1.55%	0.32%	0.18%	0.16%	0.21%	0.55%	0.41%	0.22%	0.09%	0.36%	0.06%	0.23%	0.33%	0.44%	0.41%	0.22%	0.06%	0.13%	0.00%	0.65%	0.15%	0.36%	0.19%	0.18%	0.00%	0.06%	0.17%	0.23%	0.32%	
Other organism	0.09%	0.00%	0.06%	0.32%	0.00%	0.00%	0.79%	0.05%	3.85%	0.00%	4.47%	0.04%	0.24%	0.08%	0.24%	0.37%	0.48%	0.35%	0.02%	0.20%	0.11%	2.68%	0.00%	3.23%	0.00%	0.44%	0.00%	0.04%	0.00%	0.58%		
Natural detritus	0.03%	0.00%	0.06%	0.20%	0.00%	0.05%	2.64%	0.00%	0.51%	0.00%	2.98%	0.09%	0.06%	0.00%	0.32%	0.14%	0.04%	0.06%	0.00%	0.00%	0.39%	0.00%	0.00%	0.00%	0.00%	0.00%	0.12%	0.00%	0.25%			
Bare Substrata	73.93%	81.49%	62.63%	80.72%	70.49%	76.33%	76.86%	77.80%	71.37%	51.15%	73.16%	67.56%	37.35%	85.76%	90.69%	96.28%	85.10%	86.37%	90.83%	74.17%	90.57%	84.42%	22.88%	82.43%	74.52%	67.04%	96.30%	93.89%	93.87%	33.42%	84.05%	75.50%
Soft bottom substrate	28.69%	30.67%	8.54%	44.16%	33.95%	30.21%	45.43%	38.12%	23.60%	25.40%	52.19%	42.27%	87.20%	51.13%	66.77%	60.03%	57.01%	47.72%	28.83%	37.31%	26.42%	34.20%	18.33%	32.75%	64.70%	14.30%	75.13%	46.00%	57.91%	14.40%	34.11%	38.29%
Hard bottom substrate	45.30%	50.83%	54.09%	36.55%	45.54%	46.32%	31.43%	39.68%	47.77%	25.75%	20.98%	10.06%	34.63%	23.92%	36.26%	28.09%	39.24%	61.99%	36.85%	64.25%	50.22%	4.54%	49.68%	9.83%	52.74%	21.17%	47.89%	35.96%	19.02%	49.94%	37.21%	
Bare rock-pavement boulder ledge	43.87%	49.97%	52.12%	34.58%	45.17%	41.63%	21.14%	37.62%	47.10%	25.02%	18.37%	23.11%	5.43%	28.22%	26.62%	34.73%	26.17%	36.83%	60.03%	27.50%	57.93%	45.00%	4.22%	45.78%	8.74%	52.43%	16.16%	47.78%	33.43%	17.65%	35.75%	34.18%
Bare rubble-coral	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%		
Bare rubble-rock	1.37%	0.85%	1.84%	1.97%	0.37%	4.68%	10.29%	1.71%	0.67%	0.73%	2.60%	2.18%	4.63%	6.41%	1.31%	1.52%	1.93%	2.07%	1.79%	9.36%	6.26%	5.22%	0.32%	3.86%	1.09%	0.32%	5.01%	0.11%	2.53%	1.37%	14.19%	2.99%
Standing dead coral	0.06%	0.00%	0.13%	0.05%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%		
Human debris	0.03%	0.00%	0.19%	0.20%	0.00%	0.00%	0.05%	0.05%	0.00%	0.00%	0.06%	1.10%	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.07%		
Anchor line	0.00%	0.00%	0.19%	0.00%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%		
Fishing gear/line/long line	0.00%	0.00%	0.00%	0.16%	0.00%	0.00%	0.00%	0.05%	0.00%	0.00%	0.00%	1.10%	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.05%		
Human debris-other	0.03%	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.12%	0.00%	0.00%	0.00%	0.00%	0.01%	
Grand Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%		

APPENDIX 2

Species List and Density of Fish Observations

Species list all of fish that were identified and counted from the quantitative video transects for each dive. The total distance (km) of each dive was used to calculate the density (# individuals/km) of each fish species. The estimated field of view width was ~10 m, and most fish were identified within a 5 m distance.

APPENDIX 3

SEADESC II REPORT

Characterizations and Quantitative Analyses of Habitat, Benthic Biota, and Fish Populations

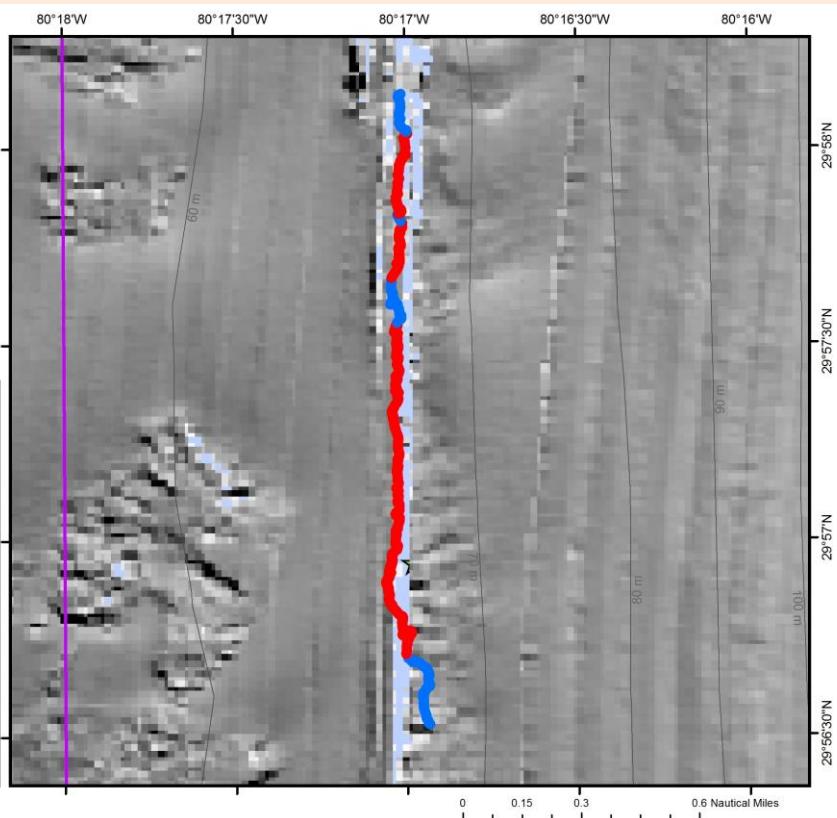
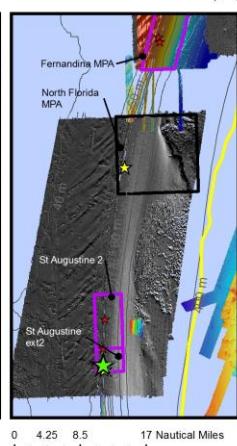
Provides the following data for each dive site: cruise and ROV dive metadata, figures showing each ROV dive track and habitat zone overlaid on multibeam sonar maps, dive track data (start and end latitude, longitude, depth), objectives, CTD plots, general description of the habitat and biota, and images of the biota and habitat that characterize the dive site. In addition, this SEADESC Level II Report provides quantitative analyses of each dive site including: 1) CPCE 4.0[©] Coral Point Count analysis of percent cover of benthic biota and substrate type, and 2) densities of fish populations (# individuals/km for each species).

Dive Site: ROV 13-01; Florida, St. Augustine, Inside Proposed "St. Augustine Ext 2" MPA, 60 m ridge

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
North Florida, St. Augustine Ext 2-
Proposed MPA
2-VII-13-2; ROV 13-01

- ★ ROV 13-01
 - ★ ROV Dives
 - ★ CTD
 - ROV Tracks
 - Hard Bottom
 - Soft Bottom
 - Other ROV Tracks
- MPA
 ■ Deep Coral HAPC
 ■ Proposed MPA 2013
 — Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	USWTR
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/2/2013
Specimens:	0
Digital Photos:	201
DVD:	2
Hard Drive:	1

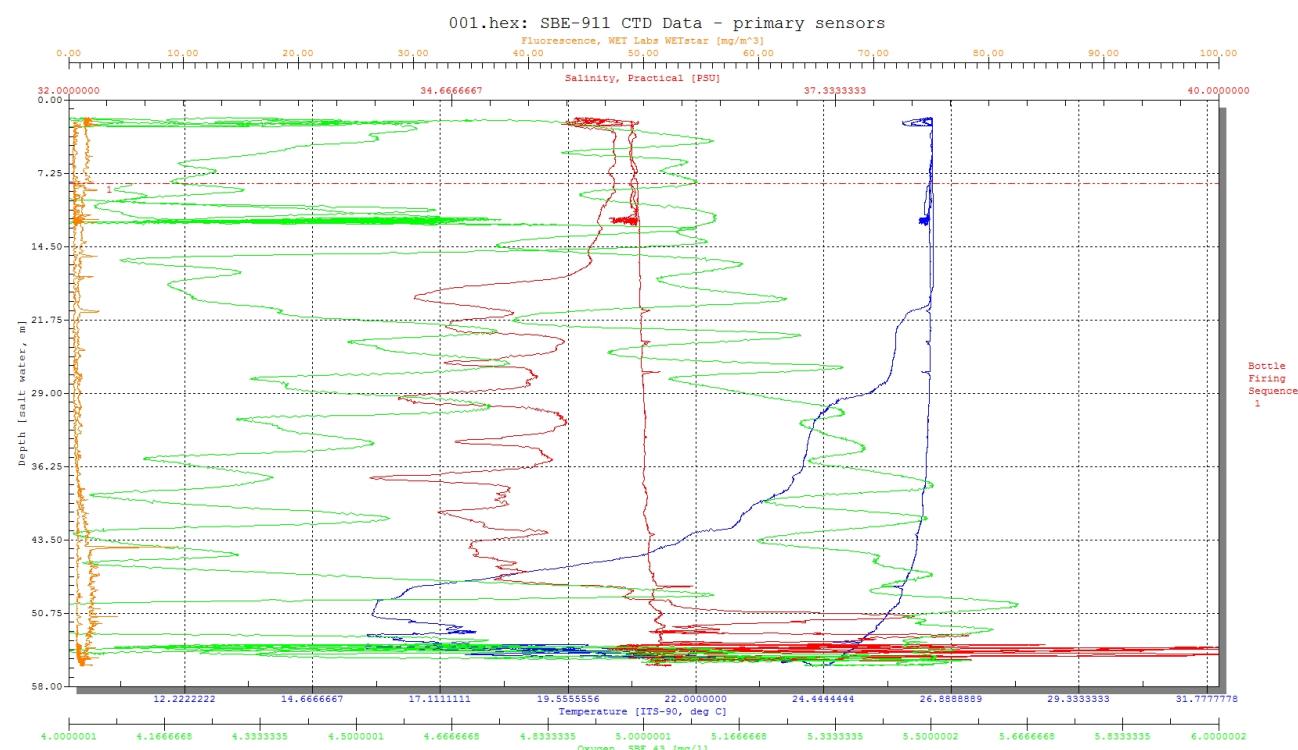
Dive Site: ROV 13-01; Florida, St. Augustine, Inside Proposed "St. Augustine Ext 2" MPA, 60 m ridge

Dive Data:

Minimum Bottom Depth (m):	-51	Total Transect Length (km):	2.96
Maximum Bottom Depth (m):	-66	Surface Current (kn):	2
On Bottom (Time- GMT):	8:47	On Bottom (Lat/Long):	29.94°N; -80.28°W
Off Bottom (Time- GMT):	10:44	Off Bottom (Lat/Long):	29.97°N; -80.28°W
Physical (bottom); Temp (°C):	15.11	Salinity:	N/A
		Visibility (ft):	40
		Current (kn):	1

Physical Environment:

Distance from Dive Site(km): 1.26



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m3). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Imagery:

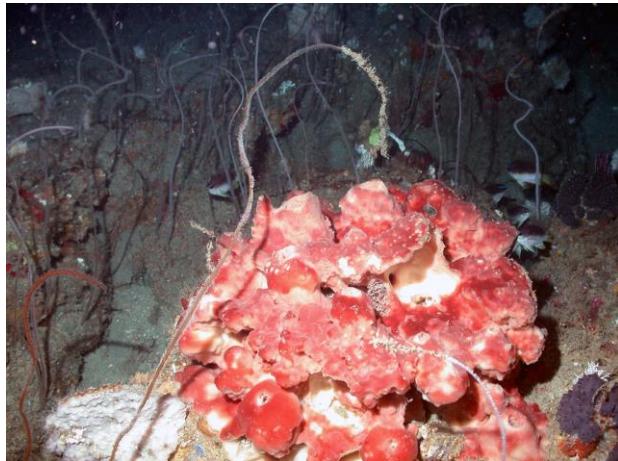


Figure 1: -59.1 m 29.96 °N; -80.28 °W

Unusual demosponge (*Xestospongia?* sp.1) with wire black coral (*Stichopathes lutkeni*) on rock ledge habitat.



Figure 2: -61.2 m 29.95 °N; -80.28 °W

Oculina varicosa coral colony (~20 cm diameter) on rock ledge. At this depth the coral is white, lacking zooxanthellae.



Figure 3: -61.2 m 29.96 °N; -80.28 °W

Large bush of black coral (*Tanacetipathes hirta*) along with wire coral (*Stichopathes lutkeni*) on rock boulders.



Figure 4: -59.5 m 29.96 °N; -80.28 °W

School of vermilion snapper (*Rhomboptilus aurorubens*) and tomates (*Haemulon aurolineatum*) on moderate relief rocky ledges.

Dive Site: ROV 13-01; Florida, St. Augustine, Inside Proposed "St. Augustine Ext 2" MPA, 60 m ridge

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-01, UNCW Superphantom ROV Dive 2236; Site #- 2-VII-13-2. Target Site - Florida, St. Augustine, Inside Proposed "St. Augustine Ext 2" MPA, 60 m ridge. Ground-truth multibeam sonar of site (USWTR Multibeam (navy B&W) and FL wgs 84 (color)). Conduct video/photo transect S to N, along main ridge.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; non-transect photos noted. Surface current approx. 2 kn, bottom current ~0-1 kn. Diving on USWTR Multibeam (navy Black and White) and FL wgs 84 (color).

Site Description/Habitat/Biota:

Transect north along top of main ridge and east slope. East slope during dive appears to along the west edge of the main N-S feature of the multibeam. East base ~62 m, top 59-60 m. Ridge slope is low to moderate relief rock slabs and boulders, 1-2 diam and 1/2 m to 1 m relief, low ledges <1 m relief, mostly low slope of 5-10°, Patchy areas of high rugosity and low rugosity on the slope. Fish more dense in high rugosity areas. East of the ridge is off reef and sediment, sediment with rubble, pavement, and low relief knolls. Ridge top is low relief, flat pavement, areas of low relief slabs and boulders, <1/2 m relief. At end of dive, ridge is less prominent, mostly flat, patchy hard bottom and sand. Dense benthic biota. Dense fish in high rugosity of east slope. Bottom temperature 15°C.

Dominant Benthic Biota:

Ann - *Filograna*; Cho - Ascidiacea; Didemnidae, Eudistoma, *Pyrosoma*; Cni - Antipathidae; *Stichopathes* (abundant), *Tanacetipathes* (abundant); Cni - Gorgonacea; Plexauridae, *Nicella* sp.; Cni - Hydroidolina; Ech - Asteroidea; *Narcissia trigonaria*, Echinoidea

Por - Demospongiae; *Ircinia campana* (abundant), Spirastrellidae, Clathriidae (rare), *Neofibularia* sp.(rare); Coral- *Oculina varicosa* (several colonies 10-25 cm, white; on east slope), *Madracis myriaster* (rare).

Fish:

yellowtail reefish - *Chromis enchrurus*; reef butterflyfish - *Chaetodon sedentarius*; tomate - *Haemulon aurolineatum*; vermillion snapper - *Rhomboplites aurorubens*; blue angelfish - *Holacanthus bermudensis*; spotfin hogfish - *Bodianus pulchellus*; squirrelfish - *Holocentrus* sp.; tattler - *Serranus phoebe*; lionfish - *Pterois volitans* (8); purple reefish - *Chromis scotti*; red porgy - *Pagrus pagrus*; spotfin butterflyfish - *Chaetodon ocellatus*; bank butterflyfish - *Prognathodes aya*; wrasse; amberjack - *Seriola* sp.; scamp grouper - *Mycteroperca phenax*; blackbar soldierfish - *Myripristis jacobus*; cubbyu - *Equetus umbrosus*; short bigeye - *Pristigenys alta*; hogfish - *Lachnolaimus maximus*; moray eel - Muraenidae; porgy - Sparidae; purple reefish; roughtongue bass; wrasse bass - *Liopropoma eukrines*.

Dive Site: ROV 13-01; Florida, St. Augustine, Inside Proposed "St. Augustine Ext 2" MPA, 60 m ridge

CPCe Percent Cover Analysis:

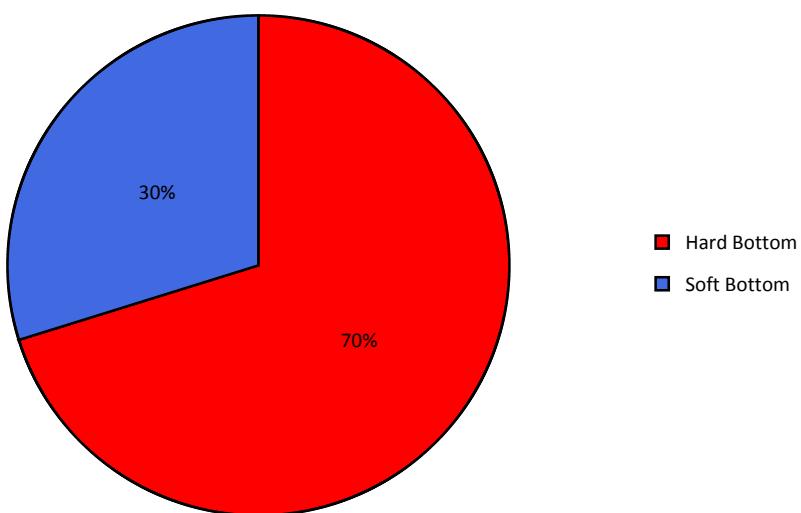


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-01. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

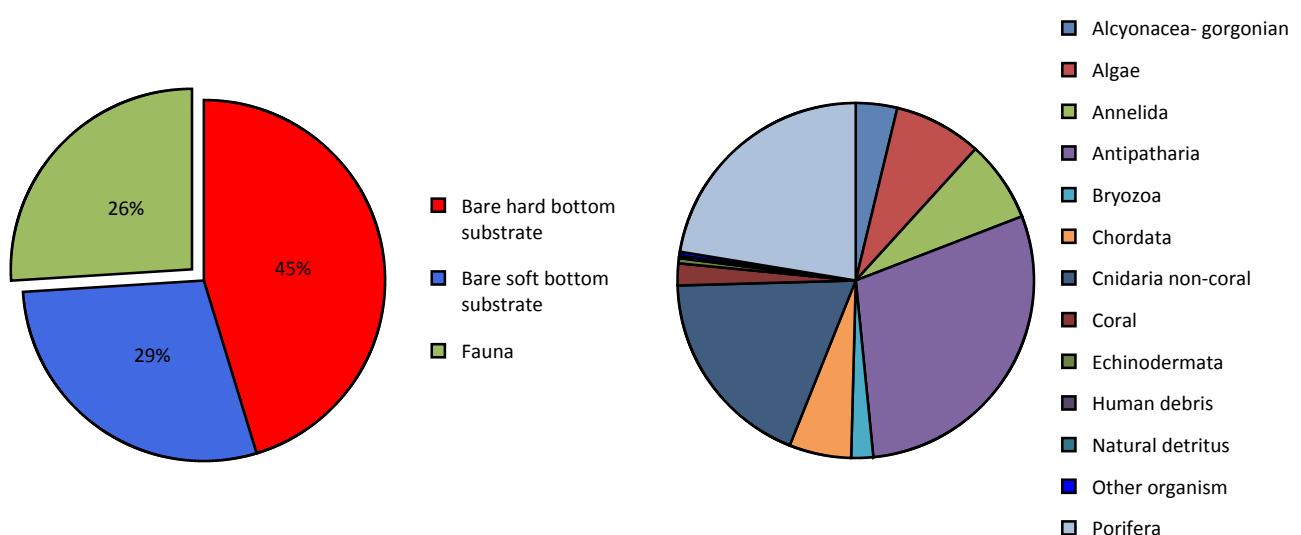


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-01.

Dive Site: ROV 13-01; Florida, St. Augustine, Inside Proposed "St. Augustine Ext 2" MPA, 60 m ridge

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-01.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	852	25.98%
Algae	68	2.07%
Corallinales/crustose coralline	43	1.31%
Cyanophyta	2	0.06%
Rhodophyta	23	0.70%
Porifera	191	5.82%
Chondrosia sp.	1	0.03%
Cinachyra sp./Cinachyrella sp.	1	0.03%
Clathria sp.	3	0.09%
Cliona sp.	1	0.03%
Demospongiae	84	2.56%
Demospongiae- ze tan starlet	3	0.09%
Hadromerida	1	0.03%
Ircinia campana	10	0.30%
Ircinia sp.	33	1.01%
Poecilosclerida	6	0.18%
Spirastrellidae	48	1.46%
Coral	17	0.52%
Oculina varicosa	16	0.49%
Scleractinia solitary	1	0.03%
Alcyonacea- gorgonian	32	0.98%
Diogorgia sp.	7	0.21%
Ellisellidae	2	0.06%
Gorgonacea	1	0.03%
Muricea sp.	19	0.58%
Telesto/Carijoa	3	0.09%
Antipatharia	250	7.62%
Antipatharia	6	0.18%
Stichopathes lutkeni	192	5.85%
Tanacetipathes hirta	52	1.59%
Cnidaria non-coral	158	4.82%
Hydroidolina	158	4.82%
Annelida	63	1.92%
Filograna sp.	16	0.49%
Sabellidae	45	1.37%
Spirobranchus gigantea	2	0.06%
Bryozoa	17	0.52%

Dive Site: ROV 13-01; Florida, St. Augustine, Inside Proposed "St. Augustine Ext 2" MPA, 60 m ridge

Bryozoa	2	0.06%
Schizoporella sp.	15	0.46%
Echinodermata	4	0.12%
Centrostephanus longispinus	1	0.03%
Echinoidea	1	0.03%
Eucidaris tribuloides	2	0.06%
Chordata	48	1.46%
Asciidiacea	10	0.30%
Didemnidae	27	0.82%
Fish	11	0.34%
Other organism	3	0.09%
Other organism	3	0.09%
Natural detritus	1	0.03%
Natural detritus	1	0.03%
Soft bottom substrate	941	28.69%
Soft bottom substrate	941	28.69%
Bare soft bottom substrate	941	28.69%
Hard bottom substrate	1486	45.30%
Hard bottom substrate	1486	45.30%
Bare rock- pavement boulder ledge	1439	43.87%
Bare rubble- rock	45	1.37%
Standing dead coral	2	0.06%
Human debris	1	0.03%
Human debris	1	0.03%
Human debris- other	1	0.03%
Grand Total	3280	100.00%

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-01.

Scientific Name	Common Name	13-01
<i>Balistes capriscus</i>	grey triggerfish	0.28
<i>Bodianus pulchellus</i>	spotfin hogfish	28.93
<i>Calamus</i> sp.	porgy	0.56
<i>Canthigaster rostrata</i>	sharpnose puffer	1.97
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	5.62
<i>Chaetodon sedentarius</i>	reef butterflyfish	17.13
<i>Chromis enchrysurus</i>	yellowtail reefish	151.69
<i>Chromis scotti</i>	purple reefish	9.83
<i>Chromis</i> sp.	damselfish	1.12
<i>Haemulon aurolineatum</i>	tomtate	352.81
<i>Halichoeres</i> sp.	wrasse	10.96
<i>Holacanthus bermudensis</i>	blue angelfish	17.42
<i>Holocentrus</i> sp.	squirrelfish	6.46
<i>Lachnolaimus maximus</i>	hogfish	0.56
<i>Liopropoma eukrines</i>	wrasse bass	0.56
<i>Malacanthus plumieri</i>	sand tilefish	0.28
Muraenidae	moray eel	0.28
<i>Mycteroperca phenax</i>	scamp	1.12
<i>Myripristis jacobus</i>	blackbar soldierfish	0.84
<i>Pagrus pagrus</i>	red porgy	4.49
<i>Pareques umbrosus</i>	cubbyu	1.97
<i>Pristigenys alta</i>	short bigeye	1.4
<i>Prognathodes aya</i>	bank butterflyfish	3.09
<i>Pronotogrammus martinicensis</i>	roughtongue bass	0.28
<i>Pterois volitans</i>	lionfish	1.4
<i>Rhomboplites aurorubens</i>	vermillion snapper	389.33
<i>Seriola dumerili</i>	greater amberjack	0.84
<i>Seriola</i> sp.	amberjack	3.37
<i>Serranus phoebe</i>	tattler	7.02
Sparidae	porgy	0.28

Dive Site: ROV 13-02; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge

General Location and Dive Track:

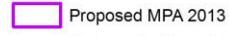
NOAA Ship Pisces Cruise 13-03
North Florida, St. Augustine 2
Proposed MPA
2-VII-13-4; ROV 13-02



ROV Dives



Deep Coral HAPC



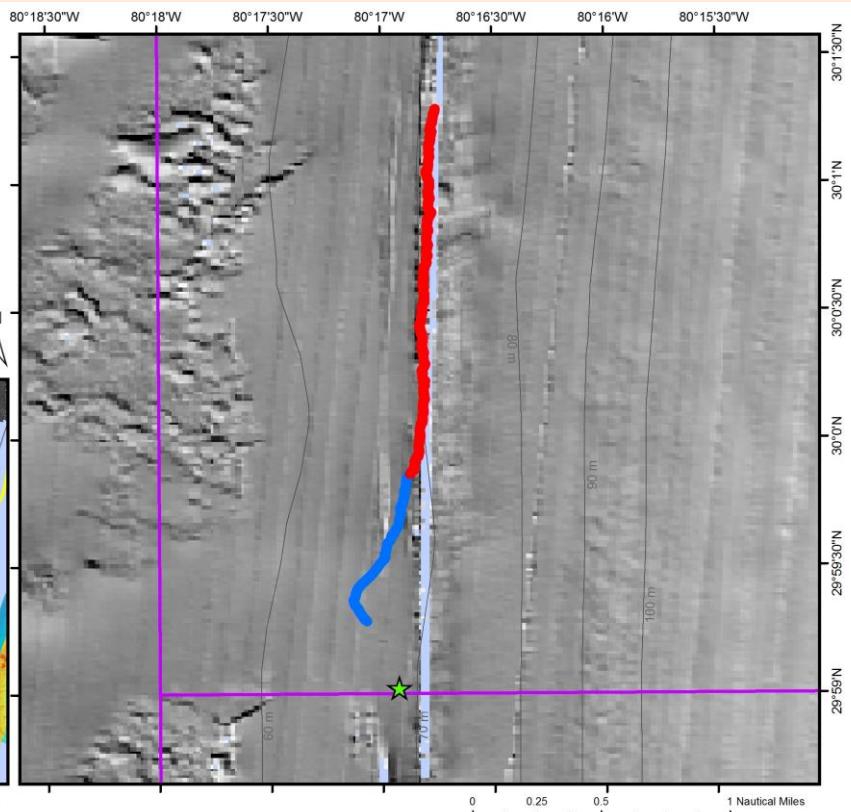
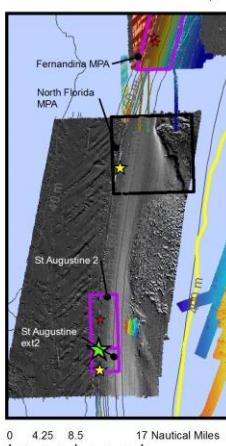
Bathymetry Lines (m)

ROV Tracks

• Hard Bottom

• Soft Bottom

• Other ROV Tracks



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	USWTR
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/2/2013
Specimens:	0
Digital Photos:	208
DVD:	2
Hard Drive:	1

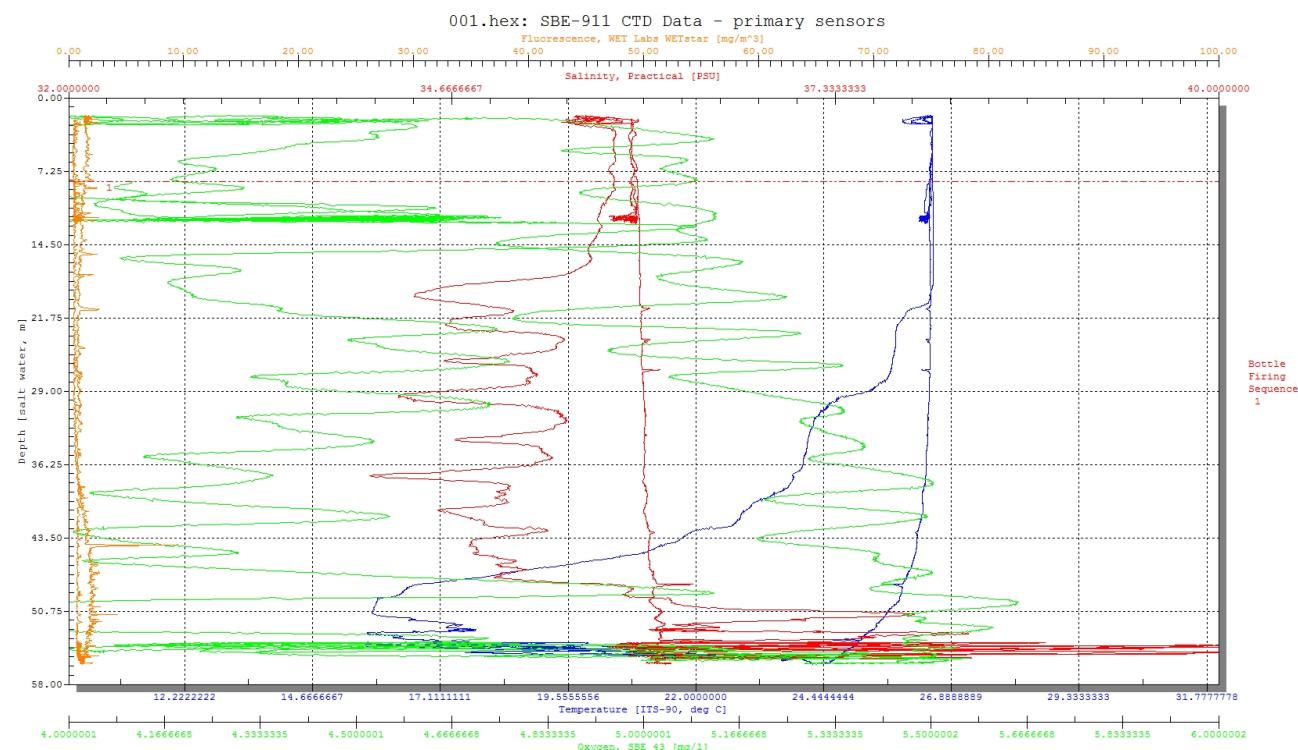
Dive Site: ROV 13-02; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge

Dive Data:

Minimum Bottom Depth (m):	-36	Total Transect Length (km):	3.74
Maximum Bottom Depth (m):	-66	Surface Current (kn):	.88
On Bottom (Time- GMT):	13:21	On Bottom (Lat/Long):	29.99°N; -80.28°W
Off Bottom (Time- GMT):	15:01	Off Bottom (Lat/Long):	30.02°N; -80.28°W
Physical (bottom); Temp (°C):	11.01	Salinity:	N/A
		Visibility (ft):	50
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 5.10



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m3). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Imagery:



Figure 1: -56.8 m 30.01 °N; -80.28 °W

School of tomates (*Haemulon aurolineatum*) on rocky ledge with various encrusting demosponges and wire coral.



Figure 2: -55.8 m 30.00 °N; -80.28 °W

Dense cover of bushy black coral (*Tanacetipathes hirta*), wire coral (*Stichopathes lutkeni*), Plexauridae gorgonians, and various demosponges on rock pavement.

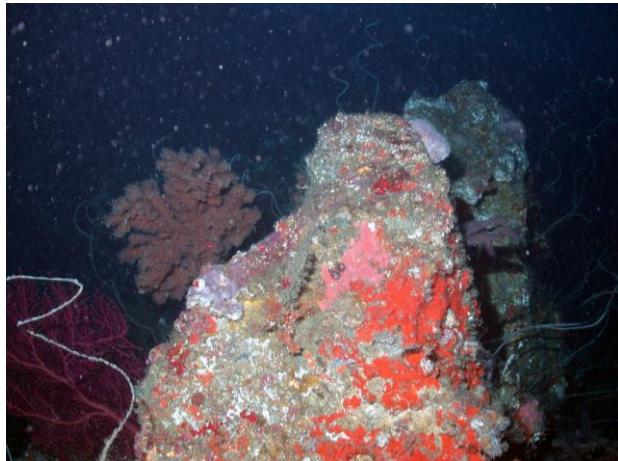


Figure 3: -59.7 m 30.02 °N; -80.28 °W

Large rock pillars encrusted with red-orange Spirastrellidae sponges, bushy black coral (*Tanacetipathes hirta*), wire coral (*Stichopathes lutkeni*), and *Muricea* sp. gorgonian.



Figure 4: -57.8 m 30.00 °N; -80.28 °W

Dense cover of wire coral (*Stichopathes lutkeni*), bushy black coral (*Tanacetipathes hirta*), sponges, and hydroids on rock pavement habitat.

Dive Site: ROV 13-02; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-02, UNCW Superphantom Dive 2237; Site #- 2-VII-13-4. Target Site - Inside proposed "St. Augustine 2" MPA; 60 m ridge. Ground-truth multibeam sonar of site (USWTR and (USWTR and Navy FL wgs 84). Conduct video/photo transect S to N, along main ridge oriented S-N.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 2 kn, bottom current ~0-1 kn.

Site Description/Habitat/Biota:

Transect along west slope and top of main ridge. Dive appears to follow along the west edge of the main N-S feature of the multibeam. West base ~62 m, top 57-58 m. Ridge slope is low to moderate relief rock slabs and boulders 1/2 m to 1 m relief, low ledges <1 m relief, mostly low slope of 5-10o. Slope edge mostly high rugosity. Off ridge to west is flat sediment. Ridge top is low relief, flat pavement, low relief ledges <1/2 m. Bottom temp 11o C, upwelling. Dense benthic biota, but fish very sparse. Dense fishing line criss-crossed over bottom.

Dominant Benthic Biota:

Ann - Filograna; Cho - Ascidiacea; Didemnidae; Cni - Antipathidae; *Stichopathes* sp. (abundant), *Tanacetipathes* sp.(abundant);

Cni - Gorgonacea; Plexauridae, *Nicella* sp.; Cni - Hydroidolina; Ech - Asteroidea; *Narcissia trigonaria*, Echinoidea; Por - Demospongiae; *Ircinia campana* (abundant), Spirastrellidae, Clathriidae (rare), *Dictyoceratida* sp.(rare).

Coral- *Oculina varicosa* (several colonies 10-25 cm, white; on east slope).

Fish:

tomtate - *Haemulon aurolineatum*; vermillion snapper - *Rhomboplites aurorubens*; yellowtail reeffish - *Chromis enchrurus*; blue angelfish - *Holacanthus bermudensis*; cubbyu - *Equetus umbrosus*; lionfish - *Pterois volitans* (3); reef butterflyfish - *Chaetodon sedentarius*; bank butterflyfish - *Prognathodes aya*; squirrelfish - *Holocentrus* sp.; tattler - *Serranus phoebe*; amberjack - *Seriola* sp.; bank seabass; bigeye - *Priacanthus arenatus*; blackbar soldierfish - *Myripristis jacobus*; gray trigger fish; purple reefish - *Chromis scotti*; roughtongue bass

Dive Site: ROV 13-02; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge

CPCe Percent Cover Analysis:

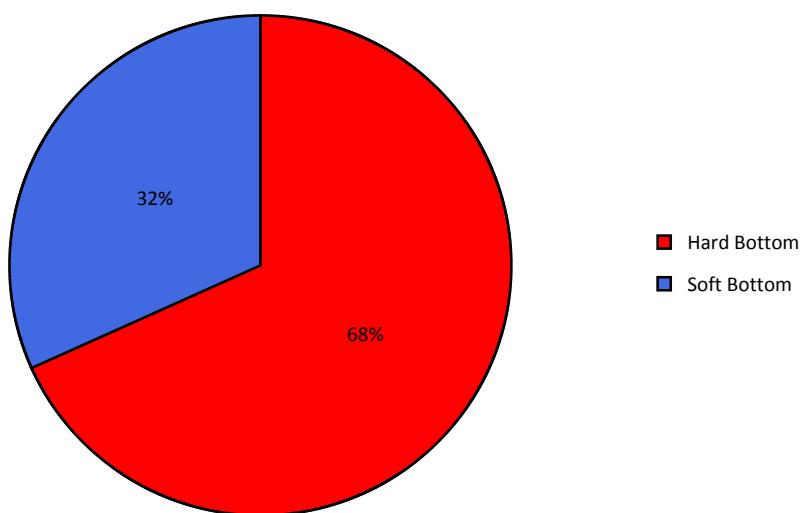


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-02. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

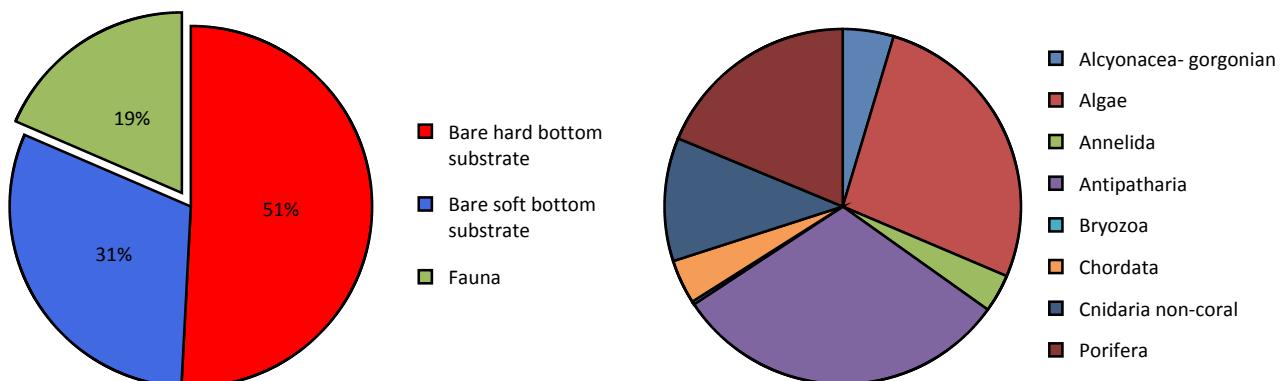


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-02.

Dive Site: ROV 13-02; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-02.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	347	18.51%
Algae	93	4.96%
Corallinales/crustose coralline	64	3.41%
Cyanophyta	23	1.23%
Rhodophyta	6	0.32%
Porifera	65	3.47%
Chondrilla sp.	1	0.05%
Demospongiae	28	1.49%
Hadromerida	10	0.53%
Ircinia campana	2	0.11%
Ircinia sp.	14	0.75%
Ircinia strobilina	2	0.11%
Poecilosclerida	1	0.05%
Spirastrellidae	7	0.37%
Alcyonacea- gorgonian	16	0.85%
Diogorgia sp.	3	0.16%
Ellisella sp.	6	0.32%
Muricea sp.	6	0.32%
Nicella sp.	1	0.05%
Antipatharia	107	5.71%
Antipatharia	1	0.05%
Stichopathes lutkeni	76	4.05%
Tanacetipathes hirta	30	1.60%
Cnidaria non-coral	39	2.08%
Hydroidolina	39	2.08%
Annelida	12	0.64%
Filograna sp.	12	0.64%
Bryozoa	1	0.05%
Schizoporella sp.	1	0.05%
Chordata	14	0.75%
Didemnidae	12	0.64%
Fish	2	0.11%
Soft bottom substrate	575	30.67%
Soft bottom substrate	575	30.67%
Bare soft bottom substrate	575	30.67%
Hard bottom substrate	953	50.83%
Hard bottom substrate	953	50.83%

Dive Site: ROV 13-02; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge

Bare rock- pavement boulder ledge	937	49.97%
Bare rubble- rock	16	0.85%
Grand Total	1875	100.00%

Dive Site: ROV 13-02; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge**Density of Fish:**

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-02.

Scientific Name	Common Name	13-02
<i>Balistes capriscus</i>	grey triggerfish	0.25
<i>Bodianus pulchellus</i>	spotfin hogfish	0.76
<i>Centropristes ocyurus</i>	bank sea bass	0.25
<i>Chaetodon sedentarius</i>	reef butterflyfish	1.76
<i>Chromis enchrysurus</i>	yellowtail reefish	1.51
<i>Chromis scotti</i>	purple reefish	0.25
<i>Haemulon aurolineatum</i>	tomtate	188.62
<i>Holacanthus bermudensis</i>	blue angelfish	1.51
<i>Holocentridae</i>		0.25
<i>Holocentrus</i> sp.	squirrelfish	0.76
<i>Myripristis jacobus</i>	blackbar soldierfish	0.25
<i>Pareques umbrosus</i>	cubbyu	2.01
<i>Prognathodes aya</i>	bank butterflyfish	0.5
<i>Pronotogrammus martinicensis</i>	roughtongue bass	0.25
<i>Pterois volitans</i>	lionfish	1.01
<i>Rhomboplites aurorubens</i>	vermillion snapper	48.6
<i>Seriola rivoliana</i>	almaco jack	0.25
<i>Serranus phoebe</i>	tattler	0.25

Dive Site: ROV 13-03; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
North Florida, St. Augustine 2
Proposed MPA
2-VII-13-5; ROV 13-03

★ ROV 13-03

★ ROV Dives

★ CTD

ROV Tracks

● Hard Bottom

● Soft Bottom

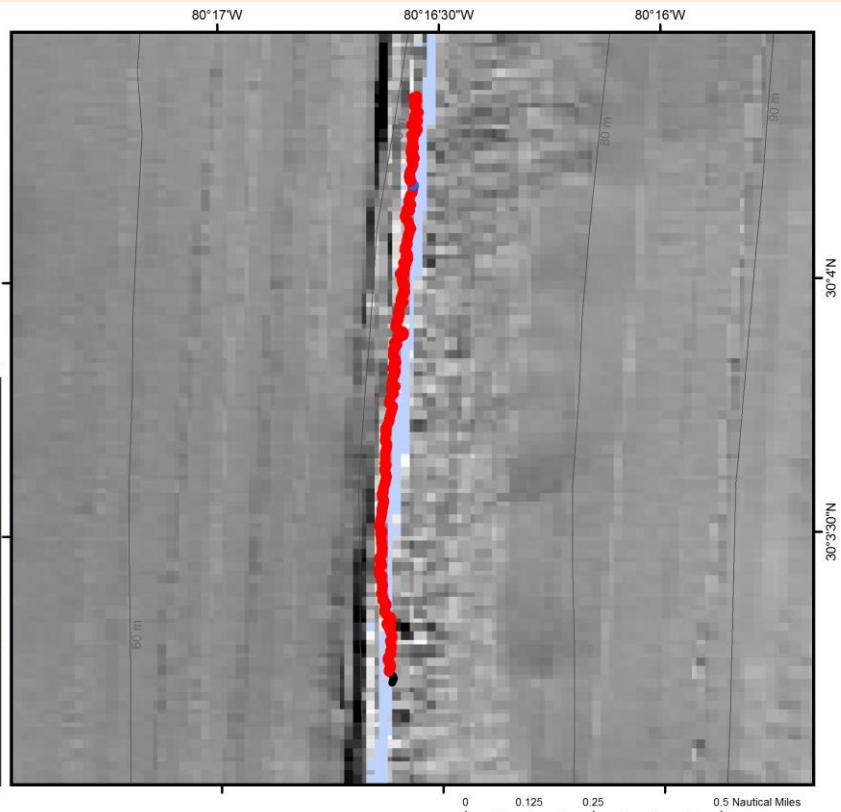
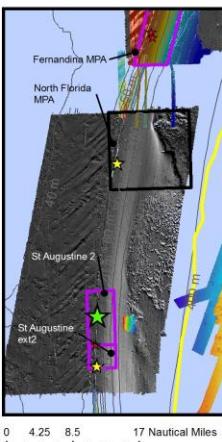
● Other ROV Tracks

■ MPA

■ Deep Coral HAPC

■ Proposed MPA 2013

— Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	USWTR
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/2/2013
Specimens:	0
Digital Photos:	120
DVD:	2
Hard Drive:	1

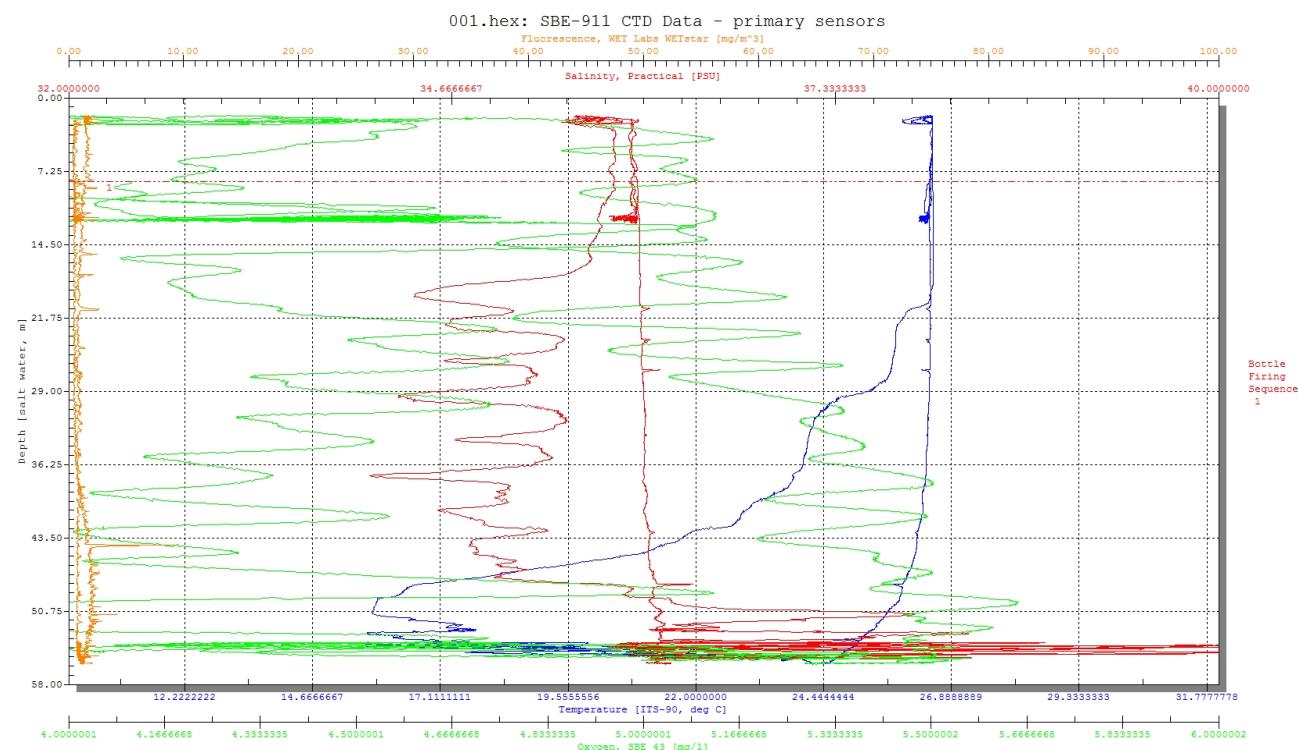
Dive Site: ROV 13-03; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge

Dive Data:

Minimum Bottom Depth (m):	-55	Total Transect Length (km):	2.06
Maximum Bottom Depth (m):	-67	Surface Current (kn):	1.9
On Bottom (Time- GMT):	15:40	On Bottom (Lat/Long):	30.05°N; -80.28°W
Off Bottom (Time- GMT):	16:54	Off Bottom (Lat/Long):	30.07°N; -80.28°W
Physical (bottom); Temp (°C):	11.49	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 12.13



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m3). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Imagery:

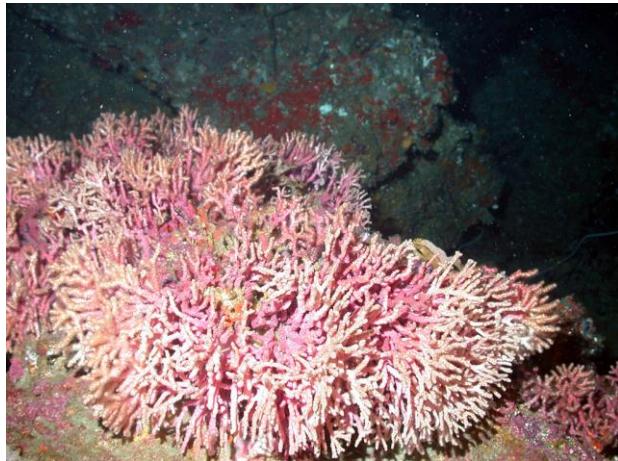


Figure 1: -61.6 m 30.07 °N; -80.28 °W

Large live *Oculina varicosa* coral colony (~50 cm diameter) on rock ledge. Some deepwater *Oculina* which are normally all white, have purple skeleta.

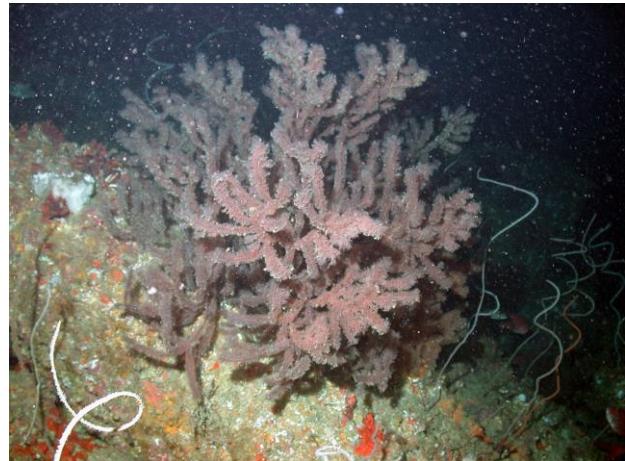


Figure 2: -59.5 m 30.07 °N; -80.28 °W

Large bushy black coral (*Tanacetipathes hirta*) on rock outcrop with wire coral.



Figure 3: -58.9 m 30.06 °N; -80.28 °W

Vermilion snapper (*Rhomboplites aurorubens*) with grunts and tomates (*Haemulon aurolineatum*) on rock pillars. *Oculina varicosa* coral on upper right and lower left.



Figure 4: -60.3 m 30.07 °N; -80.28 °W

Large colony of live *Oculina varicosa* coral (~50 cm diameter) on rock boulder.

Dive Site: ROV 13-03; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-03, UNCW Superphantom ROV Dive 2238; Site #- 2-VII-13-5. Target Site - St. Augustine 2 Proposed MPA; 60 m ridge. ROV survey inside proposed MPA; ground-truth multibeam sonar of site (USWTR and Navy FL wgs 84). Conduct video/photo transect S to N, along main ridge oriented S-N.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 2 kn, bottom current ~0-1 kn. Dive aborted, transducer pole broke.

Site Description/Habitat/Biota:

Transect along east slope and top east edge of main ridge. Dive appears to follow along the west edge of the main N-S feature of the multibeam. Maximum relief 10 m; top 56 m; east base 63 to 66 m. Most of dive along the slope. Slope varied from low to moderate 30-45° slope, moderate to high relief 1-3 m, and mostly high rugosity, approx. 10-15 m wide. Some areas low slope 10-20°; low to moderate relief, and high rugosity. Jumble of fractured rock slabs and flat boulders 1-2 m diameter, 1/2 to 1 m relief. Dense benthic biota but few fish. Upwelling; bottom temp 11° C.

Dominant Benthic Biota:

Ann - *Filograna*; Cho - Ascidiacea; Didemnidae; Cni - Antipathidae; *Stichopathes* sp.(abundant), *Tanacetipathes* sp.(abundant); Cni - Gorgonacea; Plexauridae, *Nicella* sp.; Cni - Hydroidolina; Ech - Echinoidea; *Eucidaris tribuloides*, Ech - Ophiuroidea; *Asteropora annulata*; Por - Demospongiae; *Ircinia campana* (abundant), Spirastrellidae (common).

Coral- *Oculina varicosa* (several colonies 10-25 cm, white; on east slope, most on vertical rock surface), Solitary Cup Coral - black cups *Dendrophyllia*?

Fish:

Vermilion snapper - *Rhomboplites aurorubens*; blue angelfish - *Holacanthus bermudensis*; tomate - *Haemulon aurolineatum*; squirrelfish - *Holocentrus* sp.; amberjack - *Seriola* sp.; yellowtail reefish - *Chromis encrysurus*; bank butterflyfish - *Prognathodes aya*; lionfish - *Pterois volitans* (3); purple reefish - *Chromis scotti*; moray eel - Muraenidae; reef butterflyfish - *Chaetodon sedentarius*; scorpionfish - Scorpaenidae.

Dive Site: ROV 13-03; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge

CPCe Percent Cover Analysis:

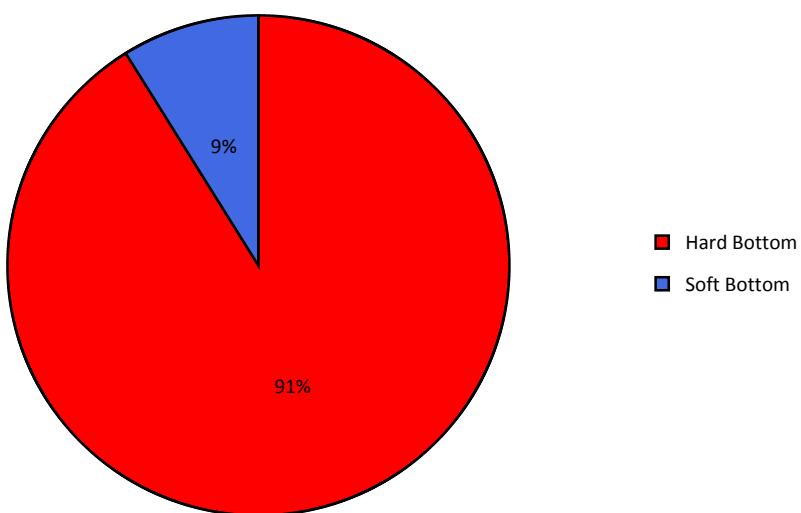


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-03. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

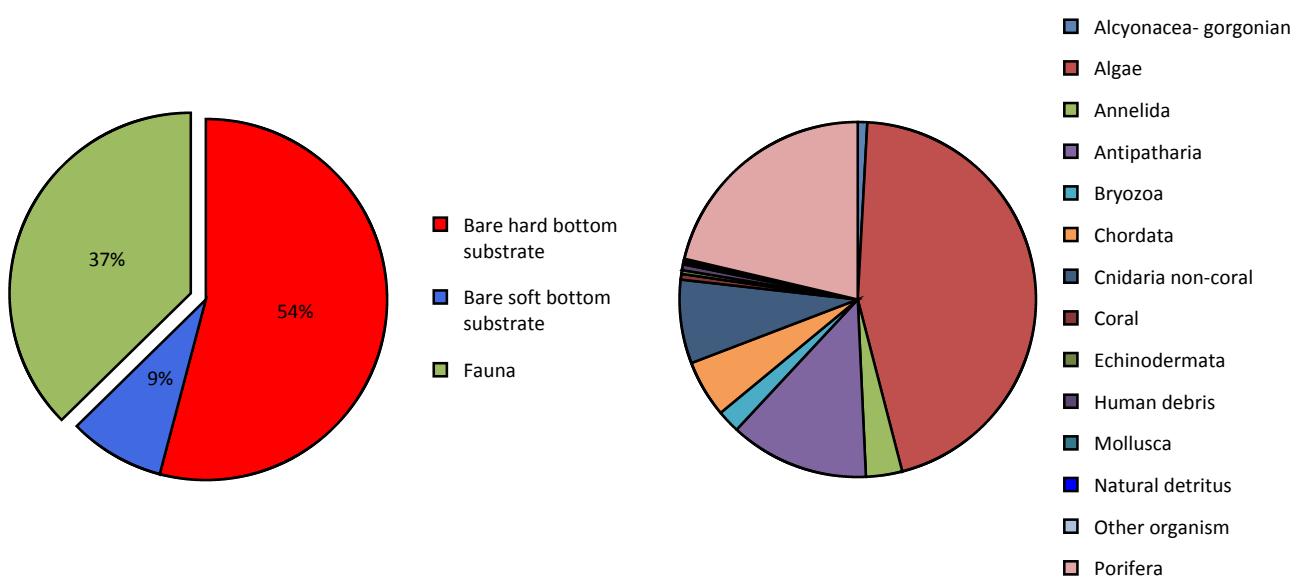


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-03.

Dive Site: ROV 13-03; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-03.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	1149	37.17%
Algae	521	16.86%
Corallinales/crustose coralline	409	13.23%
Cyanophyta	8	0.26%
Phaeophyta	30	0.97%
Rhodophyta	74	2.39%
Porifera	246	7.96%
Aplysina sp.	4	0.13%
Demospongiae	80	2.59%
Demospongiae- ze tan starlet	4	0.13%
Geodia sp.	6	0.19%
Hadromerida	6	0.19%
Ircinia sp.	10	0.32%
Ircinia strobilina	20	0.65%
Poecilosclerida	8	0.26%
Spirastrellidae	108	3.49%
Coral	6	0.19%
Oculina varicosa	4	0.13%
Phyllangia americana	2	0.06%
Alcyonacea- gorgonian	10	0.32%
Diodogorgia sp.	8	0.26%
Gorgonacea	2	0.06%
Antipatharia	146	4.72%
Antipatharia	2	0.06%
Stichopathes lutkeni	90	2.91%
Tanacetipathes hirta	54	1.75%
Cnidaria non-coral	88	2.85%
Hydroidolina	88	2.85%
Annelida	38	1.23%
Annelida	2	0.06%
Filograna sp.	18	0.58%
Sabellidae	18	0.58%
Mollusca	2	0.06%
Bivalvia	2	0.06%
Bryozoa	24	0.78%
Bryozoa	2	0.06%
Schizoporella sp.	22	0.71%

Dive Site: ROV 13-03; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge

Echinodermata	4	0.13%
Eucidaris tribuloides	4	0.13%
Chordata	60	1.94%
Asciidiacea	4	0.13%
Didemnidae	8	0.26%
Fish	48	1.55%
Other organism	2	0.06%
Other organism	2	0.06%
Natural detritus	2	0.06%
Natural detritus	2	0.06%
Soft bottom substrate	264	8.54%
Soft bottom substrate	264	8.54%
Bare soft bottom substrate	264	8.54%
Hard bottom substrate	1672	54.09%
Hard bottom substrate	1672	54.09%
Bare rock- pavement boulder ledge	1611	52.12%
Bare rubble- rock	57	1.84%
Standing dead coral	4	0.13%
Human debris	6	0.19%
Human debris	6	0.19%
Anchor line	6	0.19%
Grand Total	3091	100.00%

Dive Site: ROV 13-03; Florida, St. Augustine, Inside Proposed "St. Augustine 2" MPA, 60 m ridge

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-03.

Scientific Name	Common Name	13-03
<i>Chaetodon sedentarius</i>	reef butterflyfish	0.36
<i>Chromis encrysurus</i>	yellowtail reefish	7.94
<i>Chromis scotti</i>	purple reefish	0.36
<i>Chromis</i> sp.	damselfish	1.44
<i>Gymnothorax</i> sp.	moray eel	0.36
<i>Haemulon aurolineatum</i>	tomtate	96.75
<i>Halichoeres</i> sp.	wrasse	0.36
<i>Holacanthus bermudensis</i>	blue angelfish	9.39
<i>Holocentrus</i> sp.	squirrelfish	3.61
<i>Prognathodes aya</i>	bank butterflyfish	1.08
<i>Pterois volitans</i>	lionfish	0.36
<i>Rhomboplites aurorubens</i>	vermillion snapper	910.47
Scorpaenidae	scorpionfish	0.36
<i>Seriola</i> sp.	amberjack	2.53
<i>Serranus phoebe</i>	tattler	0.36

Dive Site: ROV 13-04; Florida, Jacksonville, Inside N FL MPA, 60 m N-S ridge

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
North Florida, North Florida MPA
3-VII-13-2; ROV 13-04

★ ROV 13-04

★ ROV Dives

★ CTD

ROV Tracks

● Hard Bottom

● Soft Bottom

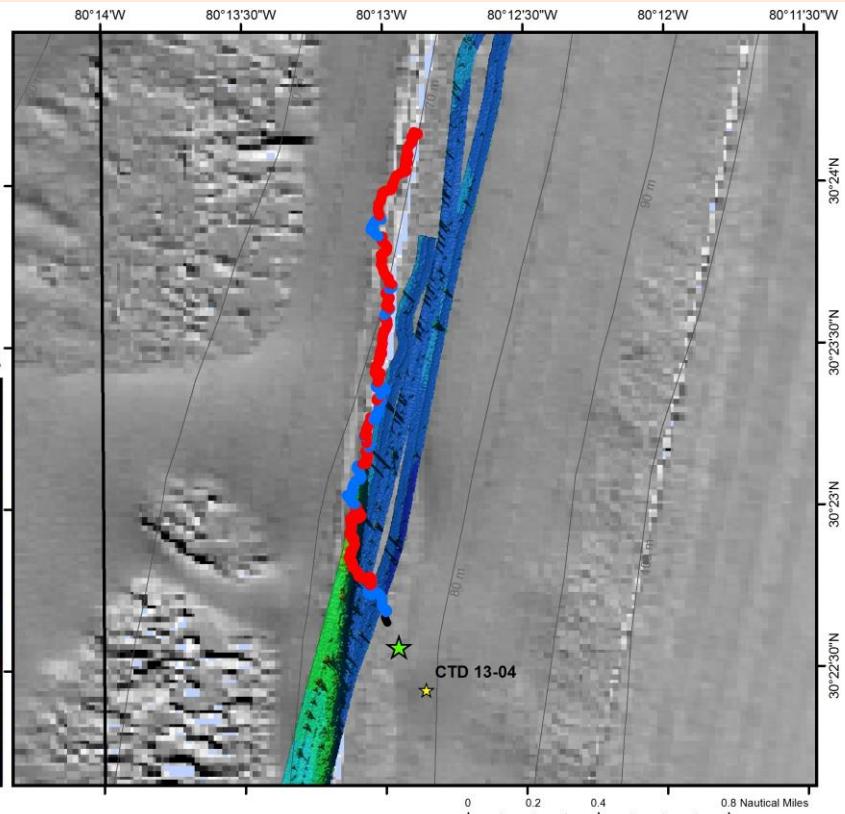
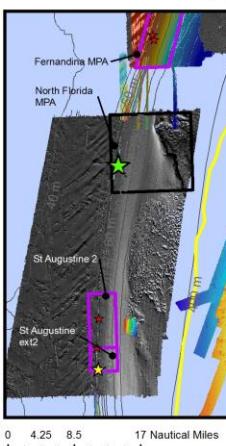
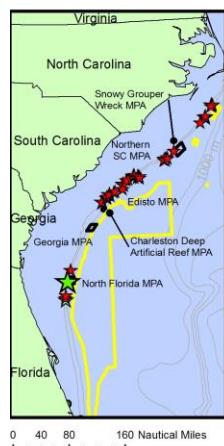
● Other ROV Tracks

■ MPA

■ Deep Coral HAPC

■ Proposed MPA 2013

— Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	USWTR
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/3/2013
Specimens:	0
Digital Photos:	165
DVD:	2
Hard Drive:	1

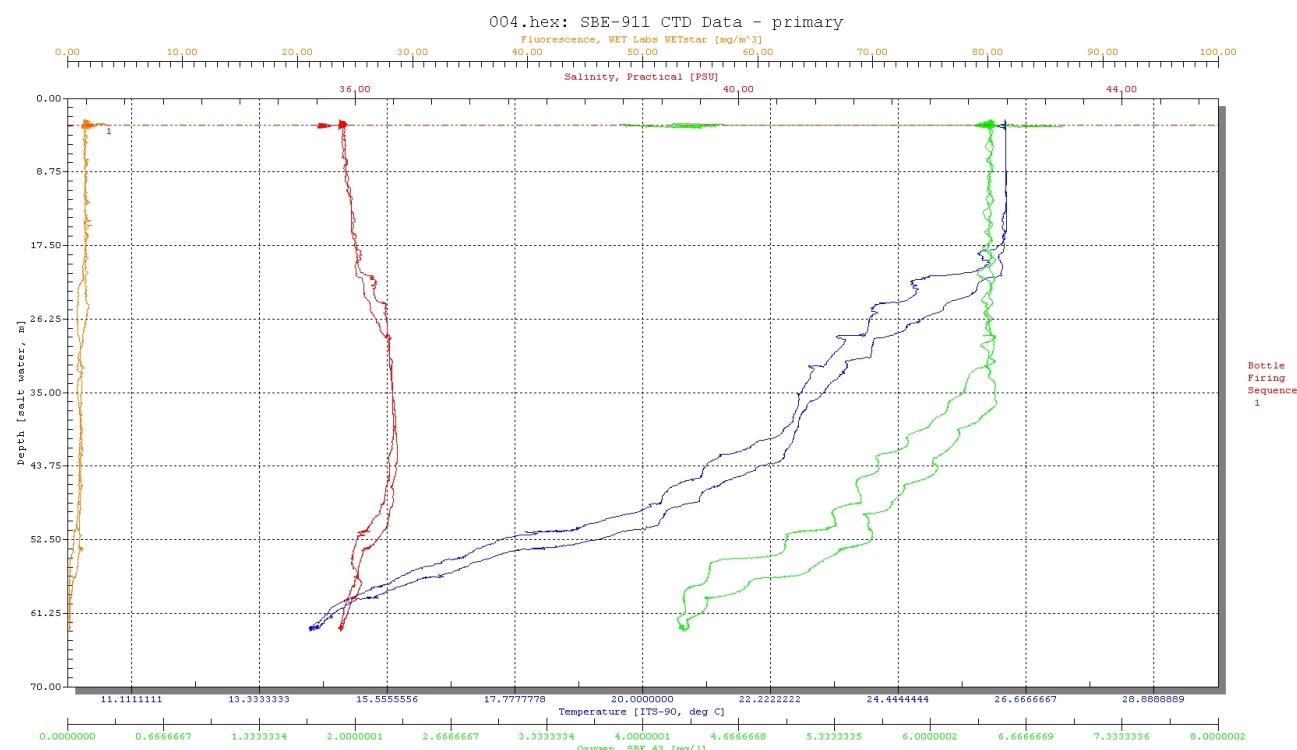
Dive Site: ROV 13-04; Florida, Jacksonville, Inside N FL MPA, 60 m N-S ridge

Dive Data:

Minimum Bottom Depth (m):	-47	Total Transect Length (km):	2.76
Maximum Bottom Depth (m):	-67	Surface Current (kn):	0.25
On Bottom (Time- GMT):	11:44	On Bottom (Lat/Long):	30.38°N; -80.22°W
Off Bottom (Time- GMT):	13:46	Off Bottom (Lat/Long):	30.4°N; -80.21°W
Physical (bottom); Temp (°C):	13.96	Salinity:	N/A
		Visibility (ft):	45
		Current (kn):	0

Physical Environment:

Distance from Dive Site(km): 0.29



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-04; Florida, Jacksonville, Inside N FL MPA, 60 m N-S ridge

Dive Imagery:



Figure 1: -59.5 m 30.40 °N; -80.22 °W

Speckled hind (*Epinephelus drummondhayi*) on rugged rock bottom, encrusted with various demosponges and wire coral (*Stichopathes lutkeni*).

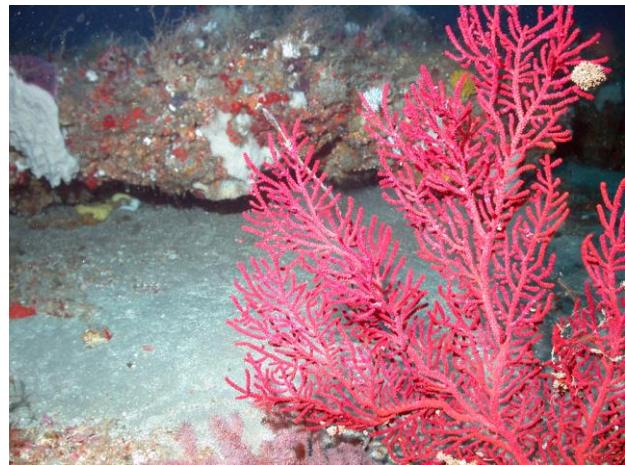


Figure 2: -60.1 m 30.39 °N; -80.22 °W

Large red *Muricea* sp. gorgonian on low relief rocky habitat.

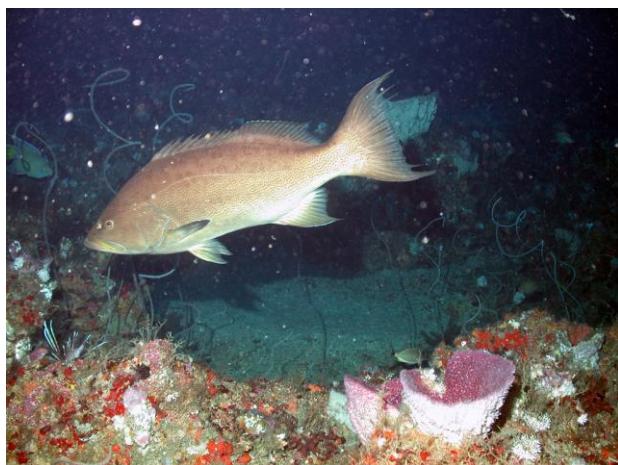


Figure 3: -57.4 m 30.38 °N; -80.22 °W

Broomtail (scamp grouper - *Mycteroperca phenax*) on rock ledges with vase sponges (*Ircinia campana*).



Figure 4: -64.5 m 30.38 °N; -80.22 °W

Lionfish (*Pterois volitans/miles*) were quite common at many of the dive sites.

Dive Site: ROV 13-04; Florida, Jacksonville, Inside N FL MPA, 60 m N-S ridge

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-04, UNCW Superphantom ROV Dive 2239; Site #- 3-VII-13-2. Target Site - Jacksonville, Inside N FL MPA, 60 m N-S ridge. ROV survey inside MPA; ground-truth multibeam sonar of site (USWTR, Navy FL wgs 84 and 2011 Pisces 2A_NFL_MPA_dusk). Conduct video/photo transect S to N, along main N-S oriented ridge.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 0.25 kn, bottom current ~0 kn.

Site Description/Habitat/Biota:

Transect along east slope and top of main ridge. Ridge top 56-59 m, east ridge base 62-65 m. East slope mostly low slope 10-20°, low to moderate relief, 1-3 m, rock slabs and boulders with 1/2 to 1 m relief; mostly high rugosity. Ridge top- flat, rock pavement with low 1/2 m ledges, sand with rubble, 50% cover hard bottom. East of ridge is off reef, soft bottom, sand with rubble, small boulders. West of ridge, 55 m, pavement with low ledges, sediment and rubble. Dense fish populations on east slope where high rugosity.

Dominant Benthic Biota:

Ann - *Filograna*; Bry - *Schizoporella*; Cho - Ascidiacea: Didemnidae; *Pyrosoma*; Cni - Antipathidae: *Stichopathes* (abundant), *Tanacetipathes* (abundant)

Cni - Gorgonacea: Plexauridae, *Nicella* sp.; Cni - Hydroidolina; Coral- *Oculina varicosa* (2- 25 cm, white, vertical rock), Solitary Cup Coral: black cups *Dendrophyllia*?; Ech - Asteroidea: Goniasteridae; Por - Demospongiae: *Ircinia campana* (abundant), Spirastrellidae, *Callyspongia vaginalis*, *Placospongia*, *Plakortis* sp..

Fish:

Warsaw grouper; gag; scamp- common; speckled hind; yellowtail reefish - *Chromis enhrysurus*; blue angelfish - *Holacanthus bermudensis*; reef butterflyfish - *Chaetodon sedentarius*; tattler - *Serranus phoebe*; tomate - *Haemulon aurolineatum*; lionfish - *Pterois volitans* (13); spotfin hogfish - *Bodianus pulchellus*; blackbar soldierfish - *Myripristis jacobus*; vermilion snapper - *Rhomboplites aurorubens*; scamp grouper - *Mycteroperca phenax*; squirrelfish - *Holocentrus* sp.; purple reefish - *Chromis scotti*; sharpnose puffer - *Canthigaster rostrata*; bank butterflyfish - *Prognathodes aya*; red porgy - *Pagrus pagrus*; amberjack - *Seriola* sp.; bank seabass; bicolor damselfish; bigeye - *Priacanthus arenatus*; cubbyu - *Equetus umbrosus*; gag grouper - *Mycteroperca microlepis*; moray eel - Muraenidae; sunshinemfish; wrasse; cowfish - *Lactophrys* sp.; creole-fish; doctorfish; french angelfish - *Pomacanthus paru*; gray trigger fish; greenband wrasse; juvenile angelfish; orangeback bass; scorpionfish - Scorpidae; short bigeye - *Pristigenys alta*; soapfish - *Rypticus* sp.; speckled hind; speckled hind - *Epinephelus drummondhayi*; spotfin butterflyfish - *Chaetodon ocellatus*; warsaw grouper; white grunt

Dive Site: ROV 13-04; Florida, Jacksonville, Inside N FL MPA, 60 m N-S ridge

CPCe Percent Cover Analysis:

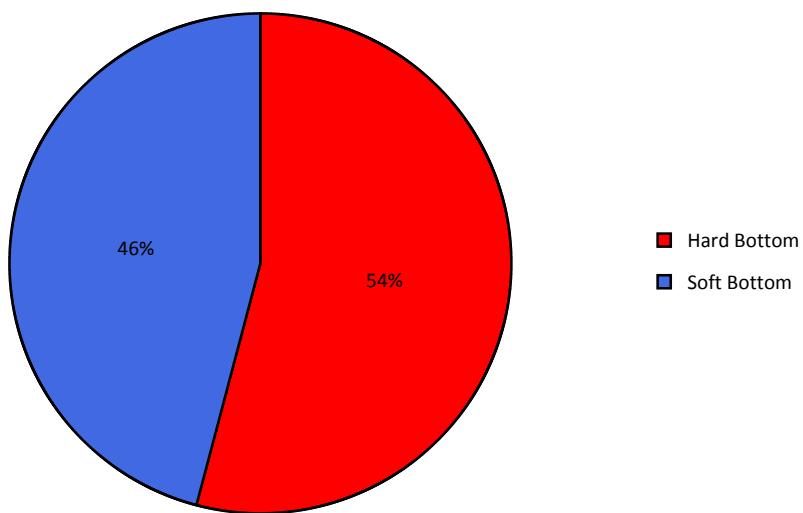


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-04. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

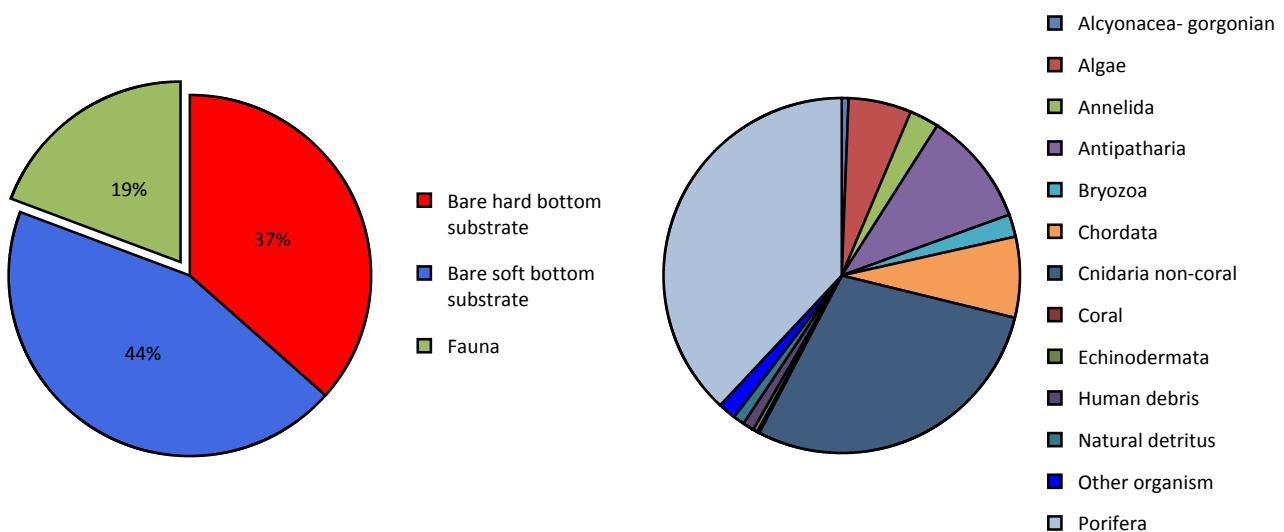


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-04.

Dive Site: ROV 13-04; Florida, Jacksonville, Inside N FL MPA, 60 m N-S ridge

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-04.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	484	19.09%
Algae	28	1.10%
Corallinales/crustose coralline	13	0.51%
Cyanophyta	6	0.24%
Rhodophyta	9	0.35%
Porifera	186	7.33%
Aiolochroia crassa	2	0.08%
Chondrosia sp.	11	0.43%
Clathria sp.	1	0.04%
Demospongiae	81	3.19%
Demospongiae- ze tan starlet	22	0.87%
Dictyoceratida	1	0.04%
Hadromerida	5	0.20%
Halisarca sp.	4	0.16%
Ircinia campana	3	0.12%
Ircinia sp.	11	0.43%
Ircinia strobilina	2	0.08%
Poecilosclerida	4	0.16%
Spirastrellidae	39	1.54%
Coral	1	0.04%
Scleractinia solitary	1	0.04%
Alcyonacea- gorgonian	3	0.12%
Ellisella sp.	1	0.04%
Nicella sp.	2	0.08%
Antipatharia	51	2.01%
Stichopathes lutkeni	30	1.18%
Tanacetipathes hirta	21	0.83%
Cnidaria non-coral	141	5.56%
Fam- Zoanthidae	1	0.04%
Hydroidolina	140	5.52%
Annelida	13	0.51%
Filograna sp.	13	0.51%
Bryozoa	10	0.39%
Bryozoa	4	0.16%
Schizoporella sp.	6	0.24%
Echinodermata	2	0.08%
Crinoidea	2	0.08%

Dive Site: ROV 13-04; Florida, Jacksonville, Inside N FL MPA, 60 m N-S ridge

Chordata	36	1.42%
Asciidiacea	18	0.71%
Didemnidae	10	0.39%
Fish	8	0.32%
Other organism	8	0.32%
Other organism	8	0.32%
Natural detritus	5	0.20%
Natural detritus	5	0.20%
Soft bottom substrate	1120	44.16%
Soft bottom substrate	1120	44.16%
Bare soft bottom substrate	1120	44.16%
Hard bottom substrate	927	36.55%
Hard bottom substrate	927	36.55%
Bare rock- pavement boulder ledge	877	34.58%
Bare rubble- rock	50	1.97%
Human debris	5	0.20%
Human debris	5	0.20%
Fishing gear/line/long line	4	0.16%
Human debris- other	1	0.04%
Grand Total	2536	100.00%

Dive Site: ROV 13-04; Florida, Jacksonville, Inside N FL MPA, 60 m N-S ridge**Density of Fish:**

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-04.

Scientific Name	Common Name	13-04
<i>Acanthurus</i> sp.	doctorfish	0.25
<i>Balistes capriscus</i>	grey triggerfish	1.25
<i>Bodianus pulchellus</i>	spotfin hogfish	9.53
<i>Canthigaster rostrata</i>	sharpnose puffer	3.51
<i>Centropristes oxyurus</i>	bank sea bass	0.75
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	0.75
<i>Chaetodon sedentarius</i>	reef butterflyfish	16.3
<i>Chromis engrysurus</i>	yellowtail reefish	59.18
<i>Chromis insolatus</i>	sunshinefish	0.5
<i>Chromis scotti</i>	purple reefish	7.02
<i>Chromis</i> sp.	damselfish	3.26
<i>Epinephelus drummondhayi</i>	speckled hind	0.5
<i>Gymnothorax</i> sp.	moray eel	0.25
<i>Haemulon aurolineatum</i>	tomtate	368.36
<i>Haemulon striatum</i>	striped grunt	14.79
<i>Halichoeres</i> sp.	wrasse	6.27
<i>Holacanthus bermudensis</i>	blue angelfish	13.29
Holocentridae		1.25
<i>Holocentrus</i> sp.	squirrelfish	5.02
<i>Hyporthodus nigritus</i>	warsaw grouper	0.25
<i>Lactophrys quadricornis</i>	scrawled cowfish	0.25
<i>Lactophrys</i> sp.	cowfish	0.25
<i>Mycteroperca microlepis</i>	gag grouper	1
<i>Mycteroperca phenax</i>	scamp	4.01
<i>Myripristis jacobus</i>	blackbar soldierfish	8.27
<i>Pagrus pagrus</i>	red porgy	11.03
<i>Paranthias furcifer</i>	creole-fish	0.75
<i>Pareques umbrosus</i>	cubbyu	5.52
<i>Pomacanthus paru</i>	french angelfish	0.75
<i>Priacanthus arenatus</i>	bigeye	1
<i>Pristigenys alta</i>	short bigeye	0.25
<i>Prognathodes aya</i>	bank butterflyfish	2.51
<i>Pterois volitans</i>	lionfish	4.76
<i>Rhomboplites aurorubens</i>	vermillion snapper	349.05
<i>Rypticus saponaceus</i>	greater soapfish	0.25
Scorpaenidae	scorpionfish	0.25
<i>Seriola dumerili</i>	greater amberjack	0.5
<i>Seriola rivoliana</i>	almaco jack	1.25

Dive Site: ROV 13-04; Florida, Jacksonville, Inside N FL MPA, 60 m N-S ridge

<i>Seriola</i> sp.	amberjack	0.5
<i>Serranus annularis</i>	orangeback bass	1.5
<i>Serranus phoebe</i>	tattler	7.77
<i>Stegastes partitus</i>	bicolor damselfish	1.25

Dive Site: ROV 13-05; Florida, Jacksonville, Inside Proposed Fernandina MPA, 60 m N-S ridge

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
North Florida, Fernandina-
Proposed MPA
3-VII-13-3; ROV 13-05

★ ROV 13-05

★ ROV Dives

★ CTD

ROV Tracks

● Hard Bottom

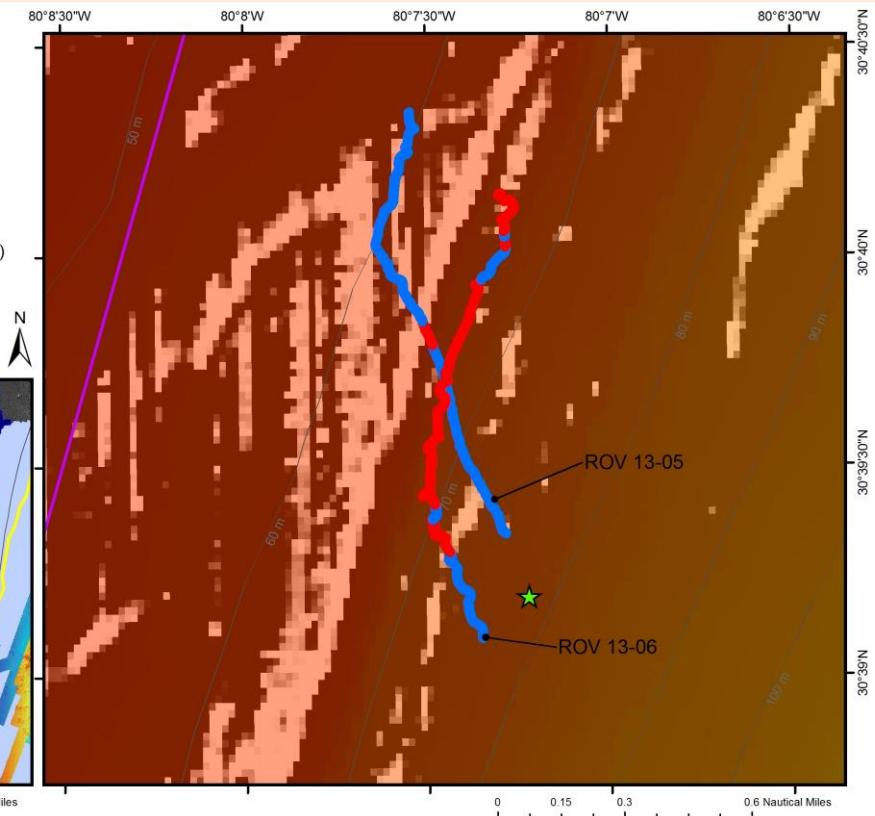
● Soft Bottom

● Other ROV Tracks

■ MPA

■ Deep Coral HAPC

■ Proposed MPA 2013



Site Overview:

Project: 2013 NMFS S. Atlantic MPA Grant

Principal Investigator: Stacy Harter

PI Contact Info: 3500 Delwood Beach Rd., Panama City, FL 32444

Website: [HBOI CIOERT](#)

Scientific Observers: Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington

Data Management: Access Database, Excel Spreadsheet

ROV Navigation Data: Trackpoint II

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/9/2014

Dive Overview:

Vessel: NOAA Ship *Pisces*

Sonar Data: ShadedCC

Purpose: Conduct ROV surveys and multibeam sonar of shelf-edge MPAs

ROV: UNCW Super Phantom

ROV Sensors: Temperature (°C), Depth (m)

Date of Dive: 7/3/2013

Specimens: 0

Digital Photos: 6

DVD: 1

Hard Drive: 1

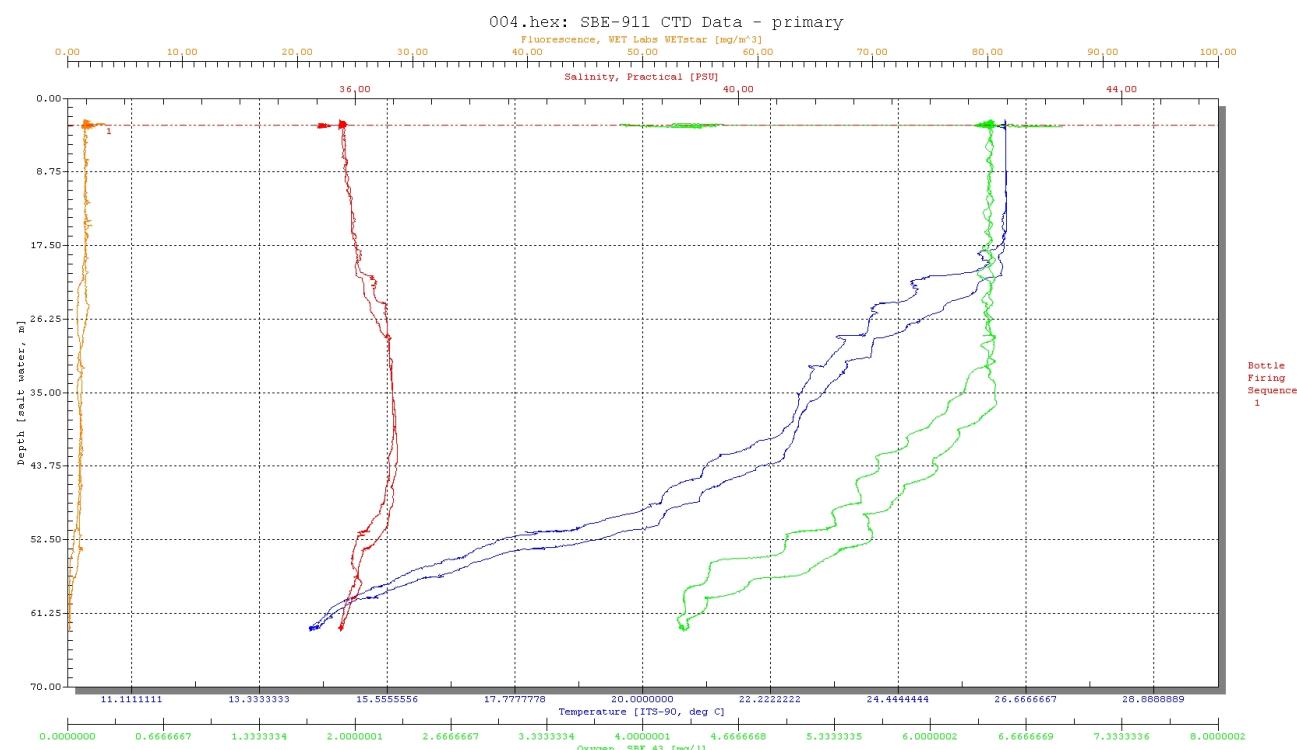
Dive Site: ROV 13-05; Florida, Jacksonville, Inside Proposed Fernandina MPA, 60 m N-S ridge

Dive Data:

Minimum Bottom Depth (m):	-44	Total Transect Length (km):	1.77
Maximum Bottom Depth (m):	-62	Surface Current (kn):	0.4
On Bottom (Time- GMT):	15:21	On Bottom (Lat/Long):	30.66°N; -80.12°W
Off Bottom (Time- GMT):	15:53	Off Bottom (Lat/Long):	30.67°N; -80.13°W
Physical (bottom); Temp (°C):	16.47	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 32.36



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-05; Florida, Jacksonville, Inside Proposed Fernandina MPA, 60 m N-S ridge

Dive Imagery:

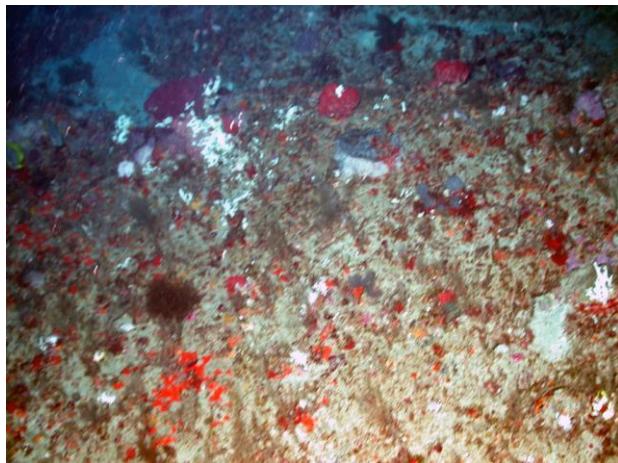


Figure 1: -51.8 m 30.66 °N; -80.12 °W

Rock pavement habitat with dense encrustations of various red and white demosponges, vase sponges (*Ircinia campana*), frilly tube worms (*Filograna* sp.), ascidians, and hydroids.



Figure 2: -52.4 m 30.67 °N; -80.13 °W

Typical soft bottom habitat with coarse sand sediment and sparse epifauna.



Figure 3: -52.8 m 30.67 °N; -80.13 °W

Typical soft bottom habitat with coarse sand sediment and sparse epifauna.



Figure 4: -45.8 m 30.66 °N; -80.12 °W

Rock pavement habitat overhead view

Dive Site: ROV 13-05; Florida, Jacksonville, Inside Proposed Fernandina MPA, 60 m N-S ridge

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-05, UNCW Superphantom ROV Dive 2240; Site #- 3-VII-13-3. Target Site - Florida, Jacksonville, Proposed Fernandina MPA. Ground-truth multibeam sonar (Navy's "ShaddedCC.tif" -b&w). Conduct video/photo transect S to N, along main N-S oriented ridge.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 0.75 Kn on ADCP. Unable to station keep, ship drift N 2 kn, unable to get ROV on bottom, drifting 2kn. Finally land on bottom 250 m west of ridge. Aborted dive. No photo transects.

Site Description/Habitat/Biota:

100 m east of ridge, 10-15 m off bottom. No photo transects taken; too far off bottom. Flat soft bottom; low smooth rock knolls, <1/2 m rock pavement, sediment. *Ircinia campana*, *Stichopathes*, *Didemnidae*. Drift over ridge, 10 m off bottom-appears to be large square fractured rock slabs, low relief, flat slope, low rugosity, few fish. Landed 250 m west of ridge- 100% flat sand, no bioturbation, no sand waves, barren.

Dominant Benthic Biota:

Cni - Antipatharia: *Stichopathes*, *Tanacetipathes* sp.; Cni- Pennatulacea (1); Cho - Ascidiacea: *Didemnidae*; Por - Demospongiae: *Ircinia campana*;

Fish:

lionfish - *Pterois volitans* (3); amberjack - *Seriola* sp.; cowfish - *Lactophrys* sp.; reef butterflyfish - *Chaetodon sedentarius*; spotfin hogfish - *Bodianus pulchellus*; tattler - *Serranus phoebe*; tomtate - *Haemulon aurolineatum*; triggerfish - *Balistes* sp.

Dive Site: ROV 13-05; Florida, Jacksonville, Inside Proposed Fernandina MPA, 60 m N-S ridge

Percent Cover of Benthic Macro-Biota and Substrate:

Due to strong currents, the dive was aborted early and no photo transects were completed.

Dive Site: ROV 13-06; Florida, Jacksonville, Inside Proposed Fernandina MPA, 60 m N-S ridge

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
North Florida, Fernandina-
Proposed MPA
3-VII-13-4; ROV 13-06

★ ROV 13-06

★ ROV Dives

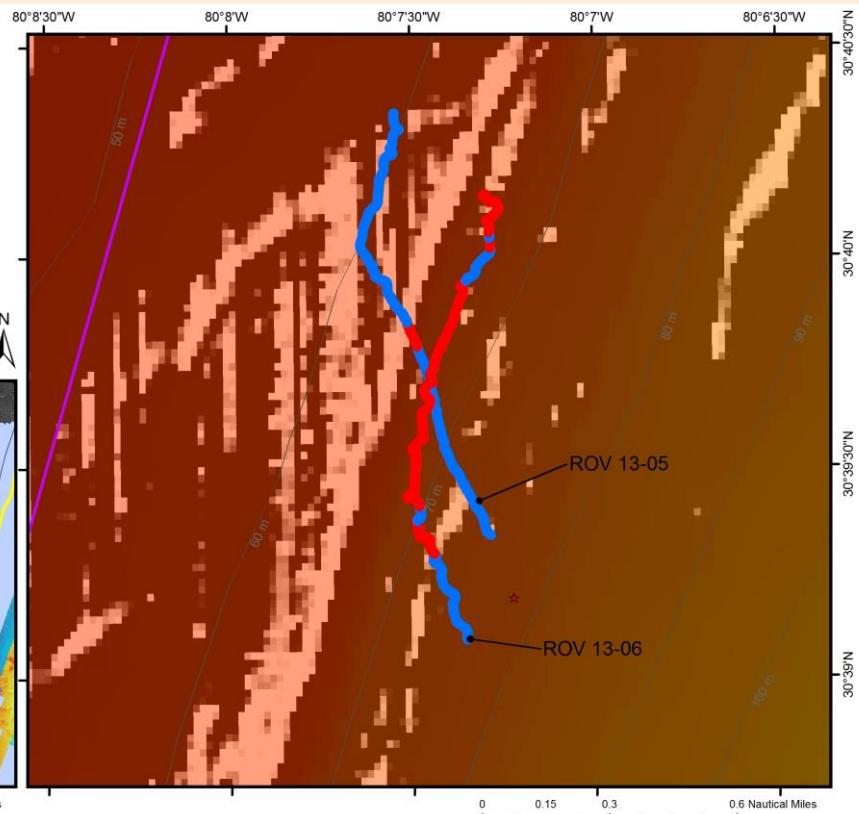
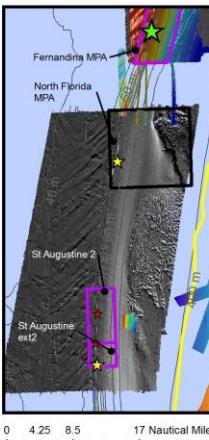
★ CTD

ROV Tracks

● Hard Bottom

● Soft Bottom

● Other ROV Tracks



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	ShadedCC
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/3/2013
Specimens:	0
Digital Photos:	52
DVD:	1
Hard Drive:	1

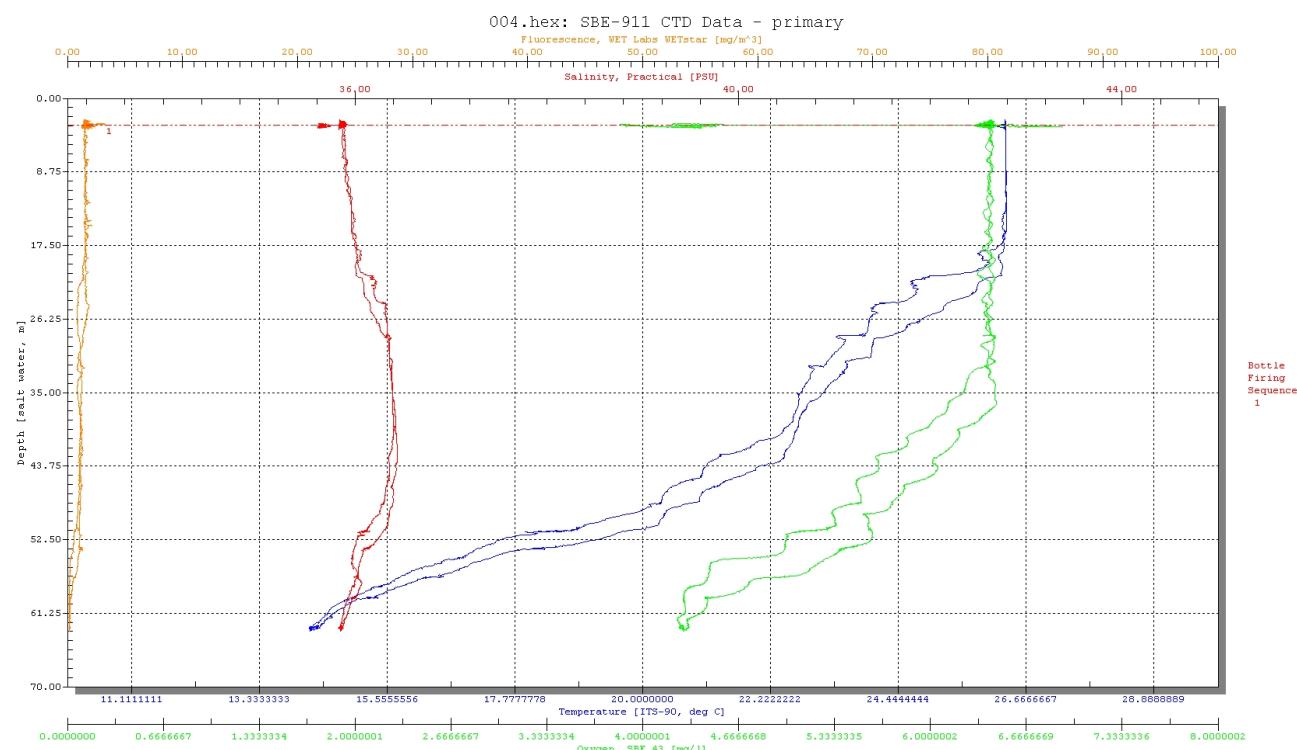
Dive Site: ROV 13-06; Florida, Jacksonville, Inside Proposed Fernandina MPA, 60 m N-S ridge

Dive Data:

Minimum Bottom Depth (m):	-49	Total Transect Length (km):	1.96
Maximum Bottom Depth (m):	-62	Surface Current (kn):	.5
On Bottom (Time- GMT):	16:51	On Bottom (Lat/Long):	30.65°N; -80.12°W
Off Bottom (Time- GMT):	17:40	Off Bottom (Lat/Long):	30.67°N; -80.12°W
Physical (bottom); Temp (°C):	14.74	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 31.30



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Imagery:



Figure 1: -58.9 m 30.66 °N; -80.12 °W
Large bushy black coral (*Tanacetipathes hirta*) on rock pavement with dense epifauna.



Figure 2: -56.6 m 30.66 °N; -80.12 °W
Low rock ledges (0.5 m relief) with dense sponges including vase sponges (*Ircinia campana*), yellow sponge (*Clathria* sp.), and encrusting orange sponges (*Spirastrellidae*).

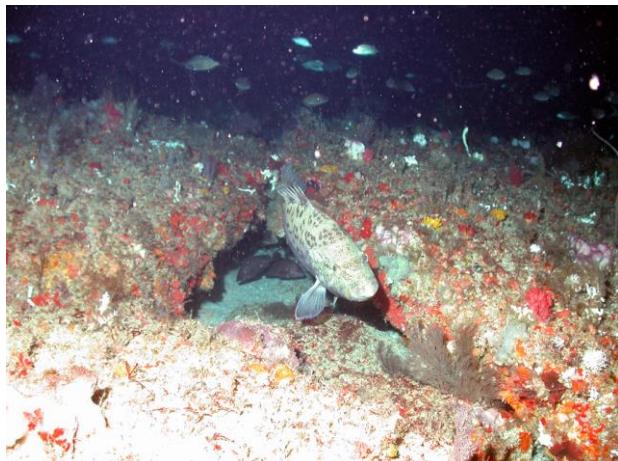


Figure 3: -56.8 m 30.66 °N; -80.12 °W
Scamp (*Myctoperca phenax*) on low rock ledges with dense encrusting epifauna.

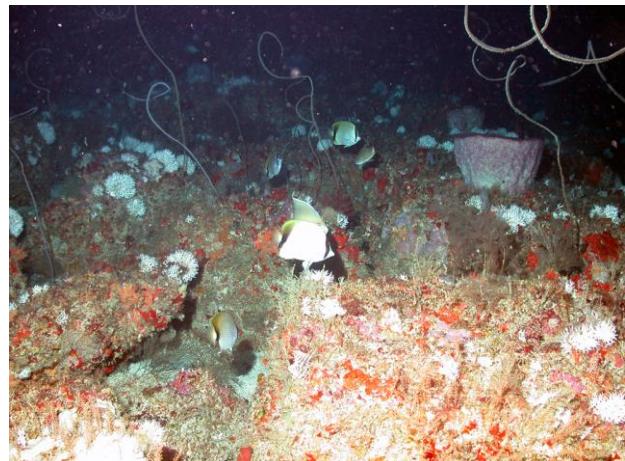


Figure 4: -59.3 m 30.66 °N; -80.13 °W
Reef butterflyfish (*Chaetodon sedentarius*) on low rock ledge habitat with dense *Filograna* sp. tube worms, wire coral (*Stichopathes lutkeni*), and vase sponges (*Ircinia campana*).

Dive Site: ROV 13-06; Florida, Jacksonville, Inside Proposed Fernandina MPA, 60 m N-S ridge

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-06, UNCW SuperPhantom ROV Dive 2241; Site #- 3-VII-13-4. Target Site - Florida, Jacksonville, Proposed Fernandina MPA. Ground-truth multibeam sonar (Navy's "ShaddedCC.tif" -b&w). Conduct video/photo transect S to N, along main N-S oriented ridge.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 0.5 Kn on ADCP. Difficulty station keeping.

Site Description/Habitat/Biota:

Transect along west slope and top of main ridge on multibeam. On bottom 200 m east of ridge; flat sediment, 62 m, 2 kn SOG. East slope- 60 m, sand rubble, low relief, <1/2 m rock slabs and boulders, patchy HB. Heading NW. Some areas of high rugosity on low slope, 5-10o, low relief < 1m. Dense schools of tomtate on the high rugosity areas. Center of ridge top of MB, 50% cover HB, sand-rubble, low relief rock pavement and rock slabs, <1/2 m relief.

Dominant Benthic Biota:

Ann - Filograna (very dense in areas); Bry - Schizoporella; Cni - Antipatharia: Stichopathes, Tanacetipathes, Antipathidae; Cni - Gorgonacea; *Diadogorgia*, *Icilogorgia grammae* (small patch of dense), Plexauridae, *Nicella* sp.; Cho - Pyrosoma, Ascidiacea; Didemnidae, Eudistoma; Por - Demospongiae; *Ircinia campana*, *Callyspongia vaginalis*, Spirastrellidae;

Fish:

lionfish- *Pterois volitans* (17); reef butterflyfish- *Chaetodon sedentarius*; tattler- *Serranus phoebe*; yellowtail reefish- *Chromis encrysurus*; tomtate- *Haemulon aurolineatum*; squirrelfish- *Holocentrus* sp.; blue angelfish- *Holacanthus bermudensis*; wrasse; bigeye- *Priacanthus arenatus*; short bigeye- *Pristigenys alta*; spotfin butterflyfish- *Chaetodon ocellatus*; spotfin hogfish- *Bodianus pulchellus*; bicolor damselfish; blackbar soldierfish- *Myripristis jacobus*; Calamus porgy- *Calamus* sp.; amberjack- *Seriola* sp.; cowfish- *Lactophrys* sp.; cubbyu- *Equetus umbrosus*; damselfish; Eel; gray trigger fish; scamp grouper- *Mycteroperca phenax*; triggerfish- *Balistes* sp.; vermillion snapper- *Rhomboplites aurorubens*

Dive Site: ROV 13-06; Florida, Jacksonville, Inside Proposed Fernandina MPA, 60 m N-S ridge

CPCe Percent Cover Analysis:

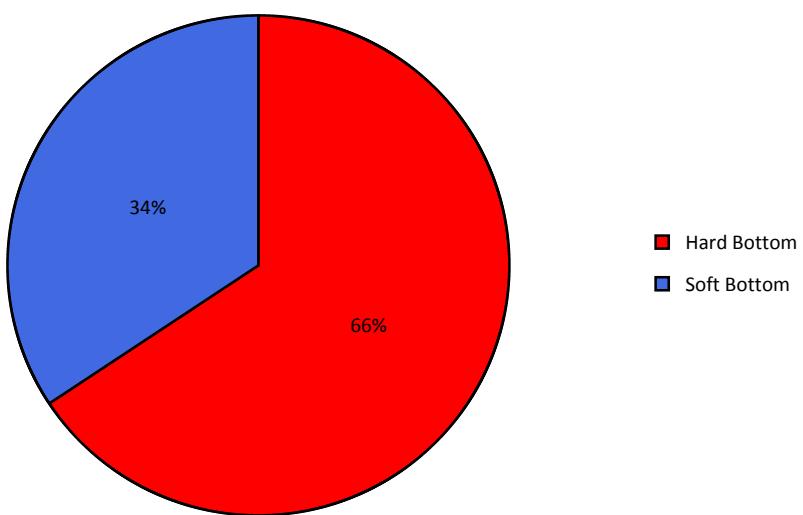


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-06. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

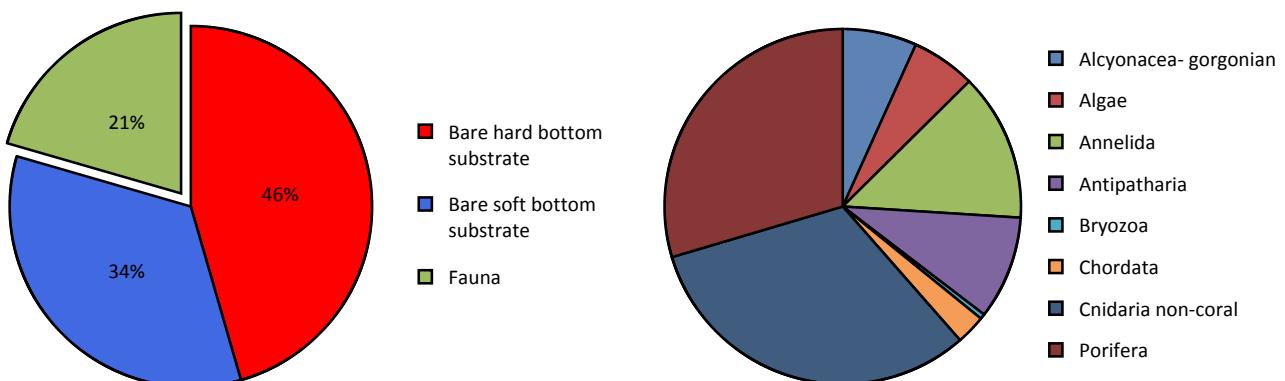


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-06.

Dive Site: ROV 13-06; Florida, Jacksonville, Inside Proposed Fernandina MPA, 60 m N-S ridge

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-06.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	223	20.52%
Algae	13	1.20%
Corallinales/crustose coralline	5	0.46%
Rhodophyta	8	0.74%
Porifera	66	6.07%
Demospongiae	30	2.76%
Demospongiae- ze tan starlet	2	0.18%
Ircinia campana	7	0.64%
Ircinia sp.	7	0.64%
Ircinia strobilina	2	0.18%
Poecilosclerida	1	0.09%
Spirastrellidae	17	1.56%
Alcyonacea- gorgonian	15	1.38%
Diodogorgia sp.	1	0.09%
Ellisella sp.	3	0.28%
Gorgonacea	3	0.28%
Iciligorgia schrammi	5	0.46%
Telesto/Carijoa	3	0.28%
Antipatharia	21	1.93%
Antipatharia	3	0.28%
Stichopathes lutkeni	15	1.38%
Tanacetipathes hirta	3	0.28%
Cnidaria non-coral	71	6.53%
Fam- Zoanthidae	1	0.09%
Hydroidolina	70	6.44%
Annelida	30	2.76%
Filograna sp.	30	2.76%
Bryozoa	1	0.09%
Schizoporella sp.	1	0.09%
Chordata	6	0.55%
Asciidiacea	2	0.18%
Didemnidae	2	0.18%
Fish	2	0.18%
Soft bottom substrate	369	33.95%
Soft bottom substrate	369	33.95%
Bare soft bottom substrate	369	33.95%
Hard bottom substrate	495	45.54%

Dive Site: ROV 13-06; Florida, Jacksonville, Inside Proposed Fernandina MPA, 60 m N-S ridge

Hard bottom substrate	495	45.54%
Bare rock- pavement boulder ledge	491	45.17%
Bare rubble- rock	4	0.37%
Grand Total	1087	100.00%

Dive Site: ROV 13-06; Florida, Jacksonville, Inside Proposed Fernandina MPA, 60 m N-S ridge**Density of Fish:**

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-06.

Scientific Name	Common Name	13-06
<i>Balistes capriscus</i>	grey triggerfish	1.59
<i>Bodianus pulchellus</i>	spotfin hogfish	2.39
<i>Calamus</i> sp.	porgy	1.2
<i>Canthigaster rostrata</i>	sharpnose puffer	1.2
<i>Centropristes oxyurus</i>	bank sea bass	0.4
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	4.39
<i>Chaetodon sedentarius</i>	reef butterflyfish	27.51
<i>Chromis enchrissurus</i>	yellowtail reefish	45.06
<i>Chromis scotti</i>	purple reefish	0.4
<i>Chromis</i> sp.	damselfish	0.4
<i>Gymnothorax</i> sp.	moray eel	0.4
<i>Haemulon aurolineatum</i>	tomtate	250
<i>Halichoeres</i> sp.	wrasse	25.92
<i>Holacanthus bermudensis</i>	blue angelfish	4.39
<i>Holocentrus</i> sp.	squirrelfish	4.78
<i>Lactophrys</i> sp.	cowfish	0.4
<i>Mycteroperca phenax</i>	scamp	0.4
<i>Myripristis jacobus</i>	blackbar soldierfish	5.18
<i>Pareques umbrosus</i>	cubbyu	1.59
<i>Priacanthus arenatus</i>	bigeye	0.8
<i>Pristigenys alta</i>	short bigeye	3.59
<i>Pterois volitans</i>	lionfish	7.97
<i>Rhomboplites aurorubens</i>	vermillion snapper	41.47
<i>Seriola dumerili</i>	greater amberjack	0.4
<i>Serranus annularis</i>	orangeback bass	0.8
<i>Serranus phoebe</i>	tattler	10.37
<i>Stegastes partitus</i>	bicolor damselfish	0.8

Dive Site: ROV 13-07; S. Carolina, Inside Proposed Edisto S Ext MPA, 53 m NE-SW Ridge

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
South Carolina, Edisto S Ext-
Proposed MPA
4-VII-13-2; ROV 13-07

★ ROV 13-07

★ ROV Dives

★ CTD

■ MPA

■ Deep Coral HAPC

■ Proposed MPA 2013

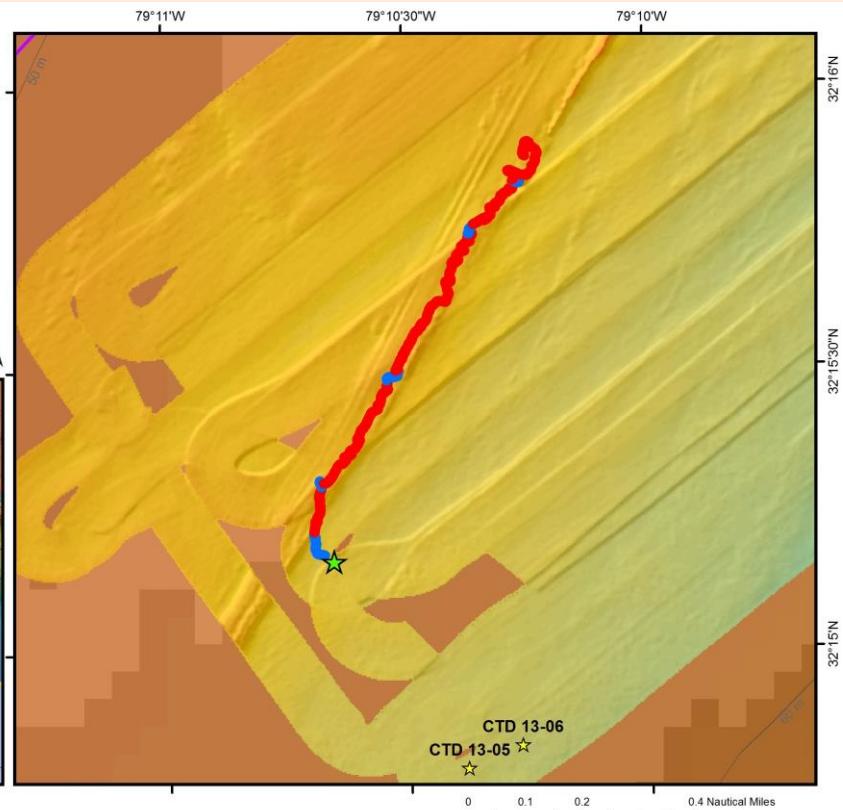
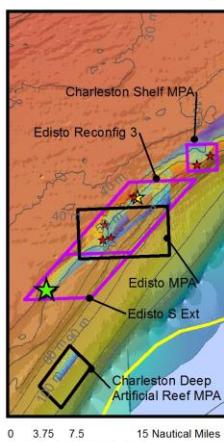
— Bathymetry Lines (m)

ROV Tracks

● Hard Bottom

● Soft Bottom

● Other ROV Tracks



Site Overview:

Project: 2013 NMFS S. Atlantic MPA Grant

Principal Investigator: Stacy Harter

PI Contact Info: 3500 Delwood Beach Rd., Panama City, FL 32444

Website: [HBOI CIOERT](#)

Scientific Observers: Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington

Data Management: Access Database, Excel Spreadsheet

ROV Navigation Data: Trackpoint II

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/9/2014

Dive Overview:

Vessel: NOAA Ship *Pisces*

Sonar Data: ed1_wgs84

Purpose: Conduct ROV surveys and multibeam sonar of shelf-edge MPAs

ROV: UNCW Super Phantom

ROV Sensors: Temperature (°C), Depth (m)

Date of Dive: 7/4/2013

Specimens: 0

Digital Photos: 141

DVD: 2

Hard Drive: 1

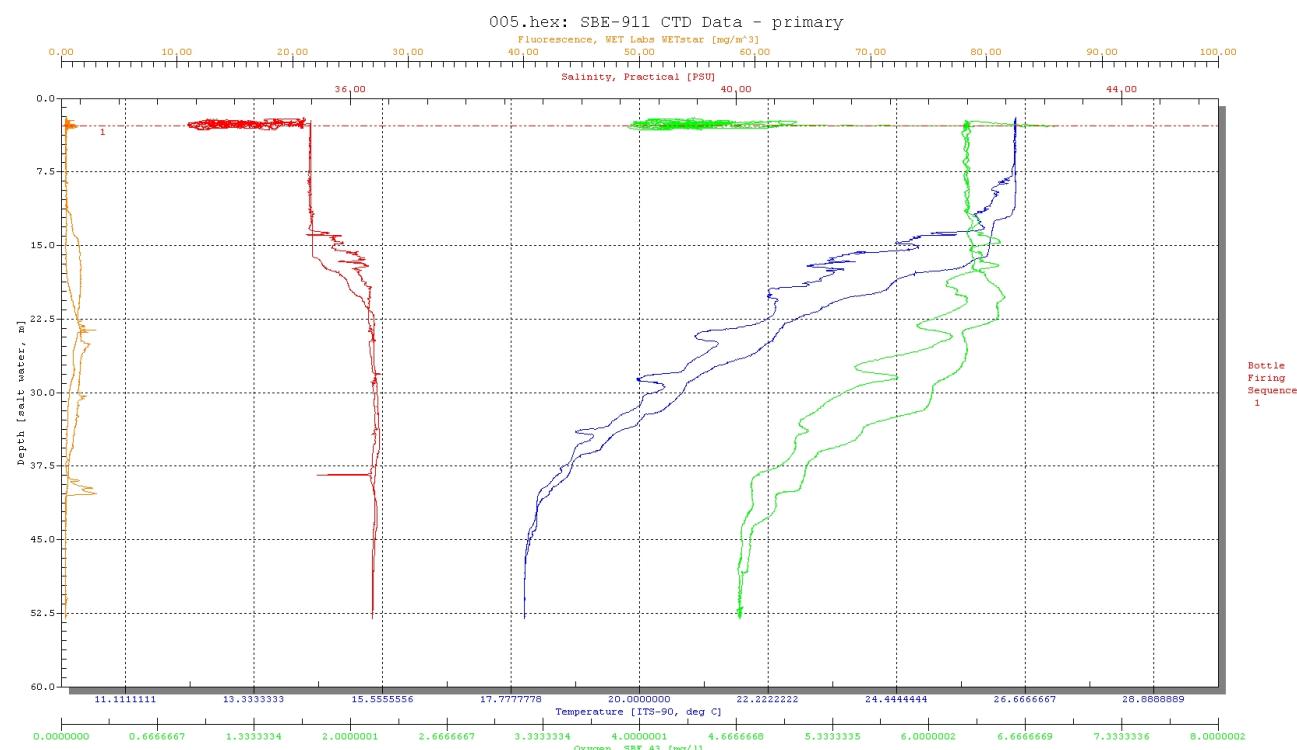
Dive Site: ROV 13-07; S. Carolina, Inside Proposed Edisto S Ext MPA, 53 m NE-SW Ridge

Dive Data:

Minimum Bottom Depth (m):	-49	Total Transect Length (km):	1.45
Maximum Bottom Depth (m):	-55	Surface Current (kn):	0.5
On Bottom (Time- GMT):	8:12	On Bottom (Lat/Long):	32.25°N; -79.18°W
Off Bottom (Time- GMT):	9:46	Off Bottom (Lat/Long):	32.26°N; -79.17°W
Physical (bottom); Temp (°C):	18.06	Salinity:	N/A
		Visibility (ft):	45
		Current (kn):	0

Physical Environment:

Distance from Dive Site(km): 0.81



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Imagery:



Figure 1: -53.1 m 32.25 °N; -79.18 °W
Scamp grouper (*Mycteroperca phenax*) in 'cats paw' pattern color phase.



Figure 2: -52.4 m 32.26 °N; -79.17 °W
Large *Muricea* sp. gorgonian.



Figure 3: -52.6 m 32.26 °N; -79.17 °W
Unfortunately, Lionfish (*Pterois volitans/miles*) are common at many of the 50-60 m reef sites.



Figure 4: -49.9 m 32.26 °N; -79.17 °W
School of tomates (*Haemulon aurolineatum*) on rock ledges.

Dive Site: ROV 13-07; S. Carolina, Inside Proposed Edisto S Ext MPA, 53 m NE-SW Ridge

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-07, UNCW SuperPhantom ROV Dive 2242; Site #- 4-VII-13-2. Target Site -South Carolina, Proposed Edisto S Ext MPA, 53 m NE-SW ridge. Ground-truth multibeam sonar (2012 Pisces MB: ed1_wgs_84). Conduct video/photo transect S to N, along main ridge.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 0.5 Kn.

Site Description/Habitat/Biota:

Transect along the SW-NE oriented ridge in the proposed Edisto S Extension MPA. Depth range from 53- 55 m. Ridge east slope is nearly flat slope with low relief, <1 m, and low to high rugosity. East of ridge is sediment. Landed on sediment 300 m to the southeast of the proposed transect line. Fractured rock slabs on top of ridge, 1-4 m diam., <1/2 m relief. Varies from 100% HB to 50% or less. First sighting of *Bebryce* and *Agelas* (thick walled chimney) and white Ellisellidae single stalk for this cruise. No hard coral. Scamp grouper common (38). Lionfish abundant.

Dominant Benthic Biota:

Ann - Filigrana; Bry - Schizoporella; Cni - Antipatharia: Stichopathes, Tanacetipathes, Antipathidae; Cni - Gorgonacea: Plexauridae, *Nicella* sp., *Swiftia exserta*, Ellisellidae, *Bebryce*; Cni - Hydroidolina (abundant); Cho - Ascidiacea: Didemnidae; Mol - Bivalvia: Flame Scallop; Por - Demospongiae; *Ircinia campana* (abundant), *Callyspongia vaginalis*, Agelas (thick walled chimney), *Cinachyrella* sp., Unid finger sponge, *Geodia* sp., Unid gray cake sponge.

Fish:

lionfish - *Pterois volitans* (47); scamp grouper - *Mycteroperca phenax*; sharpnose puffer - *Canthigaster rostrata*; reef butterflyfish - *Chaetodon sedentarius*; blue angelfish - *Holacanthus bermudensis*; spotfin hogfish - *Bodianus pulchellus*; tomtate - *Haemulon aurolineatum*; yellowtail reefish - *Chromis encrysurus*; squirrelfish - *Holocentrus* sp.; amberjack - *Seriola* sp.; bank butterflyfish - *Prognathodes aya*; filefish; vermilion snapper - *Rhomboplites aurorubens*; purple reefish - *Chromis scotti*; tattler - *Serranus phoebe*; bigeye - *Priacanthus arenatus*; Calamus porgy - *Calamus* sp.; short bigeye - *Pristigenys alta*; triggerfish - *Balistes* sp.; burr fish; orangeback bass; red porgy - *Pagrus pagrus*; wrasse; bicolor damselfish; cowfish - *Lactophrys* sp.; doctorfish; spotfin butterflyfish - *Chaetodon ocellatus*; spotted goatfish; sunshinefish; blue spotted cornet fish; cubbyu - *Equetus umbrosus*; french angelfish - *Pomacanthus paru*; gag grouper - *Mycteroperca microlepis*; wrasse bass - *Liopropoma eukrines*; yellowhead wrasse

Dive Site: ROV 13-07; S. Carolina, Inside Proposed Edisto S Ext MPA, 53 m NE-SW Ridge

CPCe Percent Cover Analysis:

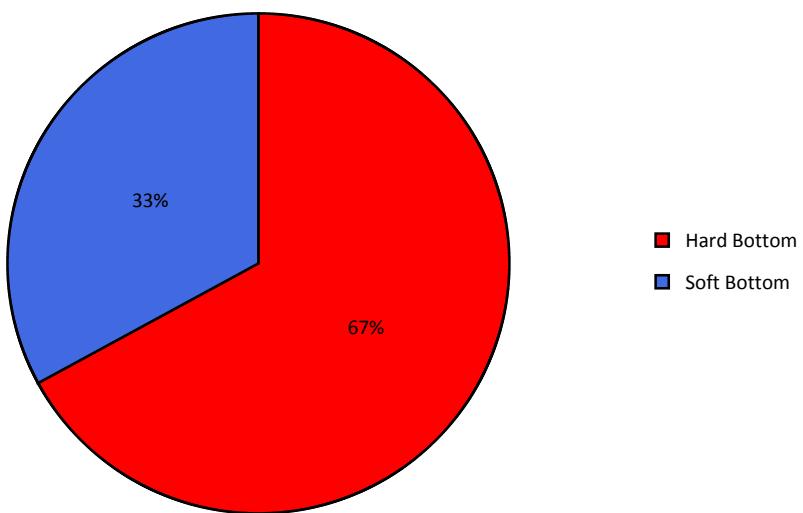


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-07. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

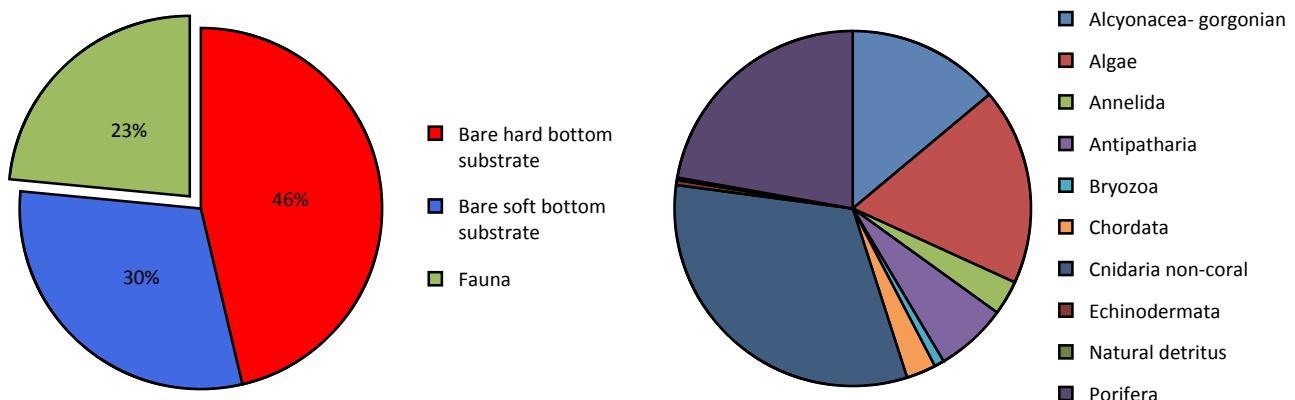


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-07.

Dive Site: ROV 13-07; S. Carolina, Inside Proposed Edisto S Ext MPA, 53 m NE-SW Ridge**Percent Cover of Benthic Macro-Biota and Substrate:**

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-07.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	446	23.47%
Algae	80	4.21%
Corallinales/crustose coralline	12	0.63%
Cyanophyta	4	0.21%
Phaeophyta	2	0.11%
Rhodophyta	62	3.26%
Porifera	99	5.21%
Aiolochroia crassa	7	0.37%
Astrophorida	1	0.05%
Demospongiae	40	2.11%
Demospongiae- ze tan starlet	13	0.68%
Ircinia campana	1	0.05%
Ircinia sp.	12	0.63%
Niphates sp.	1	0.05%
Poecilosclerida	2	0.11%
Spirastrellidae	21	1.11%
Zyzya sp.	1	0.05%
Alcyonacea- gorgonian	62	3.26%
Diogorgia sp.	31	1.63%
Ellisellidae	7	0.37%
Gorgonacea	11	0.58%
Primnoidae	1	0.05%
Swiftia exerta	1	0.05%
Telesto/Carijoa	11	0.58%
Antipatharia	29	1.53%
Antipatharia	25	1.32%
Stichopathes lutkeni	4	0.21%
Cnidaria non-coral	143	7.53%
Corallimorpharia	1	0.05%
Hydroidolina	142	7.47%
Annelida	14	0.74%
Filograna sp.	9	0.47%
Sabellidae	5	0.26%
Bryozoa	4	0.21%
Schizoporella sp.	4	0.21%
Echinodermata	2	0.11%
Davidaster sp.	1	0.05%

Dive Site: ROV 13-07; S. Carolina, Inside Proposed Edisto S Ext MPA, 53 m NE-SW Ridge

Echinoidea	1	0.05%
Chordata	12	0.63%
Asciidiacea	5	0.26%
Didemnidae	4	0.21%
Fish	3	0.16%
Natural detritus	1	0.05%
Natural detritus	1	0.05%
Soft bottom substrate	574	30.21%
Soft bottom substrate	574	30.21%
Bare soft bottom substrate	574	30.21%
Hard bottom substrate	880	46.32%
Hard bottom substrate	880	46.32%
Bare rock- pavement boulder ledge	791	41.63%
Bare rubble- rock	89	4.68%
Grand Total	1900	100.00%

Dive Site: ROV 13-07; S. Carolina, Inside Proposed Edisto S Ext MPA, 53 m NE-SW Ridge**Density of Fish:**

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-07.

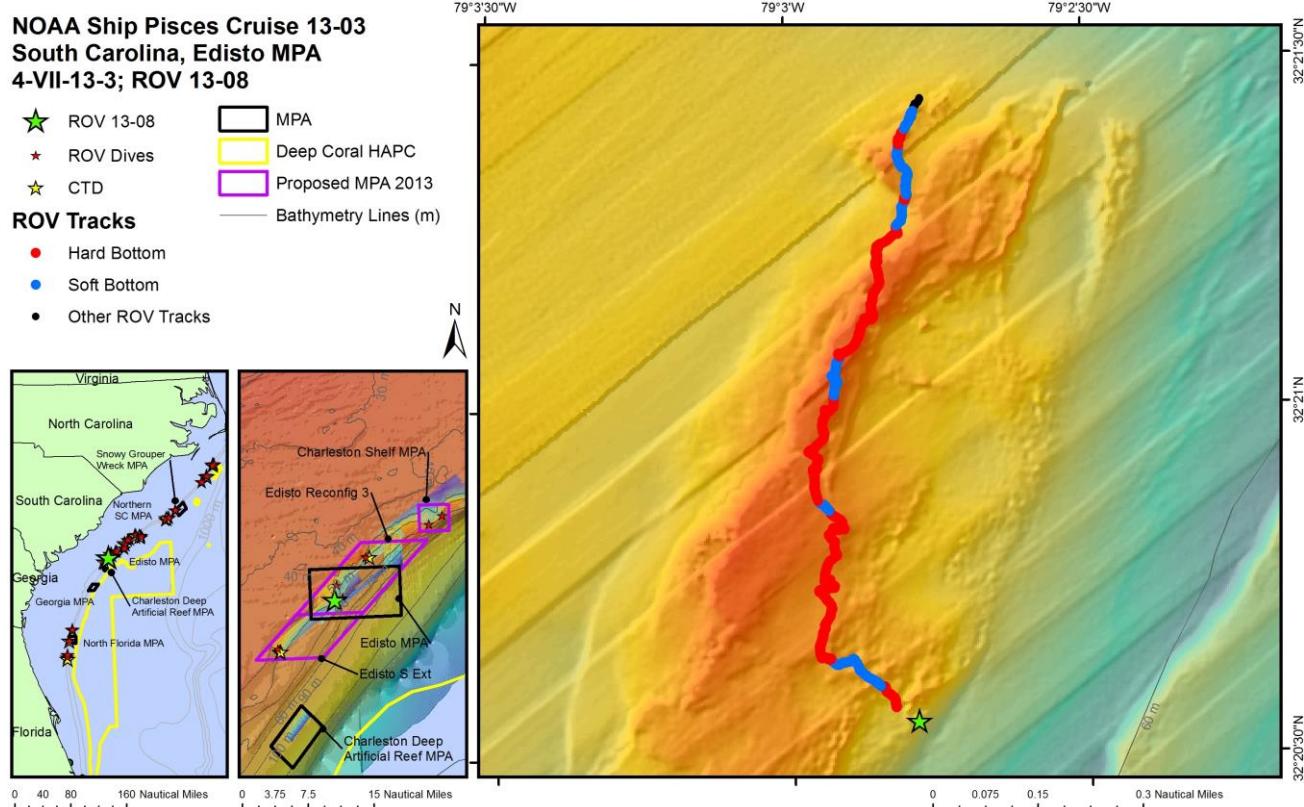
Scientific Name	Common Name	13-07
<i>Acanthurus</i> sp.	doctorfish	1.91
<i>Balistes capriscus</i>	grey triggerfish	3.81
<i>Bodianus pulchellus</i>	spotfin hogfish	23.82
<i>Calamus</i> sp.	porgy	6.67
<i>Canthigaster rostrata</i>	sharpnose puffer	74.8
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	1.91
<i>Chaetodon sedentarius</i>	reef butterflyfish	34.78
<i>Chilomycterus</i> sp.	burrfish	0.48
<i>Chromis enchrissurus</i>	yellowtail reefish	86.71
<i>Chromis insolatus</i>	sunshinefish	11.43
<i>Chromis scotti</i>	purple reefish	35.25
<i>Chromis</i> sp.	damselish	18.58
<i>Diodon</i> sp.	puffer	0.95
<i>Epinephelus cruentatus</i>	graysby	0.95
<i>Fistularia tabacaria</i>	bluespotted cornetfish	0.95
<i>Haemulon aurolineatum</i>	tomtate	2328.25
<i>Haemulon plumieri</i>	white grunt	0.48
<i>Halichoeres garnoti</i>	yellowhead wrasse	2.38
<i>Halichoeres</i> sp.	wrasse	36.21
<i>Holacanthus bermudensis</i>	blue angelfish	23.82
<i>Holocentrus</i> sp.	squirrelfish	14.29
<i>Lachnolaimus maximus</i>	hogfish	0.48
<i>Lactophrys</i> sp.	cowfish	0.95
<i>Liopropoma eukrines</i>	wrasse bass	0.95
<i>Mycteroperca microlepis</i>	gag grouper	0.95
<i>Mycteroperca phenax</i>	scamp	16.67
<i>Pagrus pagrus</i>	red porgy	32.4
<i>Pareques umbrosus</i>	cubbyu	1.43
<i>Pomacanthus paru</i>	french angelfish	0.48
<i>Priacanthus arenatus</i>	bigeye	10
<i>Pristigenys alta</i>	short bigeye	2.86
<i>Prognathodes aya</i>	bank butterflyfish	9.05
<i>Pseudupeneus maculatus</i>	spotted goatfish	1.91
<i>Pterois volitans</i>	lionfish	25.73
<i>Rhomboplites aurorubens</i>	vermillion snapper	499.76
<i>Seriola dumerili</i>	greater amberjack	0.95
<i>Seriola rivoliana</i>	almaco jack	3.81
<i>Seriola</i> sp.	amberjack	6.19

Dive Site: ROV 13-07; S. Carolina, Inside Proposed Edisto S Ext MPA, 53 m NE-SW Ridge

<i>Serranus annularis</i>	orangeback bass	2.38
<i>Serranus phoebe</i>	tattler	7.62
Sparidae	porgy	10.96
<i>Sparisoma atomarium</i>	greenblotch parrotfish	0.95
<i>Sphoeroides spengleri</i>	bandtail puffer	0.48
<i>Stegastes partitus</i>	bicolor damselfish	3.33
<i>Stephanolepis hispidus</i>	planehead filefish	6.67

Dive Site: ROV 13-08; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 52 m N-S mound

General Location and Dive Track:



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	ed1_wgs84
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/4/2013
Specimens:	
Digital Photos:	74
DVD:	2
Hard Drive:	1

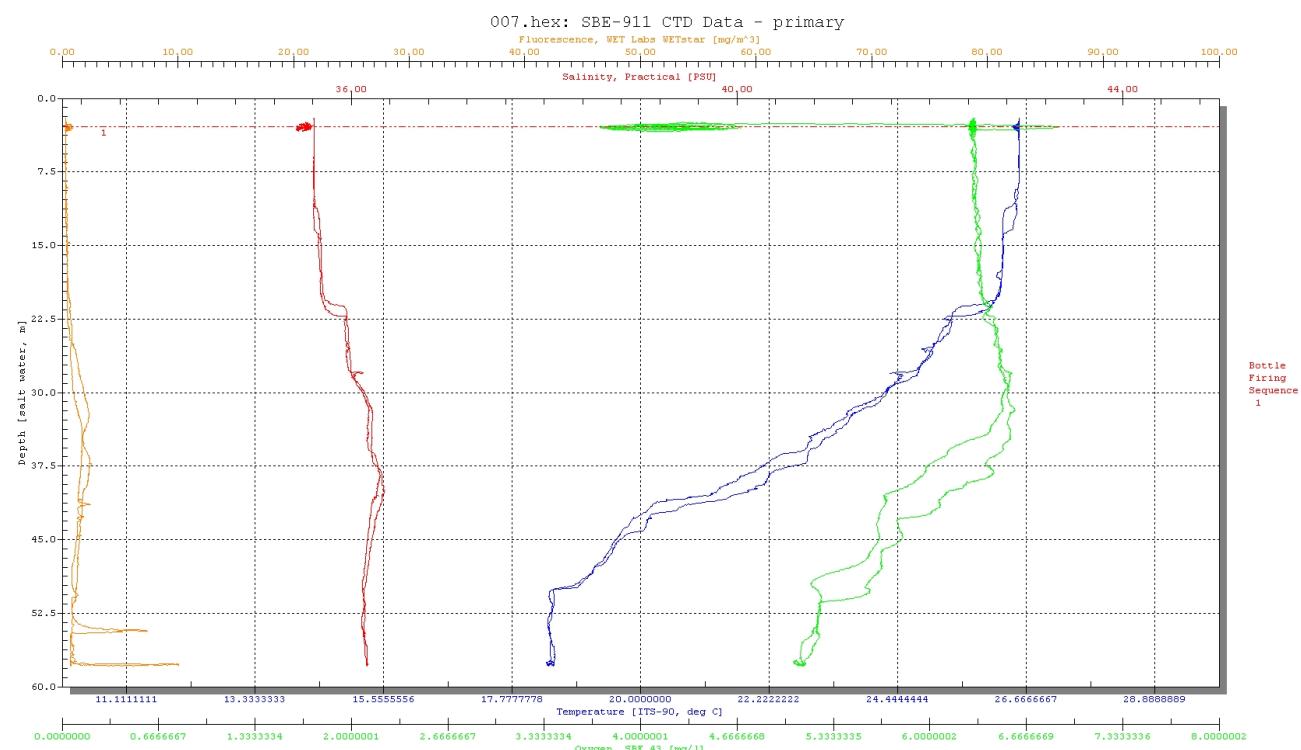
Dive Site: ROV 13-08; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 52 m N-S mound

Dive Data:

Minimum Bottom Depth (m):	-42	Total Transect Length (km):	1.62
Maximum Bottom Depth (m):	-53	Surface Current (kn):	0.70
On Bottom (Time- GMT):	11:27	On Bottom (Lat/Long):	32.34°N; -79.05°W
Off Bottom (Time- GMT):	12:37	Off Bottom (Lat/Long):	32.36°N; -79.05°W
Physical (bottom); Temp (°C):	19.37	Salinity:	N/A
		Visibility (ft):	50
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 11.64



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-08; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 52 m N-S mound

Dive Imagery:



Figure 1: -47.4 m 32.35 °N; -79.05 °W
School of tomtates (*Haemulon aurolineatum*) with rock beauty (*Holacanthus tricolor*) on low relief rock ledges.



Figure 2: -50.8 m 32.35 °N; -79.05 °W
Hogfish (*Lachnolaimus maximus*) in red color phase.

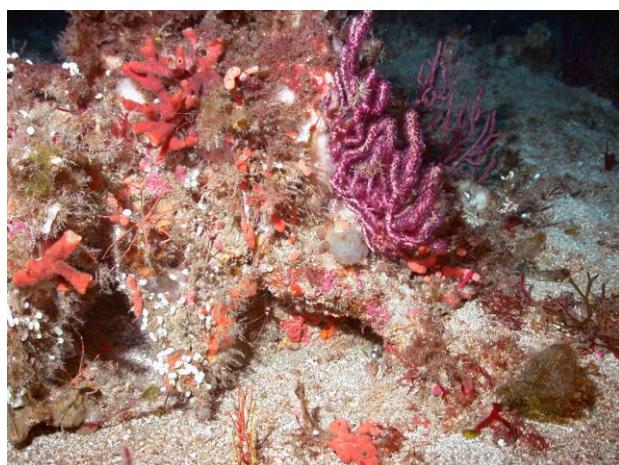


Figure 3: -49.7 m 32.35 °N; -79.05 °W
Dense cover of epifauna including purple sea fan (*Diodogorgia* sp.), red tube bryozoan (*Schizoporella* sp.), ascidians, hydroids, and sponges.



Figure 4: -48.3 m 32.35 °N; -79.05 °W
Pair of Lionfish (*Pterois volitans/miles*) on low relief rock bottom.

Dive Site: ROV 13-08; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 52 m N-S mound

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-08, UNCW SuperPhantom ROV Dive 2243; Site #- 4-VII-13-3. Target Site - S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 52 m N-S mound. Ground-truth multibeam sonar (2012 Pisces MB: ed1_wgs_84). Conduct video/photo transect S to N, along main N-S oriented 2700x778 m mound.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 0.5 Kn.

Site Description/Habitat/Biota:

N-S oriented 2700x778 m mound. Total relief 6 m, minimum on top 48 m, maximum at base 54 m. East side and top of mound was flat pavement with few interspersed areas of high rugosity. Low relief ledges 1/2 to 1 m, flat on top, low slope 5-10° at drop-off. Areas on top of 50% HB, sediment with flat pavement and no ledges. These areas had no fish. The west side of the mound was low to moderate relief (1-3 m) and high rugosity. Mound tapers off to the east and north into unconsolidated flat featureless sediment. First appearance of algae- fleshy red algae and some *Ulva* at first. Fish schools dense on in small patchy areas of high rugosity.

Dominant Benthic Biota:

Alg - Phaeophyta: *Sargassum*; Rhodophyta: several spp. fleshy macroalgae, unid red flat blades, *Halymenia*?; Chlorophyta: *Ulva* sp.; Ann - Filigrana: Art - Decapoda: *Stenorhynchus seticornis*; Cni - Stichopathes; Cni - Gorgonacea: Diodogorgia, *Nicella* sp., *Swiftia exserta*, Ellisellidae, *Bebryce*, Diodogorgia; Cni - Hydroidolina (abundant); Por - Demospongiae: *Ircinia campana*, *Callyspongia vaginalis*, Agelas (thick walled chimney)

Fish:

lionfish- *Pterois volitans* (27); reef butterflyfish- *Chaetodon sedentarius*; squirrelfish- *Holocentrus* sp.; tomtate- *Haemulon aurolineatum*; yellowtail reefish- *Chromis encrysurus*; Calamus porgy- *Calamus* sp.; blue angelfish- *Holacanthus bermudensis*; spotfin hogfish- *Bodianus pulchellus*; tattler- *Serranus phoebe*; purple reefish- *Chromis scotti*; sharpnose puffer- *Canthigaster rostrata*; scamp grouper- *Mycteroperca phenax*; blue spotted cornet fish; cowfish- *Lactophrys* sp.; cubbyu- *Equetus umbrosus*; doctorfish; hogfish- *Lachnolaimus maximus*; rock beauty- *Holacanthus tricolor*; short bigeye- *Pristigenys alta*; wrasse; barracuda; bicolor damselfish; spotfin butterflyfish- *Chaetodon ocellatus*; yellowhead wrasse; bank butterflyfish- *Prognathodes aya*; french angelfish- *Pomacanthus paru*; gray trigger fish; greenband wrasse; moray eel - Muraenidae; *Mycteroperca* sp.; orangeback bass; queen triggerfish; red porgy- *Pagrus pagrus*; rock hind- *Epinephelus adscensionis*

Dive Site: ROV 13-08; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 52 m N-S mound

CPCe Percent Cover Analysis:

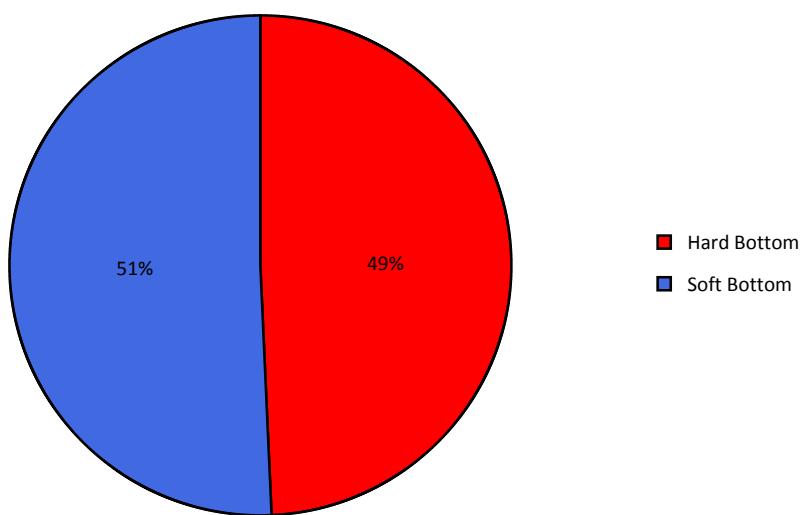


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-08. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

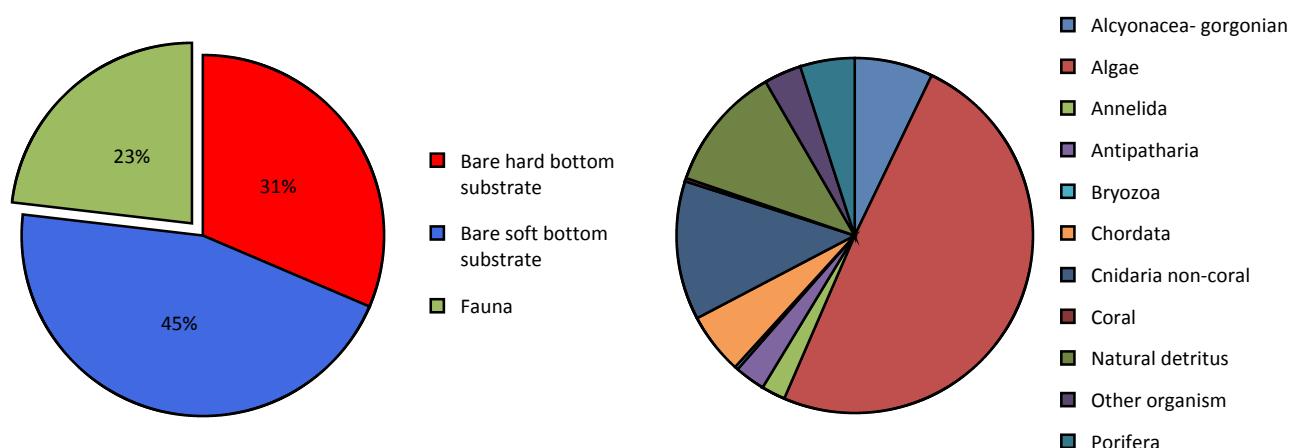


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-08.

Dive Site: ROV 13-08; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 52 m N-S mound

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-08.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	324	23.14%
Algae	160	11.43%
Chlorophyta	12	0.86%
Corallinales/crustose coralline	9	0.64%
Cyanophyta	38	2.71%
Phaeophyta	38	2.71%
Rhodophyta	63	4.50%
Porifera	16	1.14%
Clathria sp.	1	0.07%
Demospongiae	10	0.71%
Ircinia campana	5	0.36%
Coral	1	0.07%
Stylasteridae	1	0.07%
Alcyonacea- gorgonian	23	1.64%
Diogorgia sp.	9	0.64%
Ellisella sp.	6	0.43%
Gorgonacea	2	0.14%
Nicella sp.	3	0.21%
Plexauridiae	3	0.21%
Antipatharia	9	0.64%
Antipatharia	7	0.50%
Stichopathes lutkeni	1	0.07%
Tanacetipathes hirta	1	0.07%
Cnidaria non-coral	41	2.93%
Corallimorpharia	2	0.14%
Hydroidolina	39	2.79%
Annelida	7	0.50%
Filograna sp.	7	0.50%
Bryozoa	1	0.07%
Schizoporella sp.	1	0.07%
Chordata	18	1.29%
Asciidiacea	9	0.64%
Didemnidae	6	0.43%
Fish	3	0.21%
Other organism	11	0.79%
Other organism	11	0.79%
Natural detritus	37	2.64%

Dive Site: ROV 13-08; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 52 m N-S mound

Natural detritus	37	2.64%
Soft bottom substrate	636	45.43%
Soft bottom substrate	636	45.43%
Bare soft bottom substrate	636	45.43%
Hard bottom substrate	440	31.43%
Hard bottom substrate	440	31.43%
Bare rock- pavement boulder ledge	296	21.14%
Bare rubble- rock	144	10.29%
Grand Total	1400	100.00%

Dive Site: ROV 13-08; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 52 m N-S mound

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-08.

Scientific Name	Common Name	13-08
<i>Acanthurus</i> sp.	doctorfish	2.76
<i>Balistes capriscus</i>	grey triggerfish	0.92
<i>Balistes</i> sp.	triggerfish	0.46
<i>Balistes vetula</i>	queen triggerfish	1.38
<i>Bodianus pulchellus</i>	spotfin hogfish	15.62
<i>Calamus</i> sp.	porgy	7.81
<i>Canthigaster rostrata</i>	sharpnose puffer	8.73
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	5.51
<i>Chaetodon sedentarius</i>	reef butterflyfish	36.31
<i>Chromis encrysurus</i>	yellowtail reefish	21.6
<i>Chromis insolatus</i>	sunshinefish	3.22
<i>Chromis scotti</i>	purple reefish	11.49
<i>Chromis</i> sp.	damselish	14.71
<i>Epinephelus adscensionis</i>	rock hind	0.46
<i>Fistularia</i> sp.	cornetfish	1.38
<i>Fistularia tabacaria</i>	bluespotted cornetfish	0.46
<i>Haemulon aurolineatum</i>	tomtate	215.99
<i>Halichoeres garnoti</i>	yellowhead wrasse	4.6
<i>Halichoeres</i> sp.	wrasse	46.42
<i>Holacanthus bermudensis</i>	blue angelfish	9.65
<i>Holacanthus tricolor</i>	rock beauty	1.84
<i>Holocentrus</i> sp.	squirrelfish	11.03
<i>Lachnolaimus maximus</i>	hogfish	1.38
<i>Lactophrys</i> sp.	cowfish	0.92
<i>Mulloidichthys martinicus</i>	yellow goatfish	2.3
<i>Mycteroperca phenax</i>	scamp	2.3
<i>Mycteroperca</i> sp.	grouper	0.46
<i>Pagrus pagrus</i>	red porgy	1.38
<i>Pareques umbrosus</i>	cubbyu	9.65
<i>Pomacanthus</i> sp.	angelfish	0.46
<i>Priacanthus arenatus</i>	bigeye	0.46
<i>Pristigenys alta</i>	short bigeye	1.38
<i>Prognathodes aya</i>	bank butterflyfish	0.46
<i>Pseudupeneus maculatus</i>	spotted goatfish	0.46
<i>Pterois volitans</i>	lionfish	12.41
<i>Seriola</i> sp.	amberjack	0.46
<i>Serranus annularis</i>	orangeback bass	3.22
<i>Serranus phoebe</i>	tattler	7.81

Dive Site: ROV 13-08; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 52 m N-S mound

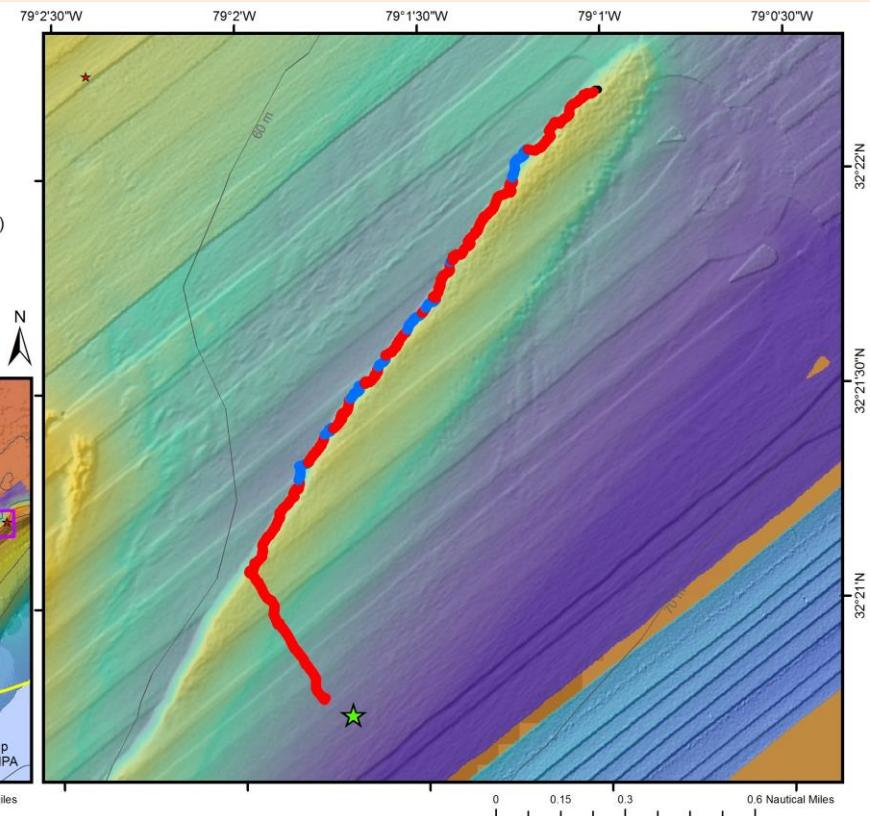
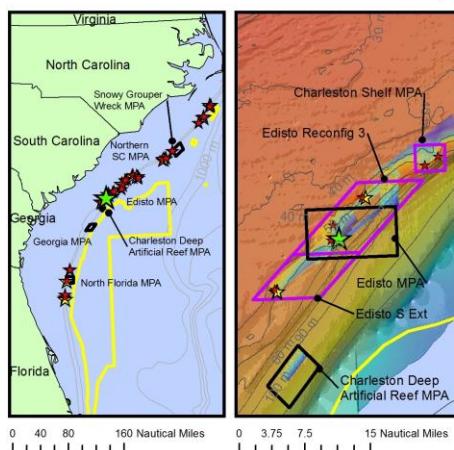
Sparidae	porgy	0.46
<i>Sphyraena barracuda</i>	great barracuda	1.38
<i>Stegastes partitus</i>	bicolor damselfish	4.6

Dive Site: ROV 13-09; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW linear ridge

General Location and Dive Track:

**NOAA Ship Pisces Cruise 13-03
South Carolina, Edisto MPA
4-VII-13-4; ROV 13-09**

- ★ ROV 13-09
 - ★ ROV Dives
 - ★ CTD
 - ROV Tracks**
 - Hard Bottom
 - Soft Bottom
 - Other ROV Tracks
- MPA
 ■ Deep Coral HAPC
 ■ Proposed MPA 2013
 — Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	ed1_wgs84
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/4/2013
Specimens:	0
Digital Photos:	99
DVD:	2
Hard Drive:	1

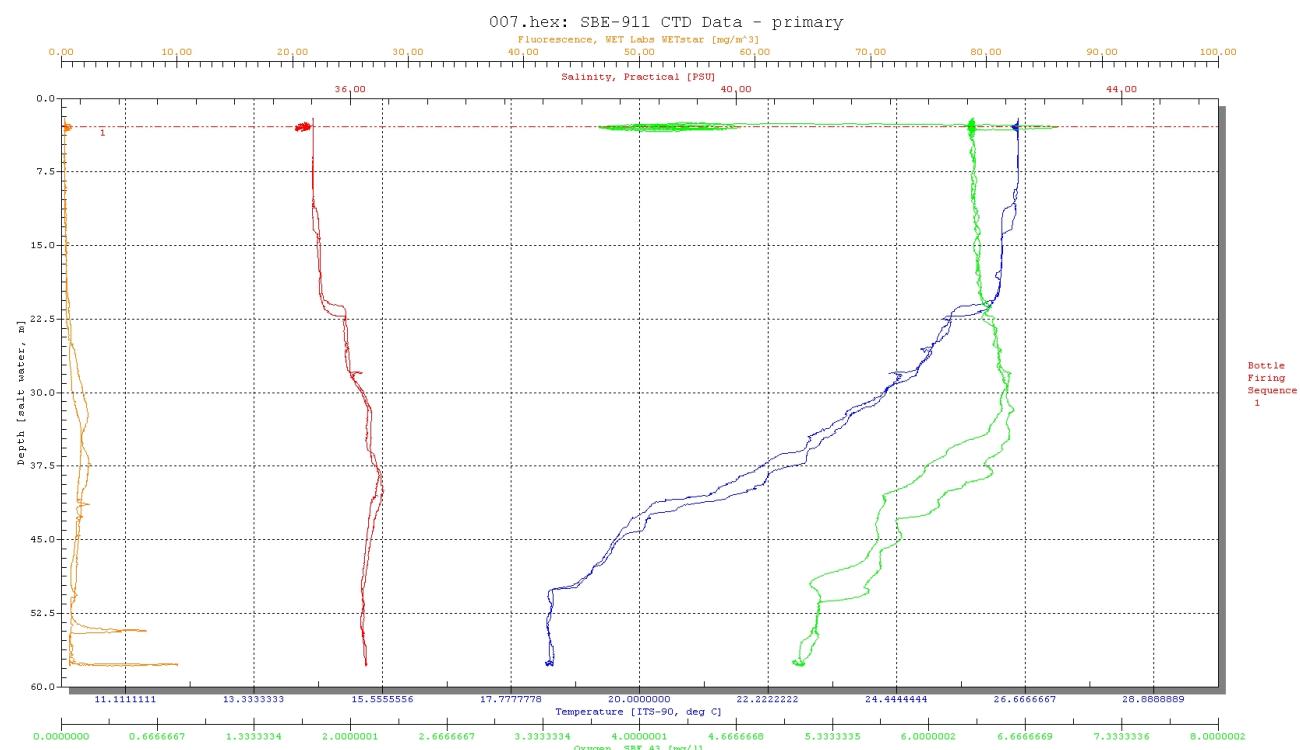
Dive Site: ROV 13-09; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW linear ridge

Dive Data:

Minimum Bottom Depth (m):	-53	Total Transect Length (km):	2.92
Maximum Bottom Depth (m):	-64	Surface Current (kn):	0.6
On Bottom (Time- GMT):	13:14	On Bottom (Lat/Long):	32.35°N; -79.03°W
Off Bottom (Time- GMT):	14:57	Off Bottom (Lat/Long):	32.37°N; -79.02°W
Physical (bottom); Temp (°C):	19.37	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	1.5

Physical Environment:

Distance from Dive Site(km): 10.31



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-09; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW linear ridge

Dive Imagery:



Figure 1: -58.5 m 32.35 °N; -79.03 °W
Scamp grouper (*Mycteroperca phenax*) with squirrelfish (*Holocentrus* sp.) on rugged rocky slope.

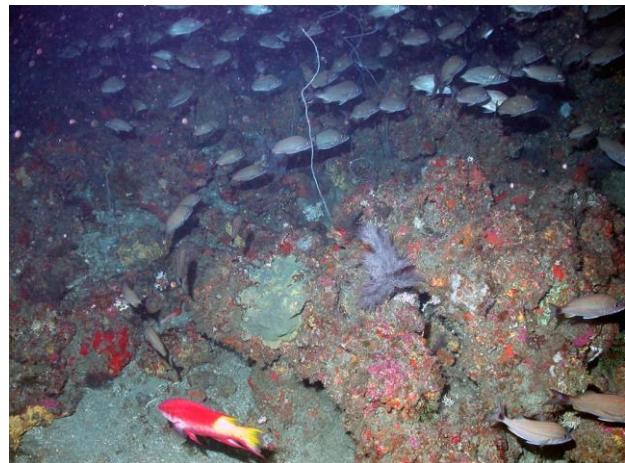


Figure 2: -60.3 m 32.36 °N; -79.03 °W
School of tomtates (*Haemulon aurolineatum*) with spotfin hogfish (*Bodianus pulchellus*) on rock slope.



Figure 3: -60.3 m 32.37 °N; -79.02 °W
Large scamp grouper (*Mycteroperca phenax*) with school of tomtates (*Haemulon aurolineatum*) and bank butterflyfish (*Prognathodes aya*).

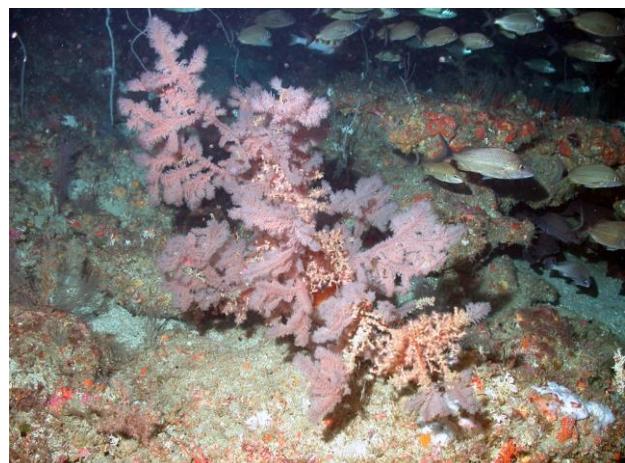


Figure 4: -60.1 m 32.37 °N; -79.02 °W
Bushy black coral (*Tanacetipathes hirta*) encrusted with *Telesto* sp. gorgonian; school of tomtates (*Haemulon aurolineatum*).

Dive Site: ROV 13-09; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW linear ridge

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-09, UNCW SuperPhantom ROV Dive 2244; Site #- 4-VII-13-4. Target Site - S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW 4730x365 m linear ridge. Ground-truth multibeam sonar (2012 Pisces MB: ed1_wgs_84). Conduct video/photo transect S to N, along main ridge.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 0.6 Kn.

Site Description/Habitat/Biota:

Linear ridge (4730x365 m). Maximum relief 2.5 m; 63.5 at base, 61 m on top. Dive landed 360 m to the east of the target linear ridge. Bottom was pavement with sediment veneer few scattered rubble. Headed west towards the mound; flat bottom, more exposed hardbottom low relief, <1/2 m, low rugosity knolls. Knolls are densely covered with Stichopathes. Transect along west slope of ridge. The western slope is 80-90% cover 1-2 m diameter, 1m relief jumble of boulders, high rugosity. Boulders, ledges 61 m deep at top, 2 m relief, eroded undercut ledges. Abrupt end of the rock zone to the west of the ledge (63.5 m). Flat sand to the west is at 64.5 m.

Dominant Benthic Biota:

Ann - Filograna; Art - Decapoda: Scyllarides; Cni - Antipatharia: Stichopathes, Tanacetipathes; Cni - Gorgonacea: Diodogorgia, *Swiftia exserta*, Ellisellidae, *Diodogorgia* sp.; Cni - Hydroidolina (abundant); Ech - Holothuroidea -unid; Por - Demospongiae: *Ircinia campana*, *Callyspongia vaginalis*, *Geodia* sp., *Cinachyrella* sp.

Fish:

lionfish - *Pterois volitans* (37); reef butterflyfish - *Chaetodon sedentarius*; scamp grouper - *Mycteroperca phenax*; spotfin hogfish - *Bodianus pulchellus*; bank butterflyfish - *Prognathodes aya*; yellowtail reefish - *Chromis enchrurus*; blue angelfish - *Holacanthus bermudensis*; squirrelfish - *Holocentrus* sp.; purple reefish - *Chromis scotti*; tomtate - *Haemulon aurolineatum*; short bigeye - *Pristigenys alta*; spotted goatfish; Calamus porgy - *Calamus* sp.; sharpnose puffer - *Canthigaster rostrata*; tattler - *Serranus phoebe*; cubbyu - *Equetus umbrosus*; red porgy - *Pagrus pagrus*; sunshinefish; bigeye - *Priacanthus arenatus*; blue spotted cornet fish; amberjack - *Seriola* sp.; cowfish - *Lactophrys* sp.; spotfin butterflyfish - *Chaetodon ocellatus*; filefish; porgy - Sparidae; vermilion snapper - *Rhomboplites aurorubens*; wrasse; bank seabass; burr fish; doctorfish; grouper; hogfish - *Lachnolaimus maximus*; orangeback bass; parrot fish; puffer; rock beauty - *Holacanthus tricolor*; triggerfish - *Balistes* sp.; trumpet fish; yellowtailed goatfish

Dive Site: ROV 13-09; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW linear ridge

CPCe Percent Cover Analysis:

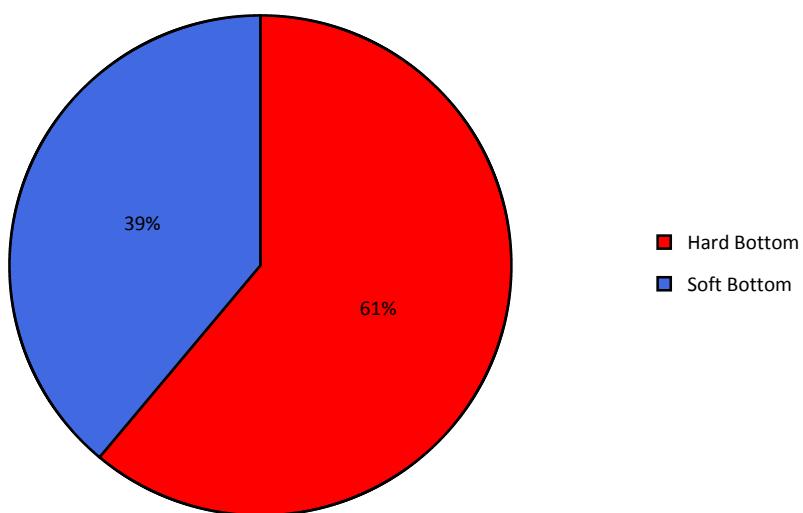


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-09. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

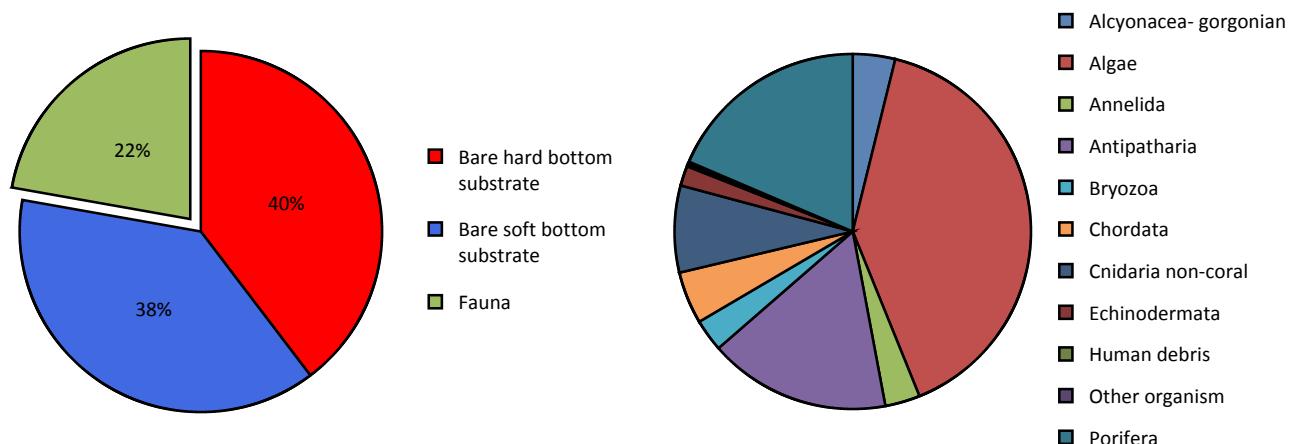


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-09.

Dive Site: ROV 13-09; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-09.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	441	22.15%
Algae	177	8.89%
Chlorophyta	2	0.10%
Corallinales/crustose coralline	70	3.52%
Cyanophyta	4	0.20%
Phaeophyta	28	1.41%
Rhodophyta	73	3.67%
Porifera	82	4.12%
Aiolochroia crassa	3	0.15%
Chondrosia sp.	1	0.05%
Demospongiae	55	2.76%
Demospongiae- ze tan starlet	2	0.10%
Hadromerida	2	0.10%
Ircinia sp.	2	0.10%
Poecilosclerida	3	0.15%
Spirastrellidae	14	0.70%
Alcyonacea- gorgonian	17	0.85%
Diogorgia sp.	1	0.05%
Ellisella sp.	1	0.05%
Ellisellidae	7	0.35%
Gorgonacea	8	0.40%
Antipatharia	73	3.67%
Antipatharia	53	2.66%
Stichopathes lutkeni	16	0.80%
Tanacetipathes hirta	4	0.20%
Cnidaria non-coral	35	1.76%
Fam- Zoanthidae	1	0.05%
Hydroidolina	34	1.71%
Annelida	14	0.70%
Filograna sp.	13	0.65%
Sabellidae	1	0.05%
Bryozoa	13	0.65%
Bryozoa	4	0.20%
Schizoporella sp.	9	0.45%
Echinodermata	8	0.40%
Crinoidea	2	0.10%
Davidaster sp.	6	0.30%

Dive Site: ROV 13-09; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW

Chordata	21	1.05%
Ascidacea	10	0.50%
Fish	11	0.55%
Other organism	1	0.05%
Other organism	1	0.05%
Soft bottom substrate	759	38.12%
Soft bottom substrate	759	38.12%
Bare soft bottom substrate	759	38.12%
Hard bottom substrate	790	39.68%
Hard bottom substrate	790	39.68%
Bare rock- pavement boulder ledge	749	37.62%
Bare rubble- coral	6	0.30%
Bare rubble- rock	34	1.71%
Standing dead coral	1	0.05%
Human debris	1	0.05%
Human debris	1	0.05%
Anchor line	1	0.05%
Grand Total	1991	100.00%

Dive Site: ROV 13-09; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-09.

Scientific Name	Common Name	13-09
<i>Acanthurus</i> sp.	doctorfish	0.27
<i>Aulostomus maculatus</i>	trumpetfish	0.82
<i>Balistes capriscus</i>	grey triggerfish	0.27
<i>Bodianus pulchellus</i>	spotfin hogfish	16.16
<i>Calamus</i> sp.	porgy	6.85
<i>Canthigaster rostrata</i>	sharpnose puffer	9.04
<i>Chaetodon aculeatus</i>	longsnout butterflyfish	2.47
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	5.75
<i>Chaetodon sedentarius</i>	reef butterflyfish	23.56
<i>Chaetodon</i> sp.	butterflyfish	1.64
<i>Chromis enchrissurus</i>	yellowtail reefish	27.94
<i>Chromis insolatus</i>	sunshinefish	8.22
<i>Chromis scotti</i>	purple reefish	23.28
<i>Chromis</i> sp.	damsel fish	43
<i>Diodon</i> sp.	puffer	0.27
<i>Epinephelus cruentatus</i>	graysby	0.55
<i>Fistularia</i> sp.	cornetfish	0.82
<i>Fistularia tabacaria</i>	bluespotted cornetfish	0.55
<i>Haemulon aurolineatum</i>	tomtate	2592.44
<i>Haemulon striatum</i>	striped grunt	96.69
<i>Halichoeres garnoti</i>	yellowhead wrasse	0.55
<i>Halichoeres</i> sp.	wrasse	17.53
<i>Holacanthus bermudensis</i>	blue angelfish	10.41
<i>Holacanthus tricolor</i>	rock beauty	0.82
<i>Holocentrus</i> sp.	squirrelfish	16.16
<i>Lachnolaimus maximus</i>	hogfish	0.55
<i>Lactophrys</i> sp.	cowfish	0.82
<i>Liopropoma eukrines</i>	wrasse bass	0.82
<i>Malacanthus plumieri</i>	sand tilefish	0.27
<i>Mycteroperca phenax</i>	scamp	7.4
<i>Mycteroperca</i> sp.	grouper	0.27
<i>Pagrus pagrus</i>	red porgy	39.44
<i>Pareques umbrosus</i>	cubbyu	9.04
<i>Priacanthus arenatus</i>	bigeye	3.01
<i>Pristigenys alta</i>	short bigeye	7.12
<i>Prognathodes aya</i>	bank butterflyfish	9.31
<i>Pseudupeneus maculatus</i>	spotted goatfish	7.12
<i>Pterois volitans</i>	lionfish	12.05

Dive Site: ROV 13-09; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW

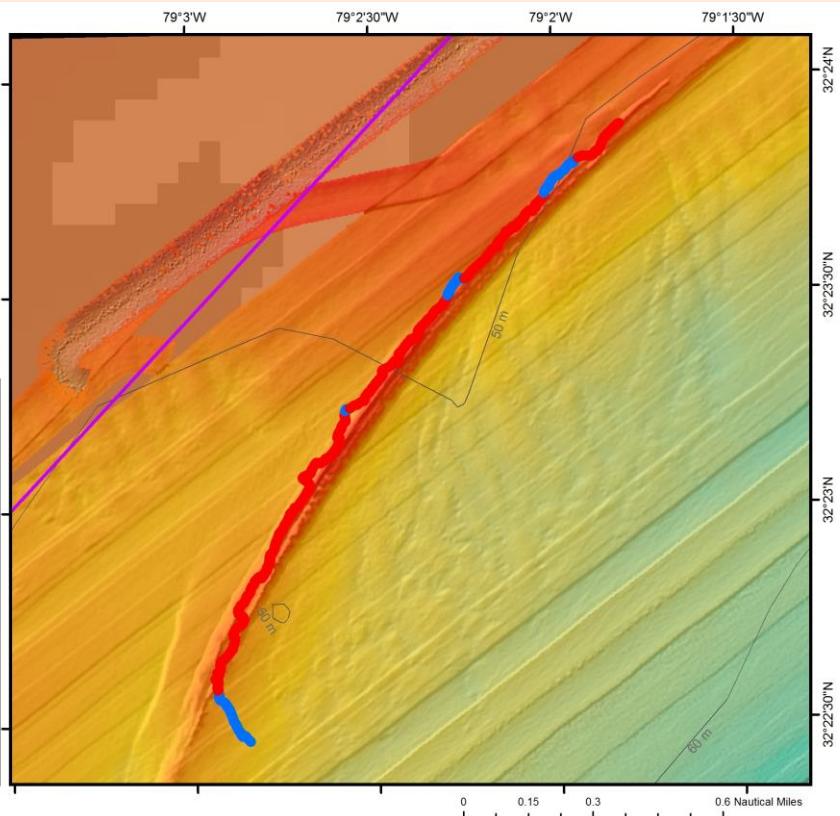
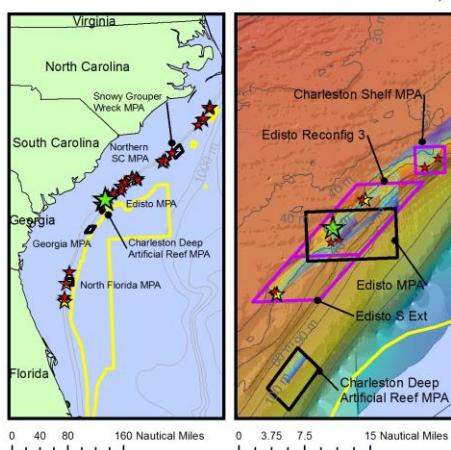
<i>Rhomboplites aurorubens</i>	vermillion snapper	21.36
<i>Seriola dumerili</i>	greater amberjack	0.82
<i>Seriola rivoliana</i>	almaco jack	1.1
<i>Seriola</i> sp.	amberjack	2.47
<i>Serranus annularis</i>	orangeback bass	1.1
<i>Serranus phoebe</i>	tattler	10.68
Sparidae	porgy	2.47
<i>Parupeneus atomarium</i>	greenblotch parrotfish	0.27
<i>Sphoeroides spengleri</i>	bandtail puffer	0.55
<i>Stephanolepis hispidus</i>	planehead filefish	0.82

Dive Site: ROV 13-10; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW
3 mi ridge

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
South Carolina, Edisto MPA
4-VII-13-5; ROV 13-10

- ★ ROV 13-10
 - ★ ROV Dives
 - ★ CTD
 - ROV Tracks**
 - Hard Bottom
 - Soft Bottom
 - Other ROV Tracks
- MPA
■ Deep Coral HAPC
■ Proposed MPA 2013
— Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	ed1_wgs84
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/4/2013
Specimens:	0
Digital Photos:	121
DVD:	2
Hard Drive:	1

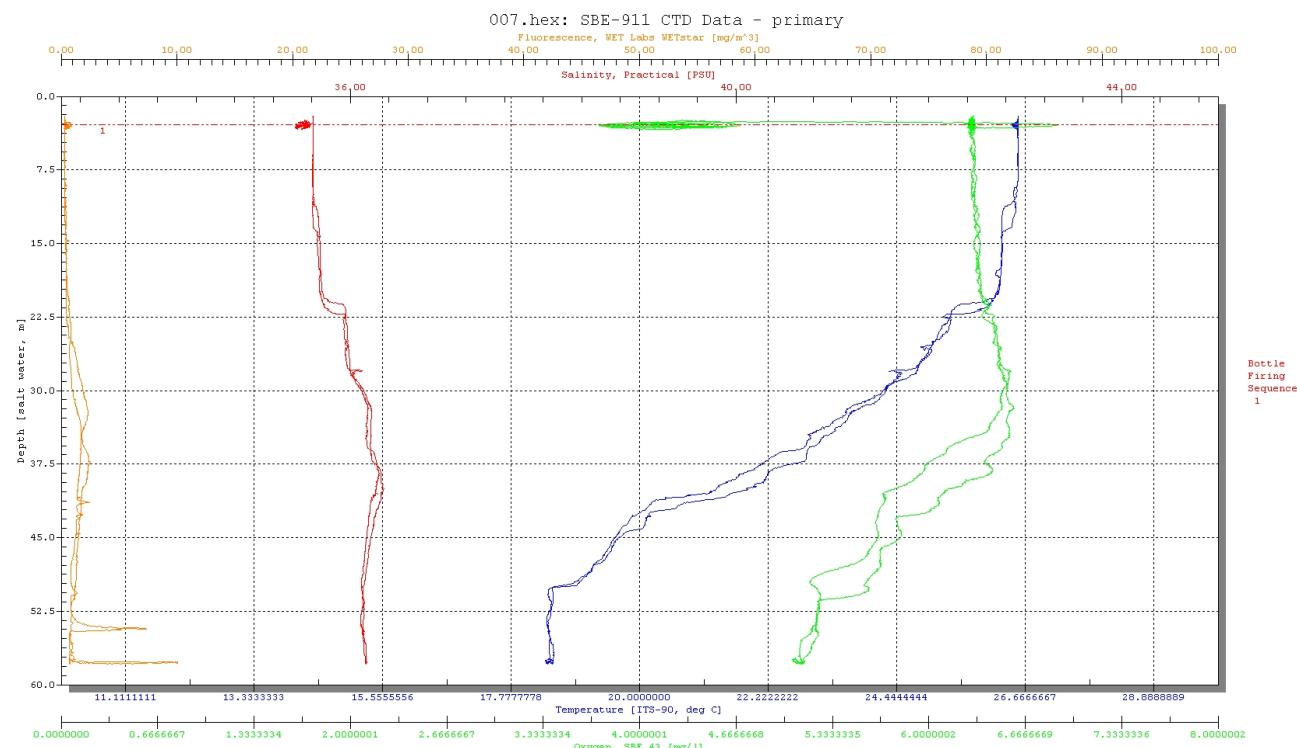
Dive Site: ROV 13-10; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW
3 mi ridge

Dive Data:

Minimum Bottom Depth (m):	-42	Total Transect Length (km):	3.09
Maximum Bottom Depth (m):	-54	Surface Current (kn):	0.7
On Bottom (Time- GMT):	15:30	On Bottom (Lat/Long):	32.37°N; -79.05°W
Off Bottom (Time- GMT):	17:06	Off Bottom (Lat/Long):	32.4°N; -79.03°W
Physical (bottom); Temp (°C):	19.59	Salinity:	N/A
		Visibility (ft):	50
		Current (kn):	0

Physical Environment:

Distance from Dive Site(km): 9.03



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-10; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW
3 mi ridge

Dive Imagery:

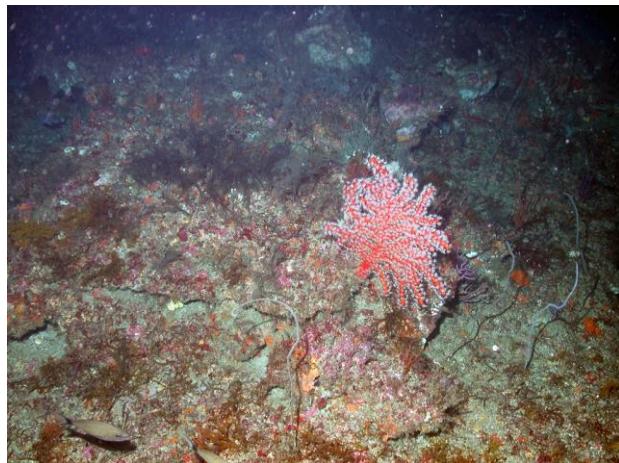


Figure 1: -47.8 m 32.38 °N; -79.05 °W
Red seafan (*Swiftia exerta*) with exert white polyps.



Figure 2: -46.4 m 32.38 °N; -79.05 °W
Lionfish (*Pterois volitans*) and spotfin hogfish (*Bodianus pulchellus*) on rugged rocky slope.



Figure 3: -45.1 m 32.39 °N; -79.04 °W
Blacktip shark (*Carcharhinus limbatus*) and porcupinefish (*Calamus* sp.) over rock pavement bottom.



Figure 4: -46.8 m 32.39 °N; -79.04 °W
Large colony of *Telesto* sp. gorgonian encrusting on rock ledge.

Dive Site: ROV 13-10; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW 3 mi ridge

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-10, UNCW SuperPhantom ROV Dive 2245; Site #- 4-VII-13-5. Target Site - S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW 5000x300 m linear ridge. Ground-truth multibeam sonar (2012 Pisces MB: ed1_wgs_84). Conduct video/photo transect S to N, along main ridge.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 0.7 Kn.

Site Description/Habitat/Biota:

65 m deep, NE-SW 5000x300 m linear ridge. On bottom 53.5 m deep in bioturbated sediment 200 m to the east of the feature. East slope of the ridge is very rugose, 1-3 m relief 49 m deep on top ledge. Under cut ledges at edge, slanted stacked rock slabs. Appears as though the top of this ridge is a double ridge with a sand region in between, there appears to be 2 parallel rock "walls" on both the east and west sides of the ridge. West slope is 1-3 m relief, high rugosity, undercut rock slabs jumbled on slope, 20-30o slope (46 m top). West base of ridge is low relief jumbles of rocks 1-2 m wide <.5 m tall (base of wall is 52 m) - total relief from top of ridge to bottom 6 m. Wall starts to taper off to the north, rugosity drops as well as relief (~1 m tall on edge and flat low Rugosity on top). Fish - 2 sunfish, 1 getting cleaned by a blue angel.

Dominant Benthic Biota:

Alg - Phaeophyta: *Dictyota*, *Sargassum*; Ann - *Filograna*; Art - Decapoda: *Panulirus argus*, Scyllarides; Cho - Ascidiacea: Didemnidae; Cni - Hydroidolina; Cni - Gorgonacea: *Swiftia* sp., *Diadogorgia* sp., Ellisellidae, *Telesto* sp.; Tanacetipathes; Ech - Holothuroidea; Por - Demospongiae: *Callyspongia vaginalis*, *Ircinia campana*, Agelas, Axinellidae, Spirastrellidae

Fish:

lionfish - *Pterois volitans* (177); scamp grouper - *Mycteroperca phenax*; blue angelfish - *Holacanthus bermudensis*; squirrelfish - *Holocentrus* sp.; reef butterflyfish - *Chaetodon sedentarius*; spotfin hogfish - *Bodianus pulchellus*; tomtate - *Haemulon aurolineatum*; gag grouper - *Mycteroperca microlepis*; graysby grouper - *Epinephelus cruentatus*; purple reeffish - *Chromis scotti*; cowfish - *Lactophrys* sp.; short bigeye - *Pristigenys alta*; bicolor damselfish; *Calamus* porgy - *Calamus* sp.; gray trigger fish; sharpnose puffer - *Canthigaster rostrata*; spotted goatfish; amberjack - *Seriola* sp.; filefish; red porgy - *Pagrus pagrus*; blackbar soldierfish - *Myripristis jacobus*; blue spotted cornet fish; hogfish - *Lachnolaimus maximus*; yellowtail reeffish - *Chromis enchrysurus*; bank butterflyfish - *Prognathodes aya*; doctorfish; gray angelfish; spotfin butterflyfish - *Chaetodon ocellatus*; white grunt; burr fish; cubbyu - *Equetus umbrosus*; french angelfish - *Pomacanthus paru*; rock beauty - *Holacanthus tricolor*; sunshinefish; vermilion snapper - aurorubens; yellowhead wrasse; bigeye - *Priacanthus arenatus*; gray snapper - *Lutjanus griseus*; moray eel - *Muraenidae*; *Rhomboplites*; porgy - *Sparidae*; scrawled filefish; shark; sunfish; trumpetfish; wrasse bass - *Liopropoma eukrines*

Dive Site: ROV 13-10; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW
3 mi ridge

CPCe Percent Cover Analysis:

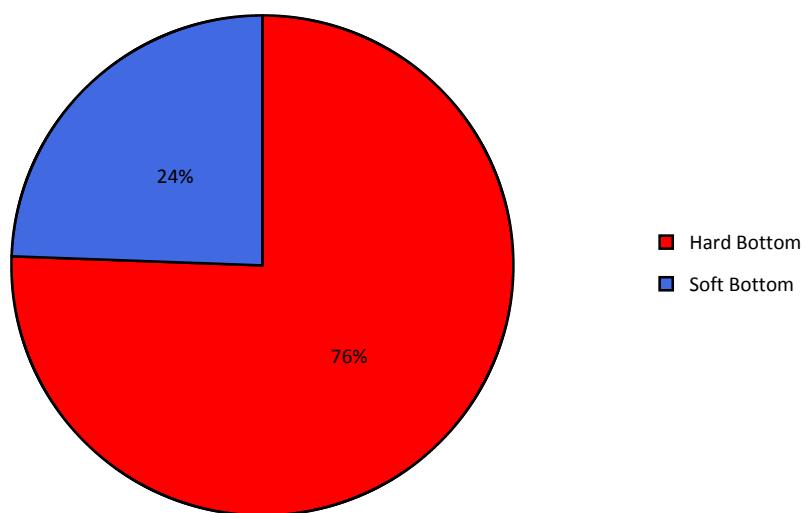


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-10. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

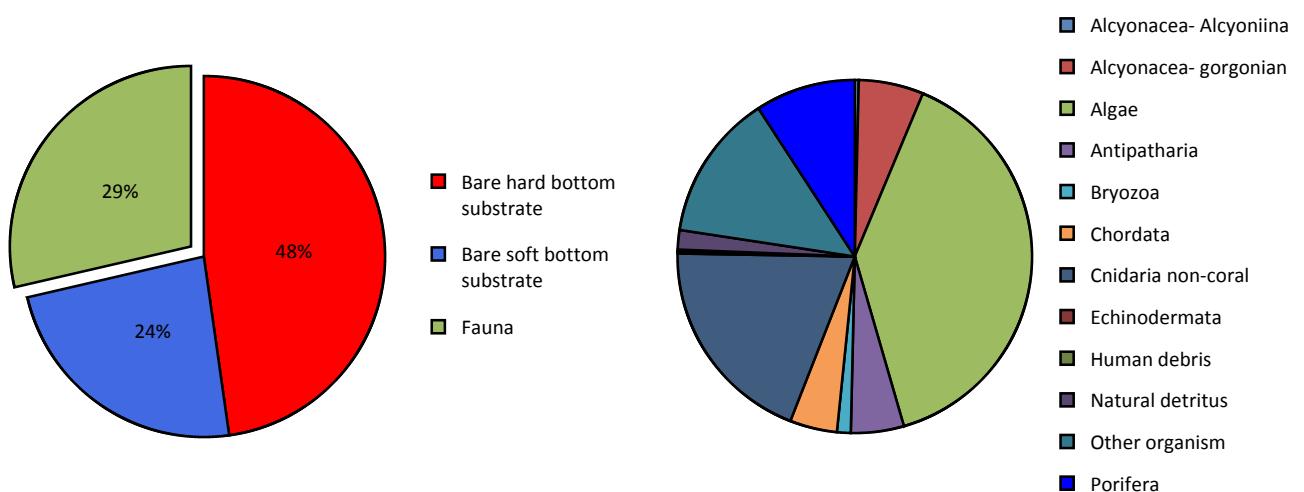


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-10.

Dive Site: ROV 13-10; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-10.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	557	28.58%
Algae	219	11.24%
Corallinales/crustose coralline	13	0.67%
Cyanophyta	6	0.31%
Phaeophyta	154	7.90%
Rhodophyta	46	2.36%
Porifera	51	2.62%
Agelas sp.	1	0.05%
Aiolochroia crassa	3	0.15%
Clathria sp.	1	0.05%
Demospongiae	28	1.44%
Demospongiae- ze tan starlet	5	0.26%
Demospongiae- ye sphere	3	0.15%
Haplosclerida	3	0.15%
Ircinia campana	2	0.10%
Ircinia sp.	2	0.10%
Poecilosclerida	1	0.05%
Spirastrellidae	2	0.10%
Alcyonacea- gorgonian	33	1.69%
Diodogorgia sp.	17	0.87%
Ellisella sp.	1	0.05%
Gorgonacea	3	0.15%
Leptogorgia	1	0.05%
Telesto/Carijoa	11	0.56%
Alcyonacea- Alcyoniina	2	0.10%
Alcyonacea	2	0.10%
Antipatharia	27	1.39%
Antipatharia	20	1.03%
Stichopathes lutkeni	3	0.15%
Tanacetipathes hirta	4	0.21%
Cnidaria non-coral	108	5.54%
Hydroidolina	108	5.54%
Bryozoa	7	0.36%
Bryozoa	3	0.15%
Schizoporella sp.	4	0.21%
Echinodermata	1	0.05%
Crinoidea	1	0.05%

Dive Site: ROV 13-10; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW

Chordata	24	1.23%
Ascidacea	9	0.46%
Didemnidae	7	0.36%
Fish	8	0.41%
Other organism	75	3.85%
Other organism	75	3.85%
Natural detritus	10	0.51%
Natural detritus	10	0.51%
Soft bottom substrate	460	23.60%
Soft bottom substrate	460	23.60%
Bare soft bottom substrate	460	23.60%
Hard bottom substrate	931	47.77%
Hard bottom substrate	931	47.77%
Bare rock- pavement boulder ledge	918	47.10%
Bare rubble- rock	13	0.67%
Human debris	1	0.05%
Human debris	1	0.05%
Fishing gear/line/long line	1	0.05%
Grand Total	1949	100.00%

Dive Site: ROV 13-10; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-10.

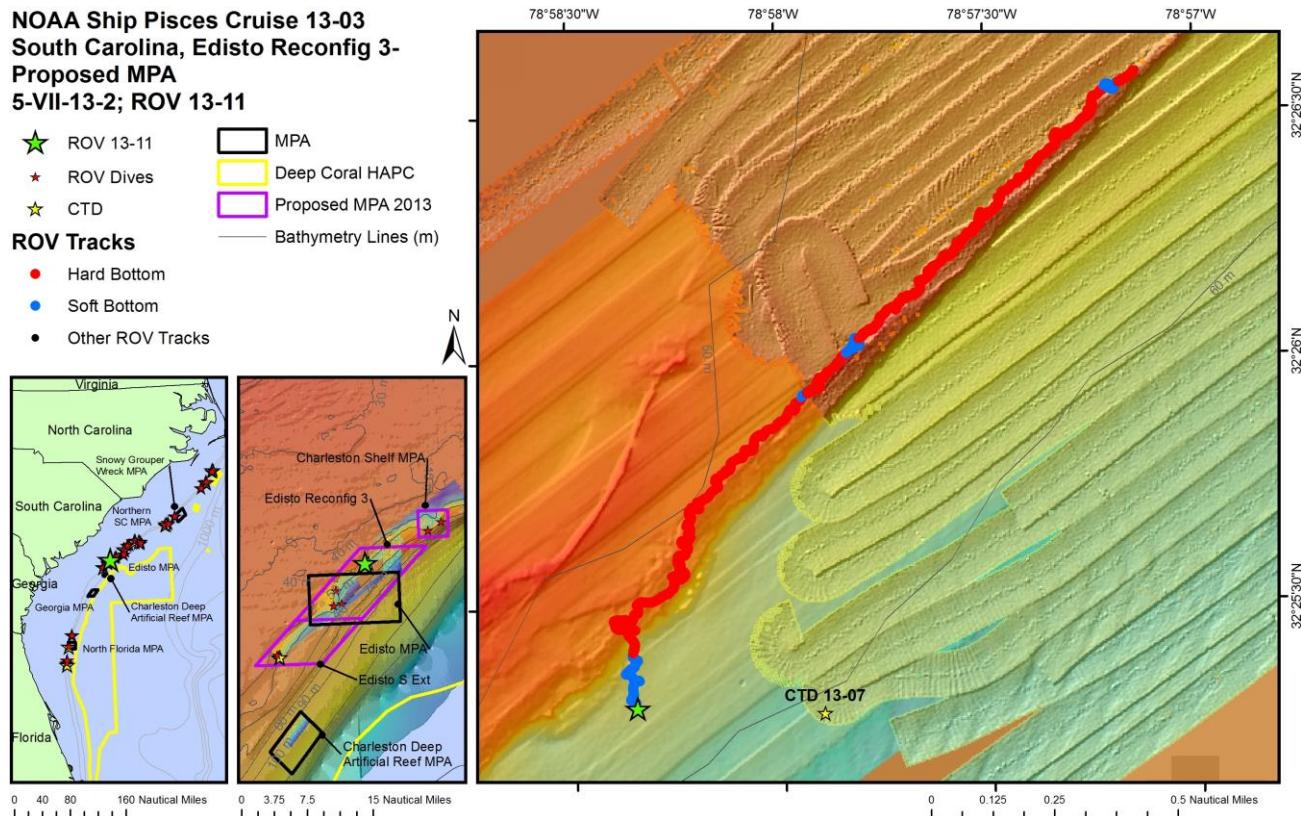
Scientific Name	Common Name	13-10
<i>Acanthurus</i> sp.	doctorfish	1.35
<i>Aluterus scriptus</i>	scrawled filefish	0.27
<i>Aulostomus maculatus</i>	trumpetfish	0.27
<i>Balistes capriscus</i>	grey triggerfish	4.04
<i>Balistes vetula</i>	queen triggerfish	0.27
<i>Bodianus pulchellus</i>	spotfin hogfish	34.72
<i>Bodianus rufus</i>	spanish hogfish	0.27
<i>Calamus</i> sp.	porgy	6.19
<i>Canthigaster rostrata</i>	sharpnose puffer	9.42
<i>Centropristes ocyurus</i>	bank sea bass	0.27
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	2.42
<i>Chaetodon sedentarius</i>	reef butterflyfish	29.34
<i>Chaetodon</i> sp.	butterflyfish	0.27
<i>Chilomycterus schoepfi</i>	striped burrfish	0.27
<i>Chromis cyaneus</i>	blue chromis	0.54
<i>Chromis enchrysurus</i>	yellowtail reefish	14
<i>Chromis insolatus</i>	sunshinefish	2.42
<i>Chromis scotti</i>	purple reefish	93.67
<i>Chromis</i> sp.	damselfish	8.08
<i>Diodon</i> sp.	puffer	0.54
<i>Epinephelus cruentatus</i>	graysby	5.11
<i>Fistularia</i> sp.	cornetfish	1.62
<i>Fistularia tabacaria</i>	bluespotted cornetfish	0.54
<i>Haemulon aurolineatum</i>	tomtate	1414.54
<i>Haemulon plumieri</i>	white grunt	2.15
<i>Haemulon striatum</i>	striped grunt	2.69
<i>Halichoeres garnoti</i>	yellowhead wrasse	0.54
<i>Halichoeres</i> sp.	wrasse	10.23
<i>Holacanthus bermudensis</i>	blue angelfish	21.27
<i>Holacanthus tricolor</i>	rock beauty	0.54
Holocentridae		0.27
<i>Holocentrus</i> sp.	squirrelfish	12.38
<i>Lachnolaimus maximus</i>	hogfish	1.35
<i>Lactophrys</i> sp.	cowfish	3.77
<i>Lutjanus griseus</i>	grey snapper	0.27
<i>Malacanthus plumieri</i>	sand tilefish	0.27
Monacanthidae	filefish	0.54
<i>Monacanthus</i> sp.	filefish	0.27

Dive Site: ROV 13-10; S. Carolina, Inside Edisto MPA (and proposed Edisto Reconfig 3), 65 m NE-SW

Muraenidae	moray eel	0.27
<i>Mycteroperca microlepis</i>	gag grouper	4.31
<i>Mycteroperca phenax</i>	scamp	8.34
<i>Myripristis jacobus</i>	blackbar soldierfish	3.77
<i>Pagrus pagrus</i>	red porgy	21.27
<i>Pareques umbrosus</i>	cubbyu	0.54
<i>Pomacanthus arcuatus</i>	grey angelfish	1.62
<i>Pomacanthus paru</i>	french angelfish	0.54
<i>Pomacanthus</i> sp.	angelfish	0.27
<i>Priacanthus arenatus</i>	bigeye	0.81
<i>Pristigenys alta</i>	short bigeye	7.81
<i>Prognathodes aya</i>	bank butterflyfish	1.08
<i>Pseudupeneus maculatus</i>	spotted goatfish	1.62
<i>Pterois volitans</i>	lionfish	58.41
<i>Rhomboplites aurorubens</i>	vermillion snapper	75.37
<i>Seriola rivoliana</i>	almaco jack	1.62
<i>Seriola</i> sp.	amberjack	2.15
<i>Serranus phoebe</i>	tattler	0.27
Sparidae	porgy	4.31
<i>Sparisoma atomarium</i>	greenblotch parrotfish	0.54
<i>Sphoeroides spengleri</i>	bandtail puffer	0.27
<i>Stegastes partitus</i>	bicolor damselfish	1.88
<i>Stephanolepis hispidus</i>	planehead filefish	2.69
<i>Thalassoma bifasciatum</i>	bluehead wrasse	0.27

Dive Site: ROV 13-11; S. Carolina, North of Edisto MPA (inside proposed Edisto Reconfig 3), 52 m NE-SW ridge

General Location and Dive Track:



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	ed1_wgs84
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/5/2013
Specimens:	0
Digital Photos:	191
DVD:	3
Hard Drive:	1

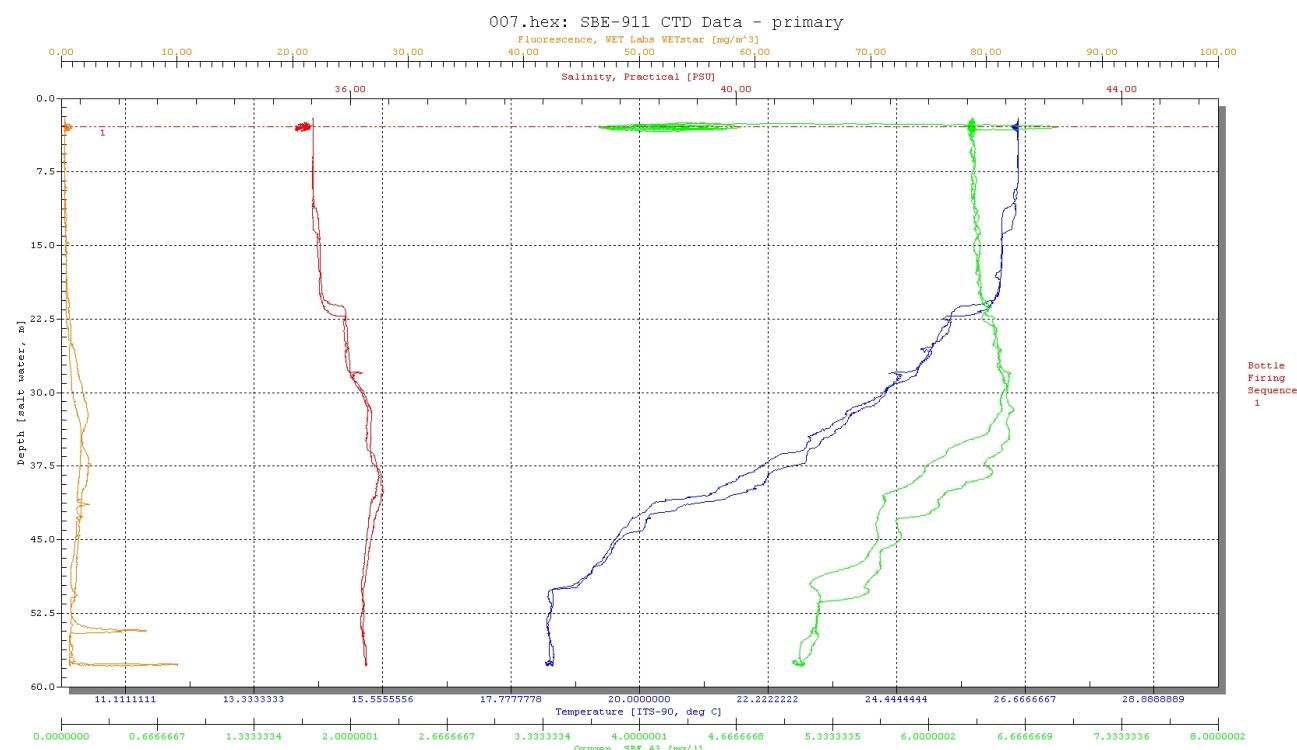
Dive Site: ROV 13-11; S. Carolina, North of Edisto MPA (inside proposed Edisto Reconfig 3), 52 m NE-SW ridge

Dive Data:

Minimum Bottom Depth (m):	-41	Total Transect Length (km):	3.03
Maximum Bottom Depth (m):	-59	Surface Current (kn):	0.4
On Bottom (Time- GMT):	8:03	On Bottom (Lat/Long):	32.42°N; -78.97°W
Off Bottom (Time- GMT):	10:34	Off Bottom (Lat/Long):	32.44°N; -78.95°W
Physical (bottom); Temp (°C):	19.04	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 0.70



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-11; S. Carolina, North of Edisto MPA (inside proposed Edisto Reconfig 3), 52 m NE-SW ridge

Dive Imagery:



Figure 1: -48.1 m 32.43 °N; -78.97 °W
Blue angelfish (*Holacanthus bermudensis*) with purple *Muricea* sp. gorgonians.



Figure 2: -48.3 m 32.43 °N; -78.97 °W
Large male hogfish (*Lachnolaimus maximus*) in dominant color phase.



Figure 3: -50.8 m 32.44 °N; -78.95 °W
Scamp grouper (*Mycteroperca phenax*) with Lionfish (*Pterois volitans/miles*) on low relief rock bottom.



Figure 4: -48.9 m 32.43 °N; -78.97 °W
Large red seafan (*Swiftia exerta*) with two bank butterflyfish (*Prognathodes aya*) and reef butterflyfish (*Chaetodon sedentarius*) in foreground.

Dive Site: ROV 13-11; S. Carolina, North of Edisto MPA (inside proposed Edisto Reconfig 3), 52 m NE-SW ridge

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-11, UNCW SuperPhantom ROV Dive 2246; Site #- 5-VII-13-2. Target Site - S. Carolina, North of Edisto MPA (proposed Edisto Reconfig 3), 52 m NE-SW ridge. Ground-truth multibeam sonar (2012 Pisces MB: ed1_wgs_84). Conduct video/photo transect S to N, along main ridge.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 0.4 Kn.

Site Description/Habitat/Biota:

Extensive 12 km long ridge, 60-90 m wide, oriented NE-SW. Dive transect up east slope, across top, and west slope. Majority of dive along west slope of ridge on multibeam. Total relief 4 m; 52.5 m to 48.5 m. Landed 230 m east of target area on MB (ridge); 100% soft bottom. Small rock boulders (10%) start to appear about 95 m from the ridge. The east base of the ridge is pavement with sediment veneer. East slope is low relief (<.5 m) rock boulders and outcrops. Low rugosity and low slope rock ledge. Top of ridge is flat, low relief rock pavement with low rugosity. East base 50.5 m, top 49.5 m. West slope: high relief 2-3 m, low slope 10-30 dg, high rugosity. Rock ledge (49.5-52m) has large under cut rock slabs at top edge, undercut 1-2 m. Slope is jumble of rock slabs and squared blocks on slope 15-20 m wide. Base of slope flattens out to sand and rubble with small boulders at 52 m depth, then to flat sand west of ridge.

Dominant Benthic Biota:

Alg - Phaeophyta: *Dictyota* sp., *Sargassum* sp., Rhodophyta; Art - Decapoda: *Panulirus argus*; Bry: *Schizoporella* sp.; Cho - Ascidiacea: Didemnidae
Cni - Gorgonacea: *Swiftia exserta*, *Diodogorgia*, Ellisellidae, *Telesto* sp., *Bebryce* sp.; Antipatharia: *Stichopathes* sp., *Tanacetipathes* sp.; Hydroidolina: Fine white hair, white bushy; Ech - Holothuroidea; Mol - Gastropoda: queen helmet; Por - Demospongiae: *Ircinia campana*, tan cake, *Geodia* sp., *Callyspongia vaginalis*, *Cinachyrella* sp., *Agelas* sp., gray cake

Fish:

lionfish - *Pterois volitans* (146); scamp grouper - *Mycteroperca phenax*; reef butterflyfish - *Chaetodon sedentarius*; spotfin hogfish - *Bodianus pulchellus*; blue angelfish - *Holacanthus bermudensis*; squirrelfish - *Holocentrus* sp.; squirrelfish - *Holocentrus* sp.; tomtate - *Haemulon aurolineatum*; sharpnose puffer - *Canthigaster rostrata*; yellowtail reeffish - *Chromis enhrysurus*; purple reeffish - *Chromis scotti*; Calamus porgy - *Calamus* sp.; vermilion snapper - *Rhomboplites aurorubens*; cubbyu - *Equetus umbrosus*; cowfish - *Lactophrys* sp.; tattler - *Serranus phoebe*; bank butterflyfish - *Prognathodes aya*; graysby grouper - *Epinephelus cruentatus*; red porgy - *Pagrus pagrus*; spotted goatfish; grunt; short bigeye - *Pristigenys alta*; spotfin butterflyfish - *Chaetodon ocellatus*; hogfish - *Lachnolaimus maximus*; sunshinefish; amberjack - *Seriola* sp.; blackbar soldierfish - *Myripristis jacobus*; doctorfish; sand tilefish; filefish; parrotfish; triggerfish - *Balistes* sp.; wrasse; bandtail puffer; bigeye - *Priacanthus arenatus*; burrfish; gray angelfish; cornetfish; gag grouper - *Mycteroperca microlepis*; *Mycteroperca* sp.; porgy - Sparidae; rock beauty - *Holacanthus tricolor*; saddlebass; tautog; wrasse bass - *Liopropoma eukrines*; yellowhead wrasse; bank seabass; barracuda; bluespotted cornetfish; french angelfish - *Pomacanthus paru*; Jack

Dive Site: ROV 13-11; S. Carolina, North of Edisto MPA (inside proposed Edisto Reconfig 3), 52 m NE-SW ridge

CPCe Percent Cover Analysis:

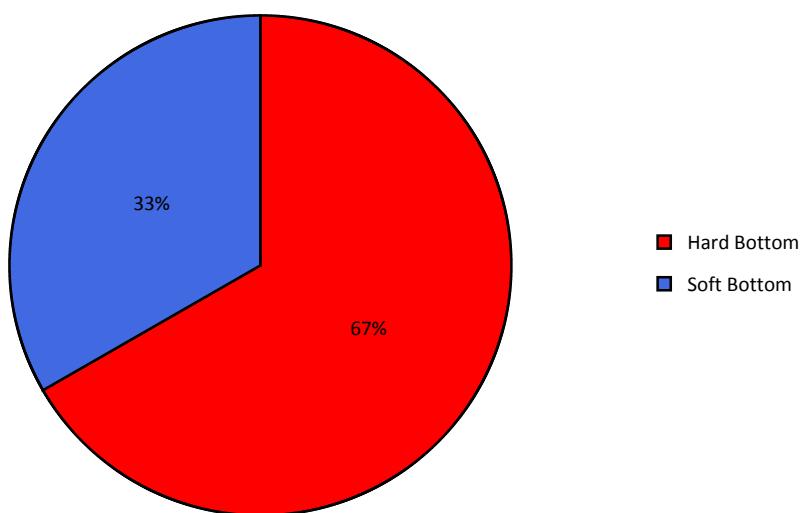


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-11. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

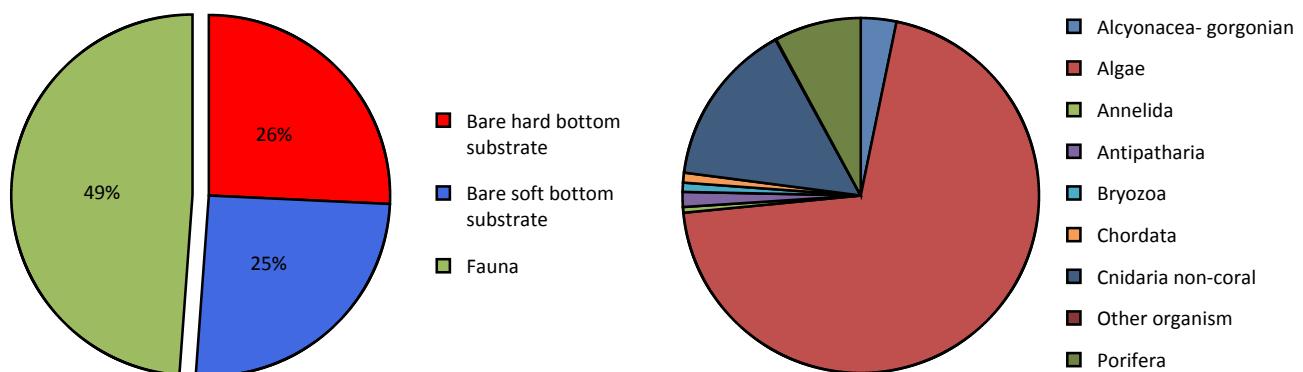


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-11.

Dive Site: ROV 13-11; S. Carolina, North of Edisto MPA (inside proposed Edisto Reconfig 3), 52 m NE-SW ridge

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-11.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	1548	48.85%
Algae	1087	34.30%
Corallinales/crustose coralline	56	1.77%
Cyanophyta	4	0.13%
Phaeophyta	702	22.15%
Rhodophyta	325	10.26%
Porifera	122	3.85%
Aiolochroia crassa	3	0.09%
Aplysina sp.	1	0.03%
Clathria sp.	1	0.03%
Demospongiae	82	2.59%
Demospongiae- ze tan starlet	10	0.32%
Dictyoceratida	1	0.03%
Ircinia sp.	3	0.09%
Niphates sp.	2	0.06%
Scopalina sp.	1	0.03%
Spirastrellidae	17	0.54%
Zyzya sp.	1	0.03%
Alcyonacea- gorgonian	50	1.58%
Diodogorgia sp.	25	0.79%
Ellisella sp.	6	0.19%
Ellisellidae	3	0.09%
Gorgonacea	9	0.28%
Leptogorgia	3	0.09%
Swiftia exerta	1	0.03%
Telesto/Carijoa	2	0.06%
Titanideum frauenfeldii	1	0.03%
Antipatharia	21	0.66%
Antipatharia	12	0.38%
Antipatharia atlantica	1	0.03%
Stichopathes lutkeni	5	0.16%
Tanacetipathes hirta	3	0.09%
Cnidaria non-coral	232	7.32%
Corallimorpharia	1	0.03%
Hydroidolina	231	7.29%
Annelida	8	0.25%
Filograna sp.	4	0.13%

Dive Site: ROV 13-11; S. Carolina, North of Edisto MPA (inside proposed Edisto Reconfig 3), 52 m NE-SW ridge

Sabellidae	4	0.13%
Bryozoa	13	0.41%
Bryozoa	1	0.03%
Schizoporella sp.	12	0.38%
Chordata	14	0.44%
Ascidacea	4	0.13%
Didemnidae	3	0.09%
Fish	7	0.22%
Other organism	1	0.03%
Other organism	1	0.03%
Soft bottom substrate	805	25.40%
Soft bottom substrate	805	25.40%
Bare soft bottom substrate	805	25.40%
Hard bottom substrate	816	25.75%
Hard bottom substrate	816	25.75%
Bare rock- pavement boulder ledge	793	25.02%
Bare rubble- rock	23	0.73%
Grand Total	3169	100.00%

Dive Site: ROV 13-11; S. Carolina, North of Edisto MPA (inside proposed Edisto Reconfig 3), 52 m NE-SW ridge

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-11.

Scientific Name	Common Name	13-11
<i>Acanthurus</i> sp.	doctorfish	2.03
<i>Balistes capriscus</i>	grey triggerfish	1.8
<i>Bodianus pulchellus</i>	spotfin hogfish	37.88
<i>Bodianus rufus</i>	spanish hogfish	0.9
<i>Calamus</i> sp.	porgy	19.62
<i>Canthigaster rostrata</i>	sharpnose puffer	26.16
<i>Centropristes ocyurus</i>	bank sea bass	0.23
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	4.74
<i>Chaetodon sedentarius</i>	reef butterflyfish	40.81
<i>Chaetodon</i> sp.	butterflyfish	1.58
<i>Chromis cyaneus</i>	blue chromis	1.58
<i>Chromis enchrysurus</i>	yellowtail reefish	38.78
<i>Chromis insolatus</i>	sunshinefish	13.08
<i>Chromis scotti</i>	purple reefish	117.7
<i>Chromis</i> sp.	damselish	13.3
<i>Diodon</i> sp.	puffer	0.9
<i>Epinephelus cruentatus</i>	graysby	3.61
<i>Fistularia petimba</i>	red cornetfish	0.23
<i>Fistularia</i> sp.	cornetfish	0.68
<i>Fistularia tabacaria</i>	bluespotted cornetfish	0.45
<i>Haemulon aurolineatum</i>	tomtate	2713.19
<i>Haemulon melanurum</i>	cottonwick	0.23
<i>Haemulon</i> sp.	grunt	22.55
<i>Haemulon striatum</i>	striped grunt	228.86
<i>Halichoeres garnoti</i>	yellowhead wrasse	2.25
<i>Halichoeres</i> sp.	wrasse	13.53
<i>Holacanthus bermudensis</i>	blue angelfish	29.76
<i>Holacanthus tricolor</i>	rock beauty	0.68
<i>Holocentrus</i> sp.	squirrelfish	20.97
<i>Lachnolaimus maximus</i>	hogfish	1.58
<i>Lactophrys polygona</i>	honeycomb cowfish	0.45
<i>Lactophrys</i> sp.	cowfish	5.64
<i>Liopropoma eukrines</i>	wrasse bass	1.13
<i>Malacanthus plumieri</i>	sand tilefish	1.13
<i>Monacanthus</i> sp.	filefish	0.23
<i>Mycteroperca phenax</i>	scamp	11.95
<i>Mycteroperca</i> sp.	grouper	0.45
<i>Myripristis jacobus</i>	blackbar soldierfish	1.35

Dive Site: ROV 13-11; S. Carolina, North of Edisto MPA (inside proposed Edisto Reconfig 3), 52 m NE-SW ridge

<i>Pagrus pagrus</i>	red porgy	6.54
<i>Pareques umbrosus</i>	cubbyu	11.95
<i>Pomacanthus paru</i>	french angelfish	0.68
<i>Pomacanthus</i> sp.	angelfish	0.23
<i>Priacanthus arenatus</i>	bigeye	0.9
<i>Pristigenys alta</i>	short bigeye	3.16
<i>Prognathodes aya</i>	bank butterflyfish	3.83
<i>Pseudupeneus maculatus</i>	spotted goatfish	3.83
<i>Pterois volitans</i>	lionfish	35.63
<i>Rhomboplites aurorubens</i>	vermillion snapper	439.68
<i>Seriola dumerili</i>	greater amberjack	0.23
<i>Seriola rivoliana</i>	almaco jack	1.13
<i>Seriola</i> sp.	amberjack	0.23
<i>Serranus annularis</i>	orangeback bass	0.23
<i>Serranus notospilus</i>	saddle bass	0.45
<i>Serranus phoebe</i>	tattler	5.41
<i>Serranus</i> sp.	sea bass	0.23
Sparidae	porgy	16.01
<i>Sparisoma atomarium</i>	greenblotch parrotfish	0.9
<i>Sparisoma aurofrenatum</i>	redband parrotfish	0.68
<i>Sparisoma chrysopterum</i>	redtail parrotfish	0.23
<i>Sphoeroides spengleri</i>	bandtail puffer	1.8
<i>Sphyraena barracuda</i>	great barracuda	0.45
<i>Stegastes partitus</i>	bicolor damselfish	0.23
<i>Stephanolepis hispidus</i>	planehead filefish	0.9
<i>Tautoga onitis</i>	tautog	0.45

Dive Site: ROV 13-12; S. Carolina, Proposed Charleston Shelf MPA, 52 m hard bottom terrace

General Location and Dive Track:

**NOAA Ship Pisces Cruise 13-03
South Carolina, Charleston Shelf-
Proposed MPA
5-VII-13-3; ROV 13-12**

★ ROV 13-12

★ ROV Dives

★ CTD

■ MPA

■ Deep Coral HAPC

■ Proposed MPA 2013

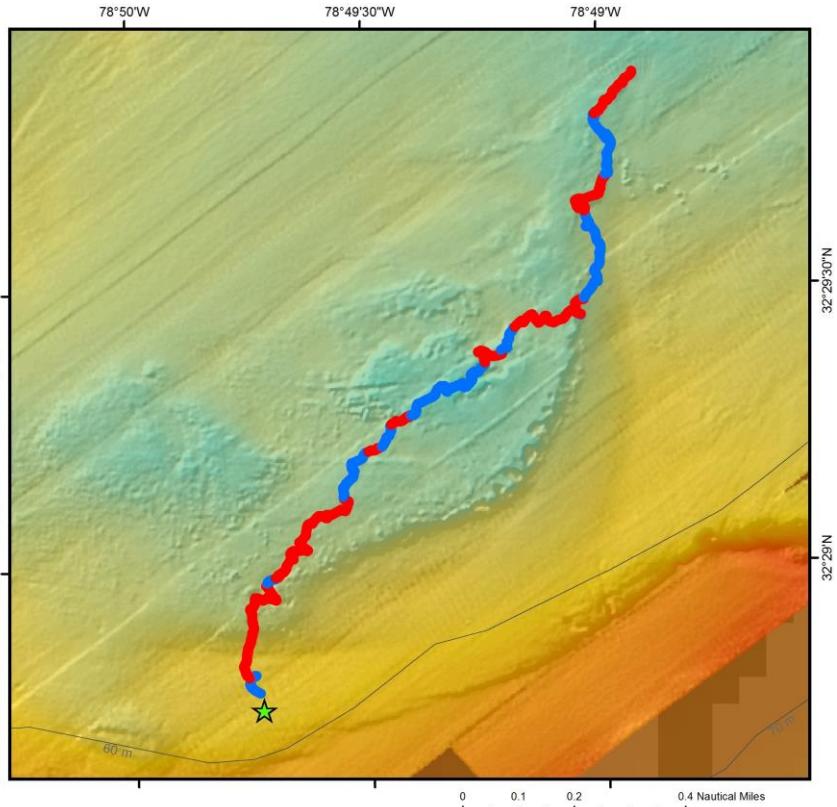
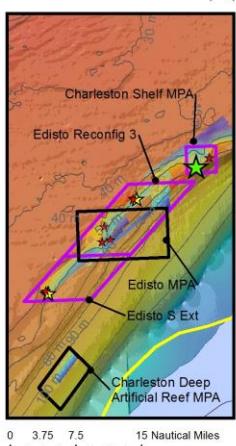
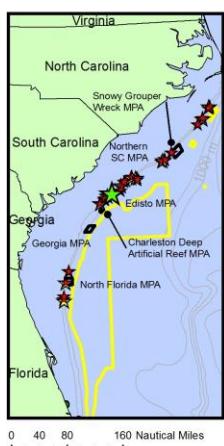
— Bathymetry Lines (m)

ROV Tracks

● Hard Bottom

● Soft Bottom

● Other ROV Tracks



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	ed2_wgs84
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/5/2013
Specimens:	0
Digital Photos:	89
DVD:	2
Hard Drive:	1

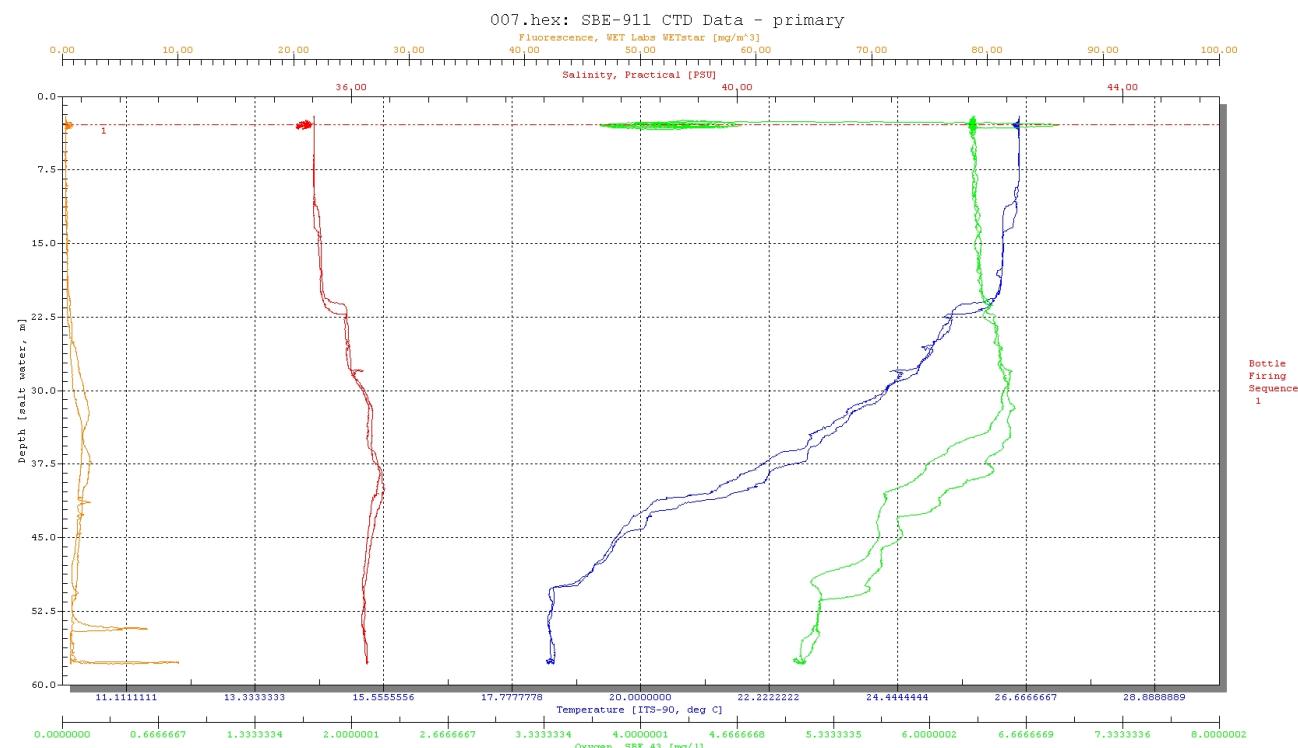
Dive Site: ROV 13-12; S. Carolina, Proposed Charleston Shelf MPA, 52 m hard bottom terrace

Dive Data:

Minimum Bottom Depth (m):	-42	Total Transect Length (km):	2.48
Maximum Bottom Depth (m):	-59	Surface Current (kn):	0.7
On Bottom (Time- GMT):	11:52	On Bottom (Lat/Long):	32.48°N; -78.83°W
Off Bottom (Time- GMT):	13:36	Off Bottom (Lat/Long):	32.5°N; -78.82°W
Physical (bottom); Temp (°C):	19.66	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 14.32



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-12; S. Carolina, Proposed Charleston Shelf MPA, 52 m hard bottom terrace

Dive Imagery:



Figure 1: -49.9 m 32.49 °N; -78.82 °W

Rock hind (*Epinephelus adscensionis*) and sharpnose puffer (*Canthigaster rostrata*) on low relief rock bottom.



Figure 2: -50.8 m 32.50 °N; -78.82 °W

Dense cover of biota on rock pavement; purple seafan (*Diodogorgia* sp.), orange tube bryozoan (*Schizoporella* sp.), green mesh algae (*Microdictyon* sp.), and various demosponges and hydroids.



Figure 3: -51.2 m 32.49 °N; -78.82 °W

School of flying gurnard (*Dactylopterus volitans*).



Figure 4: -49.7 m 32.49 °N; -78.82 °W

Amberjack (*Seriola* sp.) cruising along the rock slope.

Dive Site: ROV 13-12; S. Carolina, Proposed Charleston Shelf MPA, 52 m hard bottom terrace

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-12, UNCW SuperPhantom ROV Dive 2247; Site #- 5-VII-13-3. Target Site - S. Carolina, Proposed Charleston Shelf MPA, 52 m hard bottom terrace. Ground-truth multibeam sonar (2012 Pisces MB: ed2_wgs_84_revised_5_m resolution). Conduct video/photo transect across feature.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 0.7 Kn.

Site Description/Habitat/Biota:

2000 x 500 m relatively low relief flat delta-like, hard bottom terrace with a N-S ridge on the east side of the terrace. Total relief of dive: 8 m ; 58-50 m. Transect N from SE corner slope through middle of terrace to ridge at NE end. Landed 250 m southeast of hard bottom feature. Bottom is flat unconsolidated sediment, 58 m. South slope of the delta is flat pavement. Headed N up the low slope, low relief, low rugosity, rock pavement and sediment with smooth rock knolls with few ledges or undercuts. Looks almost like a spur and groove reef (53 m at base). The rock knolls up to 3-4 m diam, 1-2 m tall, smooth rock slope. Top of feature, on top of the middle terrace zone is smooth pavement with low relief rock knolls, 1 m relief, flat slope, low rugosity, and no ledges (depth 50 m top). Northeast region of the delta is a second flat top terrace (50 m depth); rock pavement, sediment, low relief rock knolls, <.5 m, few or no ledges, and dense biota on all exposed hard bottom. East slope of terrace on Multibeam: top edge, 51 m, pavement, sediment, 1 m ledges and rock knolls and small areas of high rugosity. Base of the slope is 52 m sediment and rubble, slope is ~50. Transected along ridge at NE end of terrace which is apparent in the multibeam: low relief rock ledges/ridges, dense biota with Diodogorgia, Ellisellidae and Sargassum; very few fish on most of the dive.

Dominant Benthic Biota:

Alg - Phaeophyta: Sargassum, Dictyota; Chlorophyta: Ulva; Rhodophyta: Peyssonnelia, Rhodomenia; Ann - Filograna; Bry - Schizoporella; Cho - Ascidiacea: Didemnidae; Cni - Gorgonacea: Swiftia exserta, Diodogorgia, Ellisellidae, Bebryce, Telesto; Hydroidolina: fine white hair and white bushy spp.; Ech - Asteroidea: unid and Narcissia trigonaria; Por - Demospongiae: Ircinia campana, Callyspongia vaginalis, Chondrosia, Cinachyrella, Clathriidae, Spirastrellidae and unid tan cake spp.

Fish:

lionfish - *Pterois volitans* (40); reef butterflyfish - *Chaetodon sedentarius*; tattler - *Serranus phoebe*; squirrelfish - *Holocentrus* sp.; sharpnose puffer - *Canthigaster rostrata*; bank butterflyfish - *Prognathodes aya*; bank butterflyfish - *Prognathodes aya*; spotfin hogfish - *Bodianus pulchellus*; blue angelfish - *Holacanthus bermudensis*; wrasse; short bigeye - *Pristigenys alta*; spotfin butterflyfish - *Chaetodon ocellatus*; triggerfish - *Balistes* sp.; amberjack - *Seriola* sp.; yellowtail reeffish - *Chromis encrysurus*; Calamus porgy - *Calamus* sp.; doctorfish; rock hind - *Epinephelus adscensionis*; bigeye - *Priacanthus arenatus*; cubbyu - *Equetus umbrosus*; Jack-knife fish; tomtate - *Haemulon aurolineatum*; bandtail puffer; flying gurnard; hogfish - *Lachnolaimus maximus*; orangeback bass; purple reeffish - *Chromis scotti*; scamp grouper - *Mycteroperca phenax*; sunshinefish; bank seabass; burrfish; filefish; gray angelfish; porgy - Sparidae; puffer; sand tilefish; white grunt; wrasse bass - *Liopropoma eukrines*; yellowhead wrasse

Dive Site: ROV 13-12; S. Carolina, Proposed Charleston Shelf MPA, 52 m hard bottom terrace

CPCe Percent Cover Analysis:

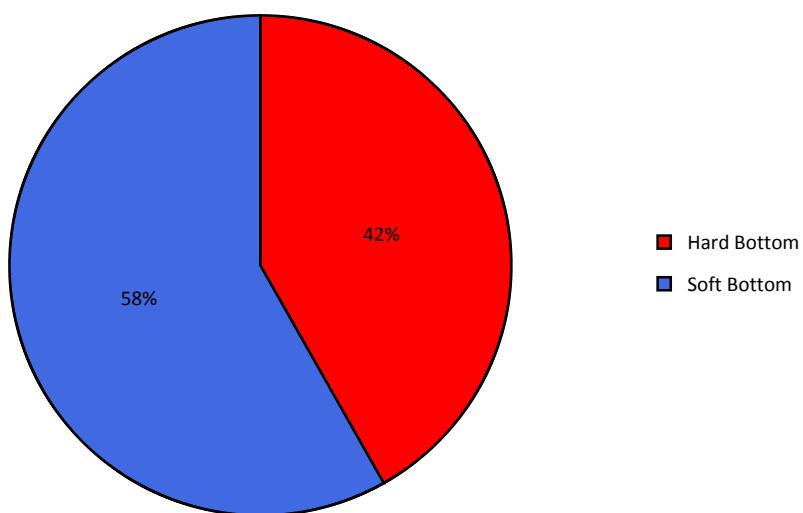


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-12. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

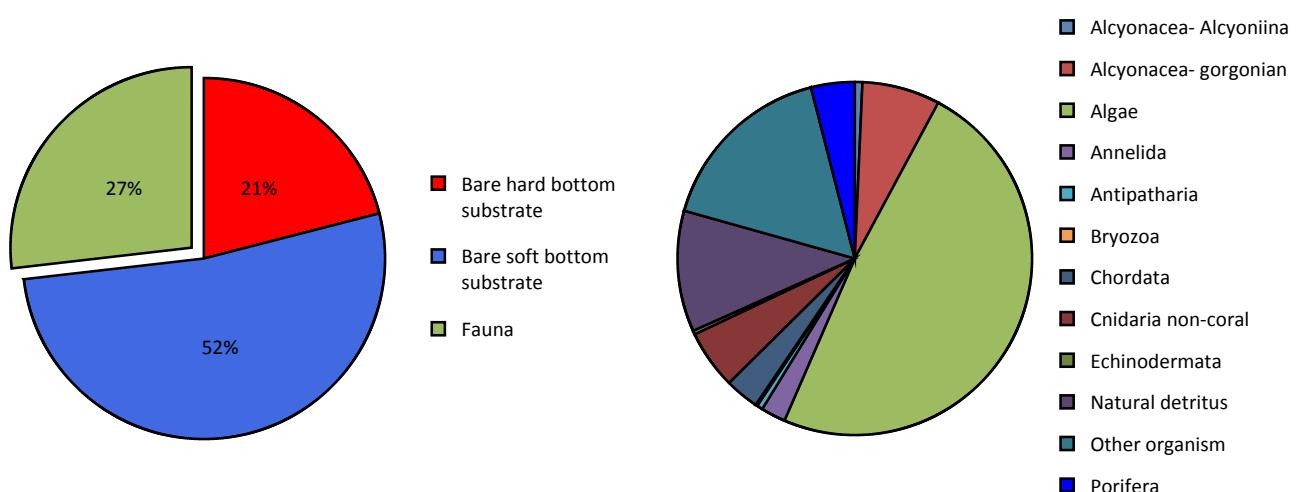


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-12.

Dive Site: ROV 13-12; S. Carolina, Proposed Charleston Shelf MPA, 52 m hard bottom terrace**Percent Cover of Benthic Macro-Biota and Substrate:**

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-12.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	577	26.84%
Algae	281	13.07%
Chlorophyta	24	1.12%
Corallinales/crustose coralline	22	1.02%
Cyanophyta	29	1.35%
Phaeophyta	106	4.93%
Rhodophyta	100	4.65%
Porifera	23	1.07%
Clathria sp.	1	0.05%
Demospongiae	16	0.74%
Demospongiae- ze tan starlet	2	0.09%
Ircinia sp.	1	0.05%
Ircinia strobilina	3	0.14%
Alcyonacea- gorgonian	41	1.91%
Diogorgia sp.	12	0.56%
Ellisella sp.	8	0.37%
Ellisellidae	1	0.05%
Gorgonacea	5	0.23%
Nicella sp.	3	0.14%
Telesto/Carijoa	12	0.56%
Alcyonacea- Alcyoniina	4	0.19%
Alcyonacea	4	0.19%
Antipatharia	3	0.14%
Antipatharia	2	0.09%
Stichopathes lutkeni	1	0.05%
Cnidaria non-coral	31	1.44%
Hydroidolina	31	1.44%
Annelida	13	0.60%
Filograna sp.	13	0.60%
Bryozoa	1	0.05%
Schizoporella sp.	1	0.05%
Echinodermata	2	0.09%
Narcissia trigonaria	2	0.09%
Chordata	18	0.84%
Ascidacea	7	0.33%
Didemnidae	9	0.42%
Fish	2	0.09%

Dive Site: ROV 13-12; S. Carolina, Proposed Charleston Shelf MPA, 52 m hard bottom terrace

Other organism	96	4.47%
Other organism	96	4.47%
Natural detritus	64	2.98%
Natural detritus	64	2.98%
Soft bottom substrate	1122	52.19%
Soft bottom substrate	1122	52.19%
Bare soft bottom substrate	1122	52.19%
Hard bottom substrate	451	20.98%
Hard bottom substrate	451	20.98%
Bare rock- pavement boulder ledge	395	18.37%
Bare rubble- rock	56	2.60%
Grand Total	2150	100.00%

Dive Site: ROV 13-12; S. Carolina, Proposed Charleston Shelf MPA, 52 m hard bottom terrace**Density of Fish:**

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-12.

Scientific Name	Common Name	13-12
<i>Acanthurus</i> sp.	doctorfish	3.18
<i>Balistes capriscus</i>	grey triggerfish	1.91
<i>Balistes</i> sp.	triggerfish	0.64
<i>Balistes vetula</i>	queen triggerfish	1.27
<i>Bodianus pulchellus</i>	spotfin hogfish	8.9
<i>Calamus</i> sp.	porgy	5.72
<i>Canthigaster rostrata</i>	sharpnose puffer	20.02
<i>Centropristes ocyurus</i>	bank sea bass	0.32
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	5.4
<i>Chaetodon sedentarius</i>	reef butterflyfish	29.23
<i>Chilomycterus antennatus</i>	bridled burrfish	0.32
<i>Chilomycterus</i> sp.	burrfish	0.32
<i>Chromis enchrysurus</i>	yellowtail reefish	16.21
<i>Chromis insolatus</i>	sunshinefish	1.27
<i>Chromis scotti</i>	purple reefish	4.45
<i>Chromis</i> sp.	damselfish	2.54
<i>Dactylopterus volitans</i>	flying gurnard	3.5
<i>Epinephelus adscensionis</i>	rock hind	1.27
<i>Epinephelus</i> sp.	grouper	0.32
<i>Equetus lanceolatus</i>	jack-knife fish	0.32
<i>Haemulon aurolineatum</i>	tomate	45.12
<i>Haemulon plumieri</i>	white grunt	0.32
<i>Halichoeres garnoti</i>	yellowhead wrasse	1.59
<i>Halichoeres</i> sp.	wrasse	68.32
<i>Holacanthus bermudensis</i>	blue angelfish	6.04
<i>Holocentrus</i> sp.	squirrelfish	12.71
<i>Lachnolaimus maximus</i>	hogfish	0.95
<i>Liopropoma eukrines</i>	wrasse bass	0.32
<i>Malacanthus plumieri</i>	sand tilefish	0.32
<i>Mycteroperca phenax</i>	scamp	0.64
<i>Pareques umbrosus</i>	cubbyu	45.12
<i>Pomacanthus arcuatus</i>	grey angelfish	0.32
<i>Priacanthus arenatus</i>	bigeye	2.54
<i>Pristigenys alta</i>	short bigeye	6.99
<i>Prognathodes aya</i>	bank butterflyfish	6.99
<i>Pterois volitans</i>	lionfish	13.66
<i>Seriola dumerili</i>	greater amberjack	1.59
<i>Seriola rivoliana</i>	almaco jack	0.32

Dive Site: ROV 13-12; S. Carolina, Proposed Charleston Shelf MPA, 52 m hard bottom terrace

<i>Seriola</i> sp.	amberjack	1.27
<i>Serranus annularis</i>	orangeback bass	2.22
<i>Serranus phoebe</i>	tattler	22.88
<i>Serranus</i> sp.	sea bass	0.32
<i>Sphoeroides spengleri</i>	bandtail puffer	2.22
<i>Stegastes partitus</i>	bicolor damselfish	0.32

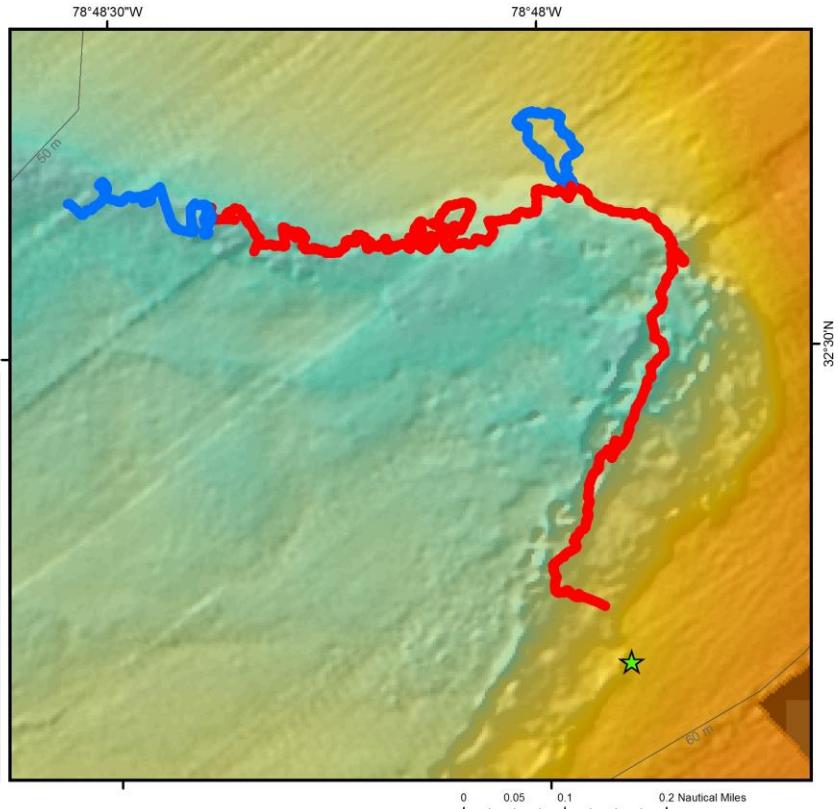
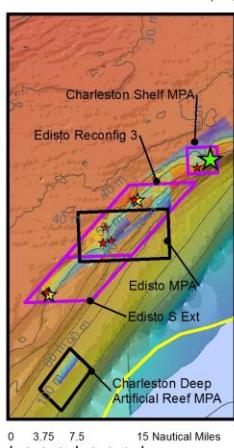
Dive Site: ROV 13-13; S. Carolina, Proposed Charleston Shelf MPA, N and E slopes of Terrace, 52 m

General Location and Dive Track:

**NOAA Ship Pisces Cruise 13-03
South Carolina, Charleston Shelf-
Proposed MPA
5-VII-13-4; ROV 13-13**

ROV Tracks
 ● Hard Bottom
 ● Soft Bottom
 • Other ROV Tracks

- ★ ROV 13-13
- ★ ROV Dives
- ★ CTD
- MPA
- Deep Coral HAPC
- Proposed MPA 2013
- Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	ed2_wgs84
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/5/2013
Specimens:	0
Digital Photos:	114
DVD:	2
Hard Drive:	1

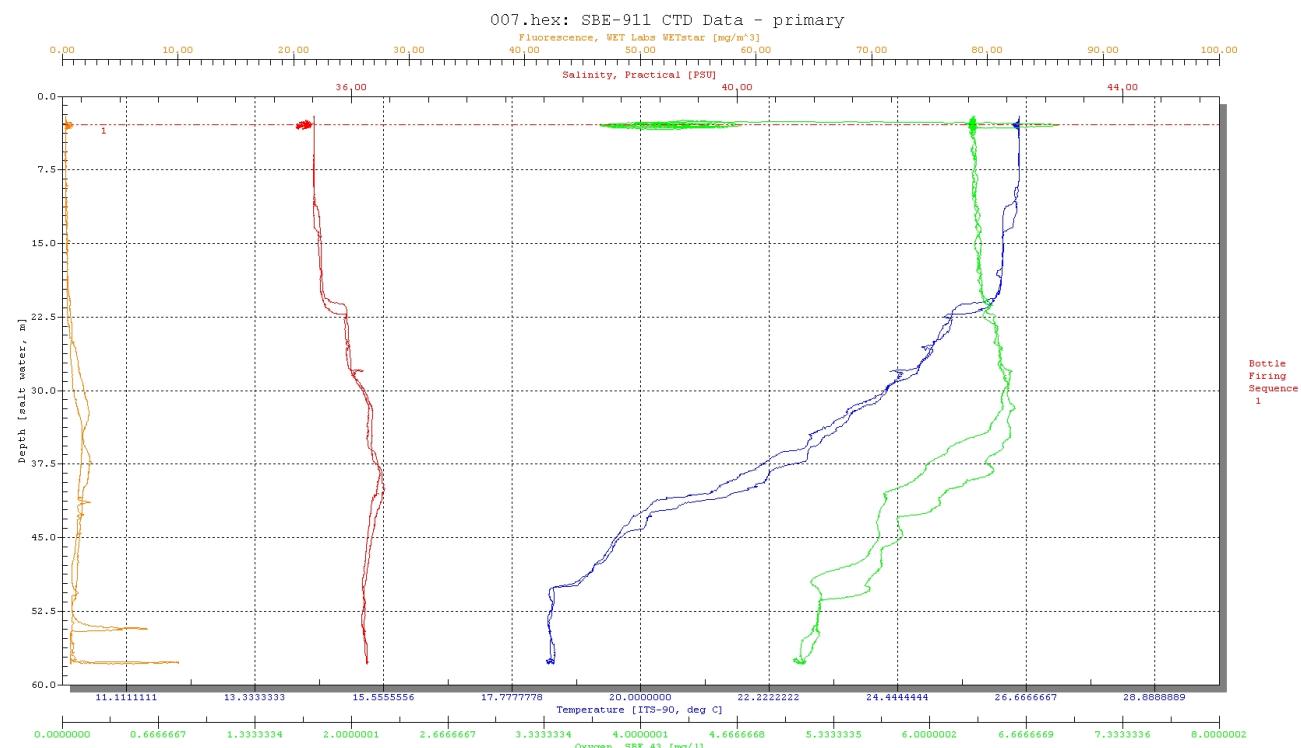
Dive Site: ROV 13-13; S. Carolina, Proposed Charleston Shelf MPA, N and E slopes of Terrace, 52 m

Dive Data:

Minimum Bottom Depth (m):	-45	Total Transect Length (km):	1.20
Maximum Bottom Depth (m):	-57	Surface Current (kn):	0.6
On Bottom (Time- GMT):	14:15	On Bottom (Lat/Long):	32.5°N; -78.8°W
Off Bottom (Time- GMT):	16:08	Off Bottom (Lat/Long):	32.5°N; -78.81°W
Physical (bottom); Temp (°C):	18.13	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	0

Physical Environment:

Distance from Dive Site(km): 17.66



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-13; S. Carolina, Proposed Charleston Shelf MPA, N and E slopes of Terrace, 52 m

Dive Imagery:



Figure 1: -49.7 m 32.50 °N; -78.80 °W

Squirrelfish (*Holocentrus* sp.) on low relief rock bottom with dense encrustations of hydroids, various demosponges including purple cake sponges (*Ircinia strobilina*), and orange horn bryozoans (*Schizoporella* sp.).



Figure 2: -50.8 m 32.50 °N; -78.80 °W

School of bluespotted cornetfish (*Fistularia tabacaria*) with blue angelfish (*Holacanthus bermudensis*) on low relief rock bottom.



Figure 3: -49.3 m 32.50 °N; -78.80 °W

School of tomtates (*Haemulon aurolineatum*) packed in forereef ledges along with graysby grouper (*Cephalopholis cruentata*).



Figure 4: -48.7 m 32.50 °N; -78.81 °W

Large purple *Muricea* sp. seafan.

Dive Site: ROV 13-13; S. Carolina, Proposed Charleston Shelf MPA, N and E slopes of Terrace, 52 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-13, UNCW SuperPhantom ROV Dive 2248; Site #- 5-VII-13-4. Target Site - S. Carolina, Proposed Charleston Shelf MPA 52 m hard bottom terrace. Ground-truth multibeam sonar (2012 Pisces MB: ed2_wgs_84_revised_5_m resolution). Conduct video/photo transect across feature.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 0.6 Kn.

Site Description/Habitat/Biota:

580 x 1350 m plateau with a distinct eastern and northern slopes. Total relief: 5 m; 51-56 m. East slope is low sloped pavement with small areas of rugged, moderate relief rock ledges, 1-2 m, and narrow zone of high rugosity along top edge. The ridge top of the eastern ledge are rock knolls 1-2 m tall (50 m on top 52 on bottom). The east slope is a double ridge system; one portion with sheer, vertical 3 m drop off, moderate to high relief, and high rugosity (49 - 54 m). Transect continued around curve at NE end of the terrace. The north slope top is rock ledge, 1 m relief, undercut, and high rugosity at the edge, 10o slope. Small rock boulders below the ledge on the slope. 56 m at the base of the N wall. Base of N slope is scattered boulders, 0 .5 m relief tapering off to sediment to the north. Northern ledge slowly tapers off to the west as well, becoming sediment and small scattered rock boulders at the end of the dive. Some areas of high rugosity with dense schools of tomate and gag grouper common.

Dominant Benthic Biota:

Alg - Phaeophyta: *Dictyota* sp., *Sargassum* sp.; Chlorophyta: *Ulva* sp.; Ann - Filigrana; Art - Decapoda: *Panulirus argus*; Cho - Ascidiacea: Didemnidae; Cni - Gorgonacea: *Diodogorgia* sp., *Swiftia exserta*, Ellisellidae, *Nicella* sp., *Ellisella barbadensis*, *Telesto* sp.; Cni - Hydroidolina: black bushy, fine white hair; Por - Demospongiae: *Ircinia campana*, *Callyspongia vaginalis*, *Cinachyrella* sp., *Geodia* spp.

Fish:

lionfish - *Pterois volitans* (21); reef butterflyfish - *Chaetodon sedentarius*; scamp grouper - *Mycteroperca phenax*; spotfin hogfish - *Bodianus pulchellus*; squirrelfish - *Holocentrus* sp.; blue angelfish - *Holacanthus bermudensis*; blue angelfish - *Holacanthus bermudensis*; tomate - *Haemulon aurolineatum*; bank butterflyfish - *Prognathodes aya*; sharpnose puffer - *Canthigaster rostrata*; Calamus porgy - *Calamus* sp.; purple reefish - *Chromis scotti*; yellowtail reefish - *Chromis encrysurus*; amberjack - *Seriola* sp.; sunshinefish; tattler - *Serranus phoebe*; *Mycteroperca* sp.; short bigeye - *Pristigenys alta*; cubbyu - *Equetus umbrosus*; gag grouper - *Mycteroperca microlepis*; spotfin butterflyfish - *Chaetodon ocellatus*; bigeye - *Priacanthus arenatus*; cowfish - *Lactophrys* sp.; graysby grouper - *Epinephelus cruentatus*; greenblotch parrotfish; yellowhead wrasse; flying gurnard; gray angelfish; gray triggerfish; hogfish - *Lachnolaimus maximus*; rock beauty - *Holacanthus tricolor*; spotted goatfish; wrasse; bluespotted cornetfish; cornetfish; doctorfish; white grunt; blackbar soldierfish - *Myripristis jacobus*; blackfin snapper; burrfish; creole-fish; french angelfish - *Pomacanthus paru*; greater soapfish; grouper; porgy - Sparidae; razorfish; rock hind - *Epinephelus adscensionis*; stingray; vermilion snapper - *Rhomboplites aurorubens*; wrasse bass - *Liopropoma eukrines*; yellowmouth grouper

Dive Site: ROV 13-13; S. Carolina, Proposed Charleston Shelf MPA, N and E slopes of Terrace, 52 m

CPCe Percent Cover Analysis:

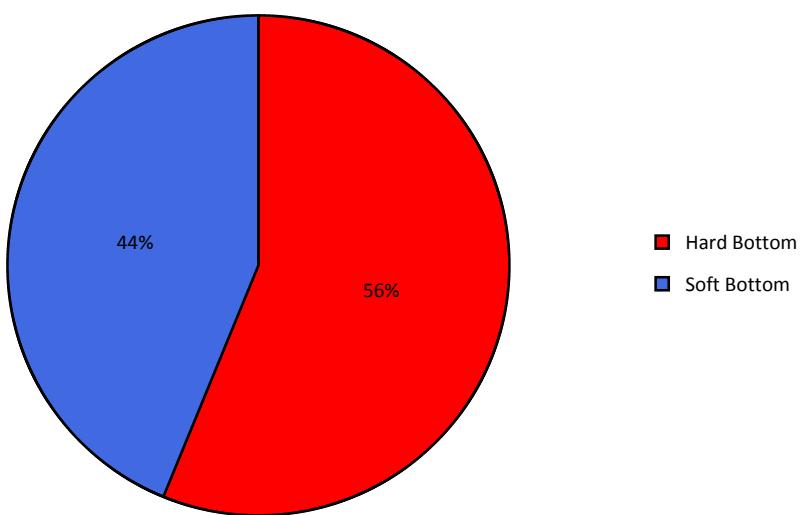


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-13. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

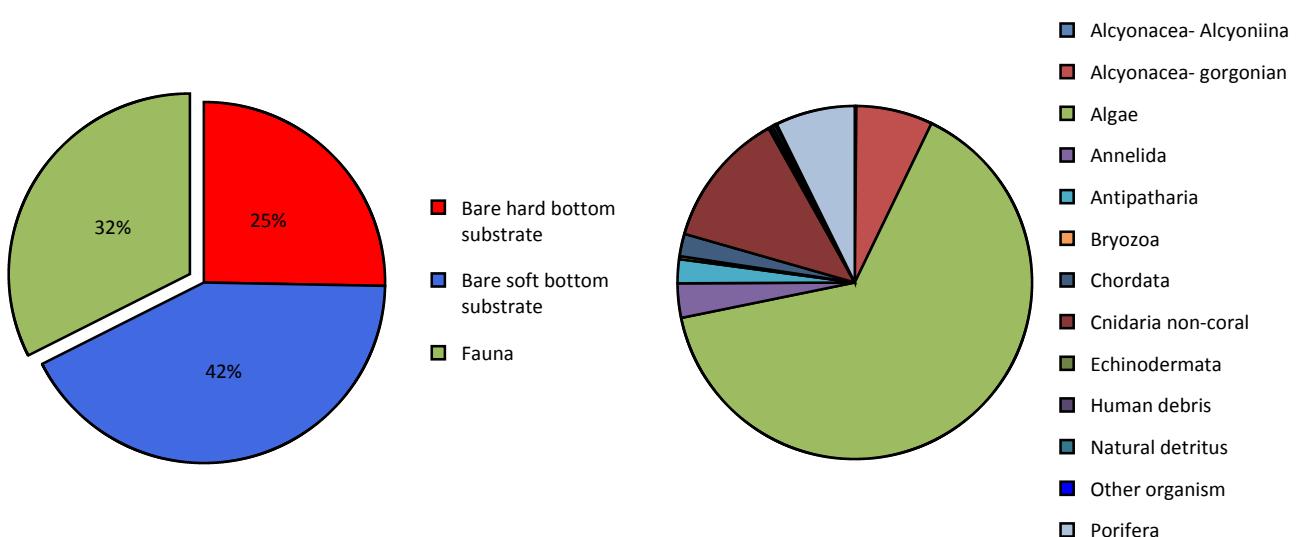


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-13.

Dive Site: ROV 13-13; S. Carolina, Proposed Charleston Shelf MPA, N and E slopes of Terrace, 52 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-13.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	728	32.36%
Algae	472	20.98%
Chlorophyta	33	1.47%
Corallinales/crustose coralline	50	2.22%
Cyanophyta	12	0.53%
Phaeophyta	184	8.18%
Rhodophyta	193	8.58%
Porifera	53	2.36%
Agelas sp.	3	0.13%
Aiolochroia crassa	11	0.49%
Callyspongia sp.	2	0.09%
Chondrosia sp.	1	0.04%
Demospongiae	27	1.20%
Demospongiae- ze tan starlet	3	0.13%
Ircinia sp.	1	0.04%
Ircinia strobilina	1	0.04%
Spirastrellidae	4	0.18%
Alcyonacea- gorgonian	51	2.27%
Diogorgia sp.	9	0.40%
Ellisella sp.	4	0.18%
Ellisellidae	4	0.18%
Gorgonacea	30	1.33%
Leptogorgia	2	0.09%
Telesto/Carijoa	1	0.04%
Titanideum frauenfeldii	1	0.04%
Alcyonacea- Alcyoniina	1	0.04%
Anthomastus	1	0.04%
Antipatharia	16	0.71%
Antipatharia	9	0.40%
Stichopathes lutkeni	4	0.18%
Tanacetipathes hirta	3	0.13%
Cnidaria non-coral	91	4.04%
Fam- Zoanthidae	2	0.09%
Hydroidolina	89	3.96%
Annelida	23	1.02%
Filograna sp.	23	1.02%
Bryozoa	2	0.09%

Dive Site: ROV 13-13; S. Carolina, Proposed Charleston Shelf MPA, N and E slopes of Terrace, 52 m

Schizoporella sp.	2	0.09%
Echinodermata	1	0.04%
Crinoidea	1	0.04%
Chordata	15	0.67%
Asciidiacea	6	0.27%
Didemnidae	1	0.04%
Fish	8	0.36%
Other organism	1	0.04%
Other organism	1	0.04%
Natural detritus	2	0.09%
Natural detritus	2	0.09%
Soft bottom substrate	951	42.27%
Soft bottom substrate	951	42.27%
Bare soft bottom substrate	951	42.27%
Hard bottom substrate	569	25.29%
Hard bottom substrate	569	25.29%
Bare rock- pavement boulder ledge	520	23.11%
Bare rubble- rock	49	2.18%
Human debris	2	0.09%
Human debris	2	0.09%
Human debris- other	2	0.09%
Grand Total	2250	100.00%

Dive Site: ROV 13-13; S. Carolina, Proposed Charleston Shelf MPA, N and E slopes of Terrace, 52 m

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-13.

Scientific Name	Common Name	13-13
<i>Acanthurus</i> sp.	doctorfish	0.53
<i>Aulostomus maculatus</i>	trumpetfish	0.26
<i>Balistes capriscus</i>	grey triggerfish	4.2
<i>Bodianus pulchellus</i>	spotfin hogfish	23.12
<i>Bodianus rufus</i>	spanish hogfish	0.26
<i>Calamus</i> sp.	porgy	21.8
<i>Canthigaster rostrata</i>	sharpnose puffer	15.76
<i>Chaetodipterus faber</i>	spadefish	0.26
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	9.98
<i>Chaetodon sedentarius</i>	reef butterflyfish	42.29
<i>Chromis cyaneus</i>	blue chromis	0.26
<i>Chromis enchrysurus</i>	yellowtail reefish	11.56
<i>Chromis insolatus</i>	sunshinefish	8.14
<i>Chromis scotti</i>	purple reefish	20.49
<i>Chromis</i> sp.	damselfish	22.33
<i>Dactylopterus volitans</i>	flying gurnard	2.1
<i>Diodon holocanthus</i>	balloonfish	0.26
<i>Epinephelus adscensionis</i>	rock hind	0.53
<i>Epinephelus cruentatus</i>	graysby	0.79
<i>Epinephelus drummondhayi</i>	speckled hind	0.26
<i>Fistularia petimba</i>	red cornetfish	0.26
<i>Fistularia</i> sp.	cornetfish	0.79
<i>Fistularia tabacaria</i>	bluespotted cornetfish	1.84
<i>Haemulon aurolineatum</i>	tomtate	3324.67
<i>Haemulon plumieri</i>	white grunt	0.53
<i>Haemulon striatum</i>	striped grunt	5.25
<i>Halichoeres garnoti</i>	yellowhead wrasse	4.47
<i>Halichoeres</i> sp.	wrasse	16.55
<i>Hemipteronotus novacula</i>	pearly razorfish	0.26
<i>Holacanthus bermudensis</i>	blue angelfish	15.24
<i>Holacanthus tricolor</i>	rock beauty	0.79
<i>Holocentrus</i> sp.	squirrelfish	39.66
<i>Lachnolaimus maximus</i>	hogfish	0.79
<i>Lactophrys quadricornis</i>	scrawled cowfish	0.26
<i>Lactophrys</i> sp.	cowfish	0.53
<i>Liopropoma eukrines</i>	wrasse bass	0.26
<i>Lujanus buccanella</i>	blackfin snapper	0.26
<i>Mycteroperca interstitialis</i>	yellowmouth grouper	0.26

Dive Site: ROV 13-13; S. Carolina, Proposed Charleston Shelf MPA, N and E slopes of Terrace, 52 m

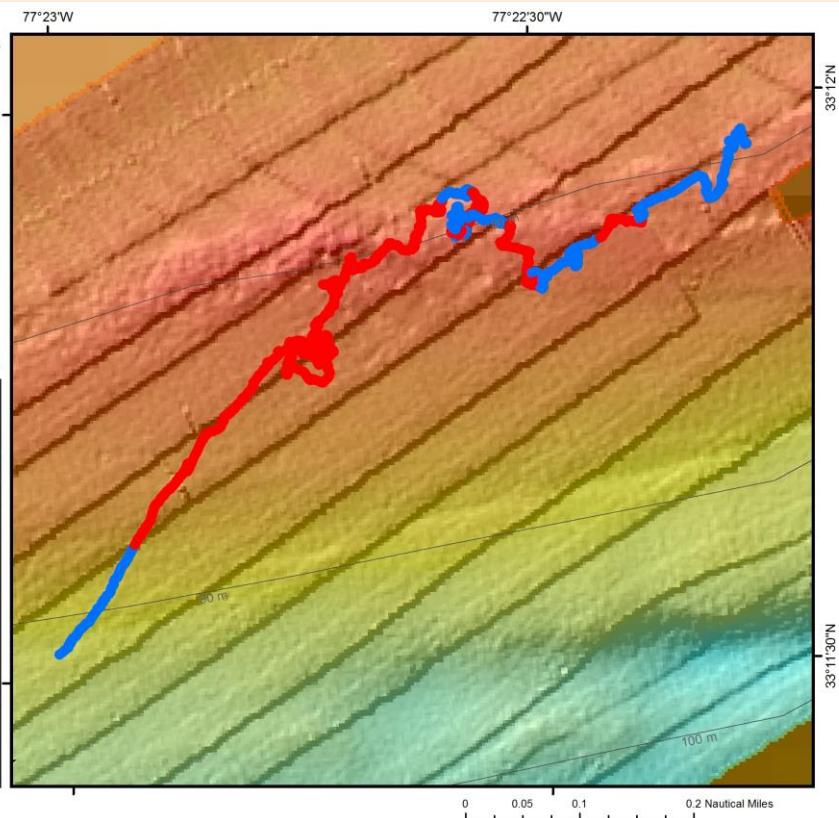
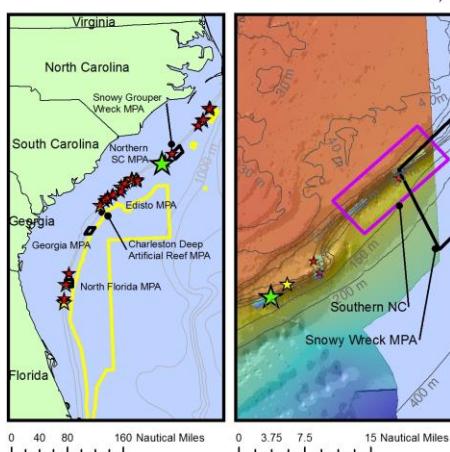
<i>Mycteroperca microlepis</i>	gag grouper	2.1
<i>Mycteroperca phenax</i>	scamp	8.93
<i>Mycteroperca</i> sp.	grouper	1.58
<i>Myripristis jacobus</i>	blackbar soldierfish	2.89
<i>Pareques umbrosus</i>	cubbyu	43.08
<i>Pomacanthus arcuatus</i>	grey angelfish	0.53
<i>Pomacanthus paru</i>	french angelfish	0.26
<i>Pomacanthus</i> sp.	angelfish	0.26
<i>Priacanthus arenatus</i>	bigeye	1.05
<i>Pristigenys alta</i>	short bigeye	4.99
<i>Prognathodes aya</i>	bank butterflyfish	4.73
<i>Pseudupeneus maculatus</i>	spotted goatfish	1.05
<i>Pterois volitans</i>	lionfish	6.83
<i>Rhomboplites aurorubens</i>	vermillion snapper	6.3
<i>Rypticus saponaceus</i>	greater soapfish	0.26
<i>Scorpaenidae</i>	scorpionfish	0.26
<i>Seriola dumerili</i>	greater amberjack	2.89
<i>Seriola rivoliana</i>	almaco jack	12.08
<i>Seriola</i> sp.	amberjack	6.83
<i>Serranus annularis</i>	orangeback bass	0.26
<i>Serranus phoebe</i>	tattler	7.09
<i>Sparisoma atomarium</i>	greenblotch parrotfish	1.05
<i>Sphoeroides spengleri</i>	bandtail puffer	0.53
<i>Stegastes partitus</i>	bicolor damselfish	0.79

Dive Site: ROV 13-14; N. Carolina, South and outside of N. Carolina MPA, low relief hard bottom, 70 m

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
North Carolina, Outside of N. Carolina MPA-
No Protection
6-VII-13-2; ROV 13-14

- ★ ROV 13-14
 - ★ ROV Dives
 - ★ CTD
 - ROV Tracks**
 - Hard Bottom
 - Soft Bottom
 - Other ROV Tracks
- MPA
■ Deep Coral HAPC
■ Proposed MPA 2013
— Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	capehope_4m_col
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/6/2013
Specimens:	0
Digital Photos:	64
DVD:	2
Hard Drive:	1

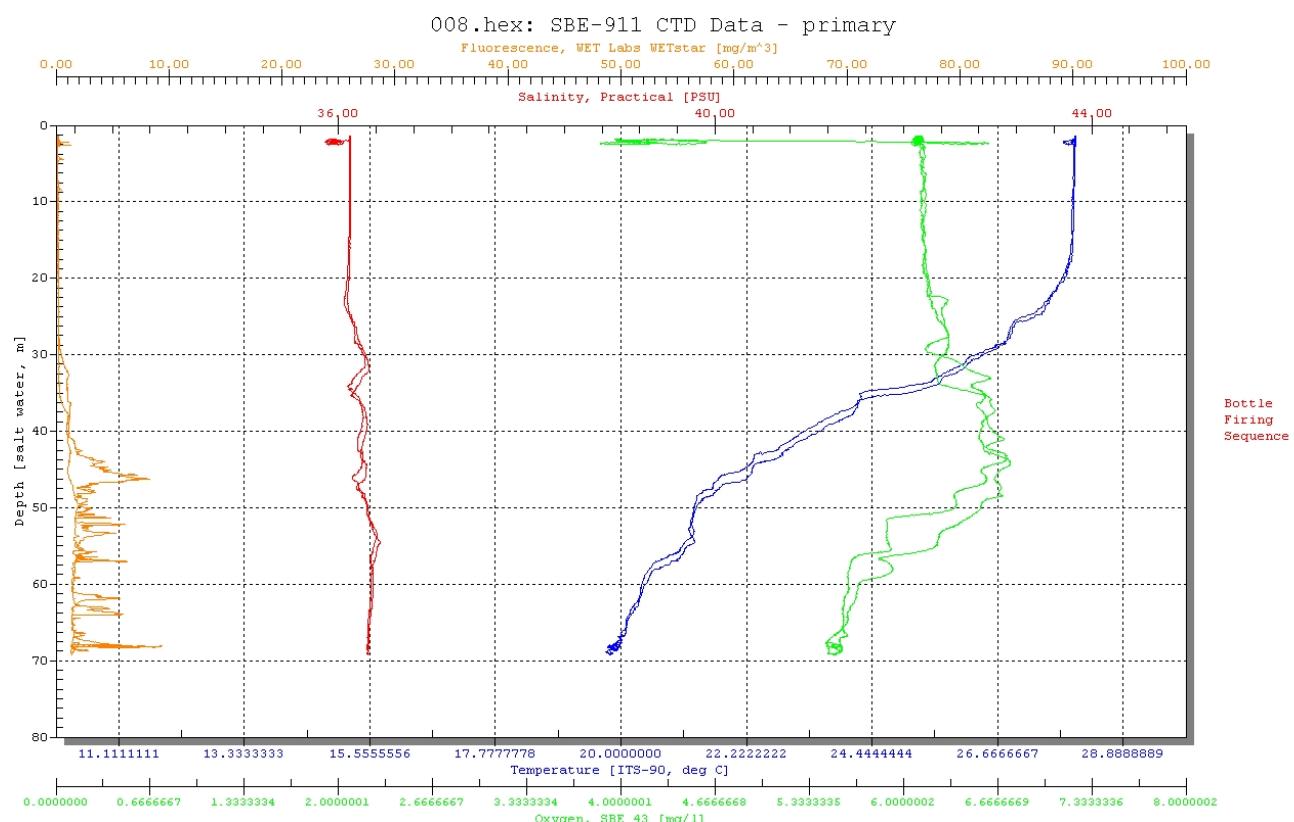
Dive Site: ROV 13-14; N. Carolina, South and outside of N. Carolina MPA, low relief hard bottom, 70 m

Dive Data:

Minimum Bottom Depth (m):	-60	Total Transect Length (km):	1.21
Maximum Bottom Depth (m):	-83	Surface Current (kn):	2
On Bottom (Time- GMT):	8:23	On Bottom (Lat/Long):	33.19°N; -77.38°W
Off Bottom (Time- GMT):	9:58	Off Bottom (Lat/Long):	33.2°N; -77.37°W
Physical (bottom); Temp (°C):	19.29	Salinity:	N/A
		Visibility (ft):	45
		Current (kn):	0.25

Physical Environment:

Distance from Dive Site(km): 4.34



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m3). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-14; N. Carolina, South and outside of N. Carolina MPA, low relief hard bottom, 70 m

Dive Imagery:



Figure 1: -67.2 m 33.20 °N; -77.37 °W

Schools of fish at base of reef: creole-fish (*Paranthias furcifer*), reef butterflyfish (*Chaetodon sedentarius*), spotfin butterflyfish (*Chaetodon ocellatus*), spotfin hogfish (*Bodianus pulchellus*), and doctorfish (*Acanthurus* sp.).



Figure 2: -69.7 m 33.20 °N; -77.37 °W

Blue angelfish (*Holacanthus bermudensis*) on patchy rock bottom with *Diodogorgia* sp. gorgonians.



Figure 3: -67.8 m 33.20 °N; -77.38 °W

Pair of rock beauty (*Holacanthus tricolor*) with cubbyu (*Equetus umbrosus*) under low relief rock ledge.



Figure 4: -67 m 33.20 °N; -77.37 °W

Dense school of cubbyu (*Equetus umbrosus*) with blue angelfish (*Holacanthus bermudensis*) and creole-fish (*Paranthias furcifer*) under low relief rock slabs.

Dive Site: ROV 13-14; N. Carolina, South and outside of N. Carolina MPA, low relief hard bottom, 70 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-14, 6-VII-13-2, UNCW SuperPhantom Dive 2249; Site #- 6-VII-13-2. Target Site - N. Carolina, South and outside of N. Carolina MPA, low relief hard bottom, 70 m. Ground-truth multibeam sonar (2012 Pisces MB: capehope_4m_col.tif). Conduct video/photo transect across feature.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 2.0 Kn.

Site Description/Habitat/Biota:

Multibeam appears as flat relief, hard bottom, small patches of low relief (purple area on MB). Landed in sediment 500 m south of target site. Top of feature is flat, 5-20% cover of patchy exposed hard bottom, rock pavement with sediment veneer, alternating with sediment areas, bottom flat, slope 0-5°, with no ledges, excavated rock pits around the bigeye burrow. Hardbottom dominated by sparse Stichopathes, hydroids, small gorgonians, and bigeyes. Few small patch reefs, 10-20m m diameter, low relief, flat, flat rock slabs 0.25-0.5 m relief ledges. Fish at these sites. Never made it to the WP feature of the MB. NNE of the target area, the bottom is 90% soft bottom with few patches of hard bottom. Large area of sediment to the east changes to a small patch reef, pavement, low relief rock knolls 0.25 - 0.5 m relief ledges with undercuts and larger fish assemblages (68 m deep). No difference is apparent in the MB between flat sand bottom and the low relief patch reefs, or pavement bottom.

Dominant Benthic Biota:

Alg - Rhodophyta: Peyssonnelia; Cni - Gorgonacea: *Diogogorgia* sp., Ellisellidae, *Ellisella barbadensis*, *Nicella* sp., *Swiftia exserta*; Hydroidolina: unid black bushy, unid white bushy; Ech - Asteroidea: *Narcissia trigonaria*, *Luidia alternata*, *Asteropora annulata*; Por - Demospongiae unid.

Fish:

tattler - *Serranus phoebe*; lionfish - *Pterois volitans* (13); short bigeye - *Pristigenys alta*; blue angelfish - *Holacanthus bermudensis*; bigeye - *Priacanthus arenatus*; cubbyu - *Equetus umbrosus*; doctorfish; reef butterflyfish - *Chaetodon sedentarius*; rock beauty - *Holacanthus tricolor*; amberjack - *Seriola* sp.; creole-fish; sharpnose puffer - *Canthigaster rostrata*; soapfish - *Rypticus* sp.; spotfin butterflyfish - *Chaetodon ocellatus*; spotfin hogfish - *Bodianus pulchellus*; bandtail puffer; gray triggerfish; graysby grouper - *Epinephelus cruentatus*; hogfish - *Lachnolaimus maximus*; *Mycteroperca* sp.; porgy - Sparidae; sargassum triggerfish; scamp grouper - *Mycteroperca phenax*; squirrelfish - *Holocentrus* sp.; yellowtail reefish - *Chromis ochrysurus*

Dive Site: ROV 13-14; N. Carolina, South and outside of N. Carolina MPA, low relief hard bottom, 70 m

CPCe Percent Cover Analysis:

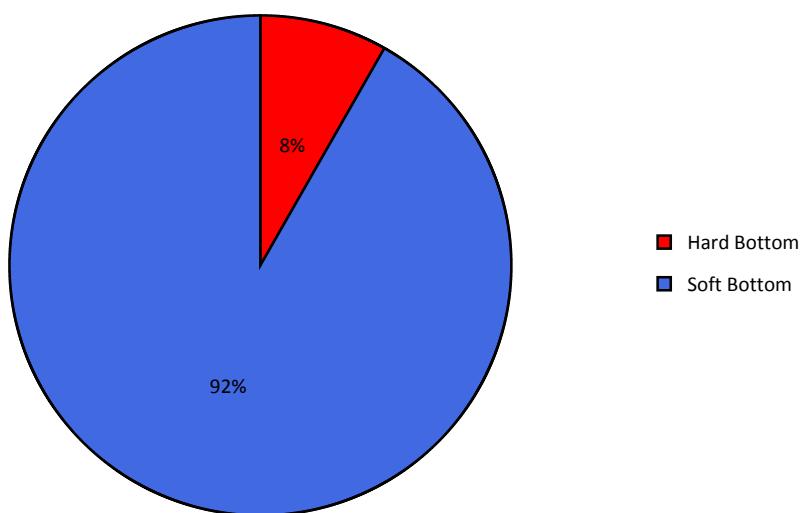


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-14. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

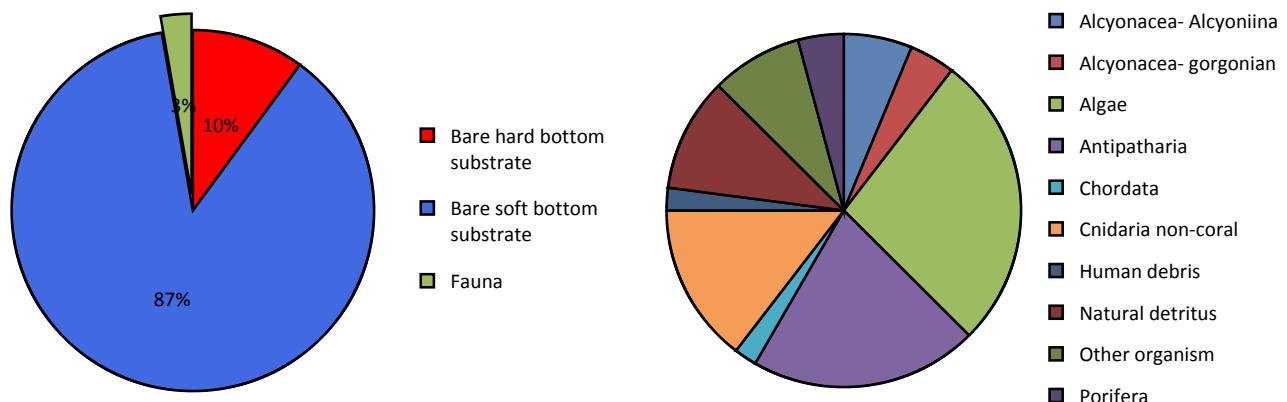


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-14.

Dive Site: ROV 13-14; N. Carolina, South and outside of N. Carolina MPA, low relief hard bottom, 70 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-14.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	47	2.69%
Algae	13	0.74%
Corallinales/crustose coralline	2	0.11%
Cyanophyta	10	0.57%
Phaeophyta	1	0.06%
Porifera	2	0.11%
Demospongiae	2	0.11%
Alcyonacea- gorgonian	2	0.11%
Ellisella sp.	1	0.06%
Gorgonacea	1	0.06%
Alcyonacea- Alcyoniina	3	0.17%
Alcyonacea	3	0.17%
Antipatharia	10	0.57%
Stichopathes lutkeni	10	0.57%
Cnidaria non-coral	7	0.40%
Fam- Zoanthidae	1	0.06%
Hydroidolina	6	0.34%
Chordata	1	0.06%
Fish	1	0.06%
Other organism	4	0.23%
Other organism	4	0.23%
Natural detritus	5	0.29%
Natural detritus	5	0.29%
Soft bottom substrate	1526	87.20%
Soft bottom substrate	1526	87.20%
Bare soft bottom substrate	1526	87.20%
Hard bottom substrate	176	10.06%
Hard bottom substrate	176	10.06%
Bare rock- pavement boulder ledge	95	5.43%
Bare rubble- rock	81	4.63%
Human debris	1	0.06%
Human debris	1	0.06%
Fishing gear/line/long line	1	0.06%
Grand Total	1750	100.00%

Dive Site: ROV 13-14; N. Carolina, South and outside of N. Carolina MPA, low relief hard bottom, 70 m

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-14.

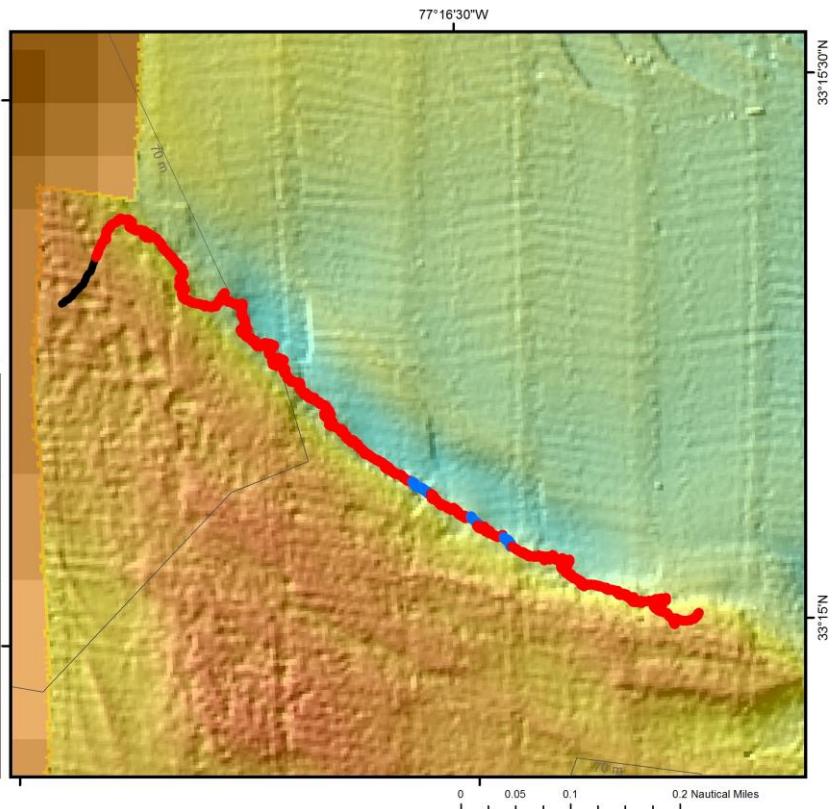
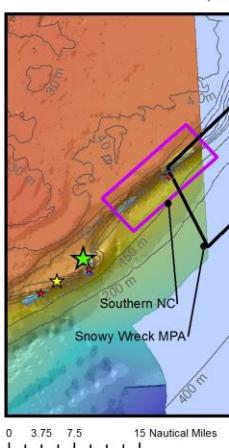
Scientific Name	Common Name	13-14
<i>Acanthurus</i> sp.	doctorfish	3.68
<i>Apogon pseudomaculatus</i>	twospot cardinalfish	0.37
<i>Balistes capriscus</i>	grey triggerfish	0.37
<i>Bodianus pulchellus</i>	spotfin hogfish	2.21
<i>Calamus</i> sp.	porgy	1.47
<i>Canthigaster rostrata</i>	sharpnose puffer	2.58
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	1.47
<i>Chaetodon sedentarius</i>	reef butterflyfish	3.31
<i>Chromis enchrysurus</i>	yellowtail reefish	2.94
<i>Epinephelus cruentatus</i>	graysby	0.37
<i>Halichoeres</i> sp.	wrasse	2.58
<i>Holacanthus bermudensis</i>	blue angelfish	3.31
<i>Holacanthus tricolor</i>	rock beauty	1.84
<i>Holocentrus</i> sp.	squirrelfish	0.37
<i>Lachnolaimus maximus</i>	hogfish	0.74
<i>Mycteroperca microlepis</i>	gag grouper	0.37
<i>Mycteroperca phenax</i>	scamp	0.37
<i>Mycteroperca</i> sp.	grouper	0.37
<i>Paranthias furcifer</i>	creole-fish	6.62
<i>Pareques umbrosus</i>	cubbyu	32.02
<i>Priacanthus arenatus</i>	bigeye	1.47
<i>Pristigenys alta</i>	short bigeye	21.35
<i>Pterois volitans</i>	lionfish	3.31
<i>Rypticus saponaceus</i>	greater soapfish	0.74
<i>Seriola</i> sp.	amberjack	2.94
<i>Serranus phoebe</i>	tattler	14.72
<i>Sphoeroides spengleri</i>	bandtail puffer	0.74
<i>Xanthichthys ringens</i>	sargassum triggerfish	0.74

Dive Site: ROV 13-15; N. Carolina, South and outside of N. Carolina MPA, N slope of terrace, 80 m

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
North Carolina, Outside of N. Carolina MPA -
No Protection
6-VII-13-3; ROV 13-15

- ★ ROV 13-15
 - ★ ROV Dives
 - ★ CTD
 - ROV Tracks**
 - Hard Bottom
 - Soft Bottom
 - Other ROV Tracks
- MPA
■ Deep Coral HAPC
■ Proposed MPA 2013
— Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	SnowyWreckTwo
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/6/2013
Specimens:	0
Digital Photos:	69
DVD:	2
Hard Drive:	1

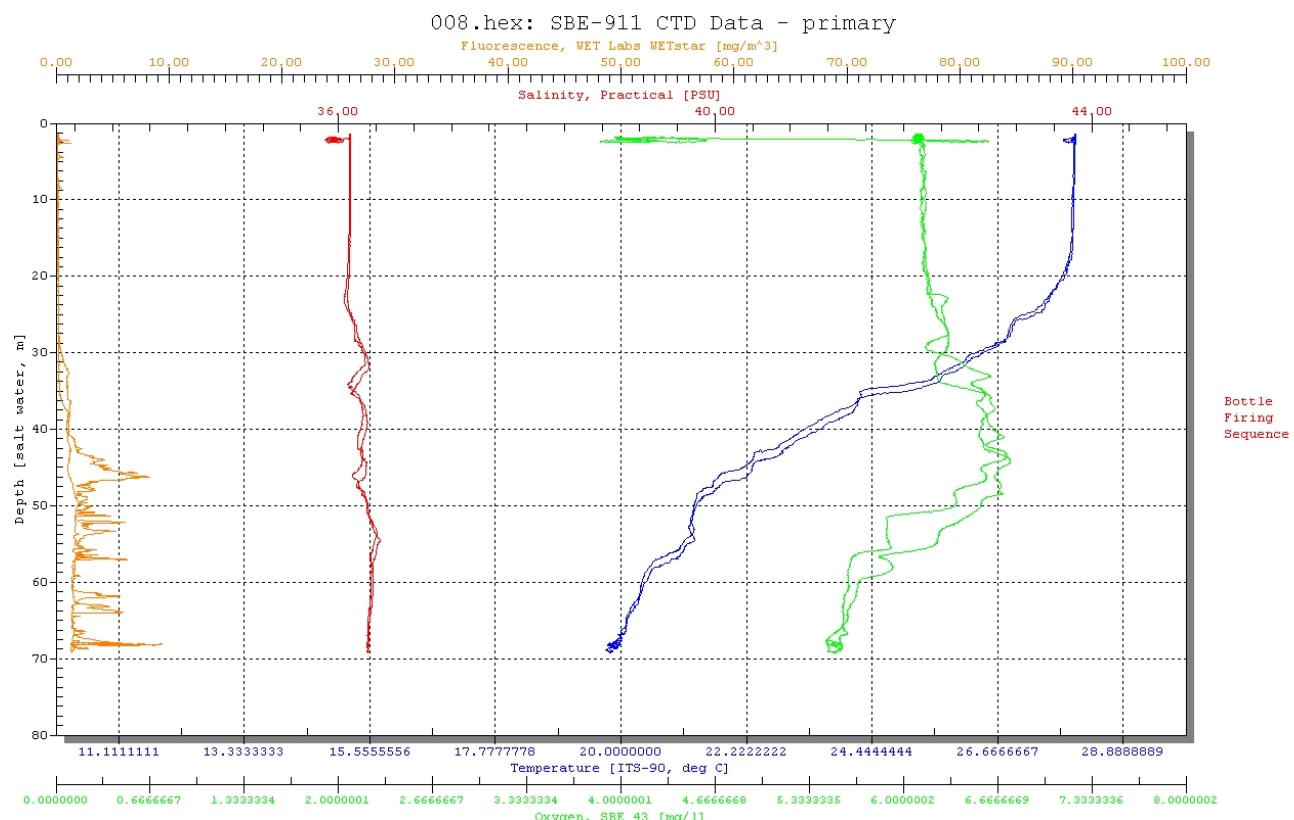
Dive Site: ROV 13-15; N. Carolina, South and outside of N. Carolina MPA, N slope of terrace, 80 m

Dive Data:

Minimum Bottom Depth (m):	-55	Total Transect Length (km):	1.20
Maximum Bottom Depth (m):	-86	Surface Current (kn):	
On Bottom (Time- GMT):	11:38	On Bottom (Lat/Long):	33.26°N; -77.28°W
Off Bottom (Time- GMT):	13:07	Off Bottom (Lat/Long):	33.25°N; -77.27°W
Physical (bottom); Temp (°C):	19.78	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	0.5

Physical Environment:

Distance from Dive Site(km): 7.42



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-15; N. Carolina, South and outside of N. Carolina MPA, N slope of terrace, 80 m

Dive Imagery:



Figure 1: -79.3 m 33.25 °N; -77.28 °W

Pile of fishing line wrapped around small rock boulders. The rugged rock bottom is easily snagged by bottom tending fishing gear.



Figure 2: -76.8 m 33.25 °N; -77.27 °W

Large scamp grouper (*Mycteroperca phenax*) with school of tomtates (*Haemulon aurolineatum*) on rugged fore reef ledge.



Figure 3: -77 m 33.25 °N; -77.27 °W

Beautiful red *Swiftia exerta* seafan. This species is used in aquaria trade.

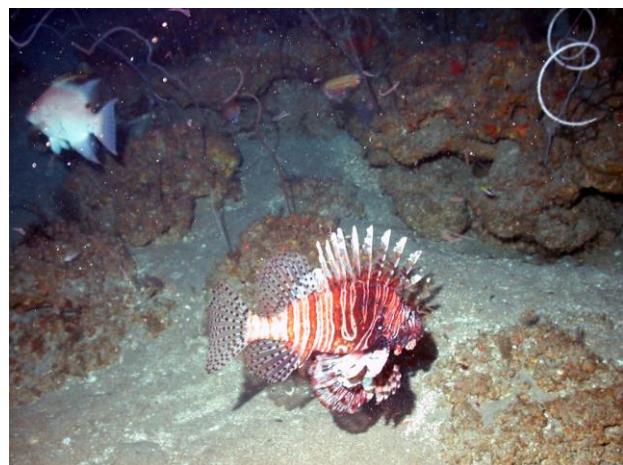


Figure 4: -79.9 m 33.25 °N; -77.28 °W

Unfortunately, Lionfish (*Pterois volitans/miles*) are common at many of these shelf-edge reef sites.

Dive Site: ROV 13-15; N. Carolina, South and outside of N. Carolina MPA, N slope of terrace, 80 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-15, 6-VII-13-3, UNCW SuperPhantom Dive 2250; Site #- 6-VII-13-3. Target Site - N. Carolina, South and outside of N. Carolina MPA, north slope of hard bottom terrace, 80 m. Ground-truth multibeam sonar (2012 Pisces MB: capehope_4m_col.tif). Conduct video/photo transect across feature.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 2.0 Kn. ds ahead of the computers. Video was 4 seconds ahead of GMT time. Nav time and digital photos are always set to GMT automatically.

Site Description/Habitat/Biota:

North slope of flat, hard bottom terrace. Landed on top of terrace, SW of target at N slope. Flat pavement and rippled soft bottom, barren, 66 m. Top of terrace: rock knolls, low relief, and patches of sand with E-W oriented sand waves. Rock cobble and pavement, 0.5 m relief, low slope 5-10°. Barren with a few *Stichopathes* sp. Top of north slope - 80 m: patchy low relief rocks, 10-20° slope, 2-3 m diameter rock boulders 0.5 m relief, 50% cover. Base of slope: low relief rock outcrops <0.5 m tall, 1-2 m diameter, 10-20° slope, low rugosity 86 m at base. Transect along lower slope and base of slope to SE. Rock boulders increase in size, relief and rugosity at around 79 m. Low relief rock < 0.5 m relief 50% cover rock boulders, 1-2 m. North slope, nearing the slight "dog-leg" bend in the multibeam. Heading due E along base of slope: area of high rugosity and relief, 10-20° slope, 1-2 m ledges, high rugosity, moderate relief rock ledges, boulders, 1-2 m. Biota increases in density and diversity, including a large aggregation of scamp, 6+ (77.5 m).

Dominant Benthic Biota:

Alg - Chlorophyta: *Ulva* sp.; Phaeophyta; Cni - Gorgonacea: *Diodogorgia* sp., Ellisellidae, Plexauridae, *Swiftia exserta*; Cni - *Stichopathes* sp., *Tanacetipathes*; Hydroidolina; black stinging; Coral- *Oculina varicosa* (several colonies, white, 10-25 cm, on vertical rock)

Fish:

lionfish - *Pterois volitans* (26); reef butterflyfish - *Chaetodon sedentarius*; scamp grouper - *Mycteroperca phenax*; amberjack - *Seriola* sp.; squirrelfish - *Holocentrus* sp.; tattler - *Serranus phoebe*; roughtongue bass; short bigeye - *Pristigenys alta*; doctorfish; Calamus porgy - *Calamus* sp.; cubbyu - *Equetus umbrosus*; sharpnose puffer - *Canthigaster rostrata*; spotfin hogfish - *Bodianus pulchellus*; blue angelfish - *Holacanthus bermudensis*; spotfin butterflyfish - *Chaetodon ocellatus*; tomtate - *Haemulon aurolineatum*; rock beauty - *Holacanthus tricolor*; soapfish - *Rypticus* sp.; spotted goatfish; bank butterflyfish - *Prognathodes aya*; bandtail puffer; bigeye - *Priacanthus arenatus*; hogfish - *Lachnolaimus maximus*; jack-knife fish; longsnout butterfly fish; purple reefish - *Chromis scotti*; red porgy - *Pagrus pagrus*; triggerfish - *Balistes* sp.; wrasse; wrasse bass - *Liopropoma eukrines*; yellowtail reefish - *Chromis encrysurus*;

Dive Site: ROV 13-15; N. Carolina, South and outside of N. Carolina MPA, N slope of terrace, 80 m

CPCe Percent Cover Analysis:

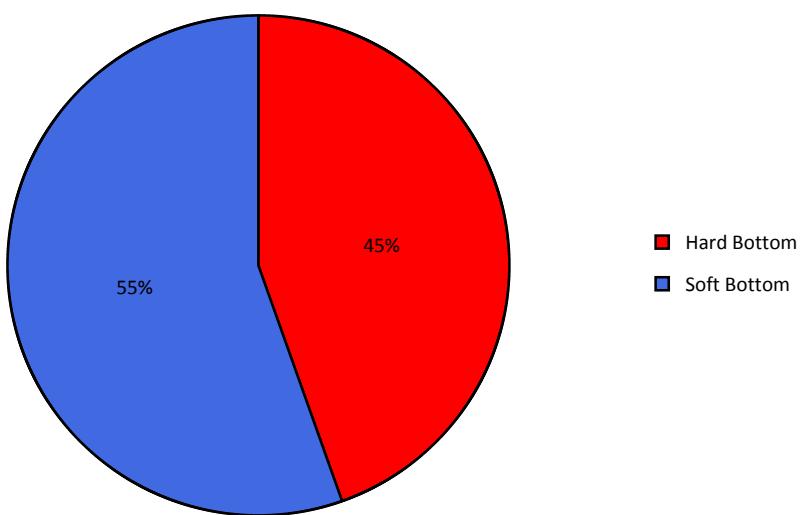


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-15. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

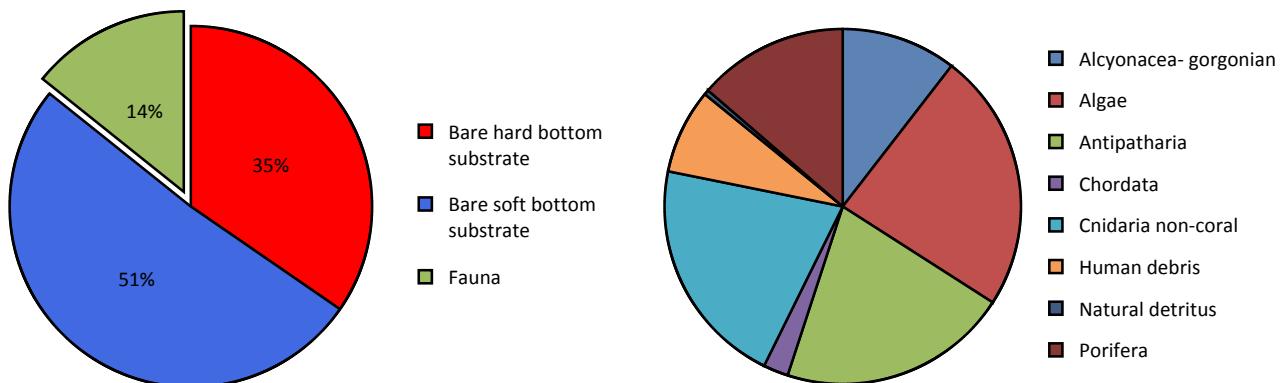


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-15.

Dive Site: ROV 13-15; N. Carolina, South and outside of N. Carolina MPA, N slope of terrace, 80 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-15.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	203	13.14%
Algae	52	3.37%
Corallinales/crustose coralline	39	2.52%
Phaeophyta	13	0.84%
Porifera	30	1.94%
Demospongiae	25	1.62%
Spirastrellidae	5	0.32%
Alcyonacea- gorgonian	23	1.49%
Ellisellidae	1	0.06%
Gorgonacea	10	0.65%
Plexauridiae	12	0.78%
Antipatharia	46	2.98%
Antipatharia	8	0.52%
Stichopathes lutkeni	33	2.14%
Tanacetipathes hirta	5	0.32%
Cnidaria non-coral	46	2.98%
Hydroidolina	46	2.98%
Chordata	5	0.32%
Fish	5	0.32%
Natural detritus	1	0.06%
Natural detritus	1	0.06%
Soft bottom substrate	790	51.13%
Soft bottom substrate	790	51.13%
Bare soft bottom substrate	790	51.13%
Hard bottom substrate	535	34.63%
Hard bottom substrate	535	34.63%
Bare rock- pavement boulder ledge	436	28.22%
Bare rubble- rock	99	6.41%
Human debris	17	1.10%
Human debris	17	1.10%
Fishing gear/line/long line	17	1.10%
Grand Total	1545	100.00%

Dive Site: ROV 13-15; N. Carolina, South and outside of N. Carolina MPA, N slope of terrace, 80 m

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-15.

Scientific Name	Common Name	13-15
<i>Acanthurus</i> sp.	doctorfish	3.35
<i>Balistes capriscus</i>	grey triggerfish	1.12
<i>Bodianus pulchellus</i>	spotfin hogfish	12.83
<i>Calamus</i> sp.	porgy	3.35
<i>Canthigaster rostrata</i>	sharpnose puffer	11.15
<i>Chaetodon aculeatus</i>	longsnout butterflyfish	1.12
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	4.46
<i>Chaetodon sedentarius</i>	reef butterflyfish	21.75
<i>Chaetodon</i> sp.	butterflyfish	1.12
<i>Chromis enchrysurus</i>	yellowtail reefish	1.12
<i>Chromis insolatus</i>	sunshinefish	2.23
<i>Chromis scotti</i>	purple reefish	1.12
<i>Chromis</i> sp.	damselfish	0.56
<i>Equetus lanceolatus</i>	jack-knife fish	0.56
<i>Haemulon aurolineatum</i>	tomtate	839.38
<i>Halichoeres</i> sp.	wrasse	7.25
<i>Hemanthias vivanus</i>	red barbier	16.73
<i>Holacanthus bermudensis</i>	blue angelfish	3.35
<i>Holacanthus tricolor</i>	rock beauty	2.79
<i>Holocentrus</i> sp.	squirrelfish	11.71
<i>Lachnolaimus maximus</i>	hogfish	0.56
<i>Liopropoma eukrines</i>	wrasse bass	1.67
<i>Mycteroperca phenax</i>	scamp	11.15
<i>Pagrus pagrus</i>	red porgy	0.56
<i>Pareques umbrosus</i>	cubbyu	63.58
<i>Priacanthus arenatus</i>	bigeye	0.56
<i>Pristigenys alta</i>	short bigeye	7.81
<i>Prognathodes aya</i>	bank butterflyfish	2.79
<i>Prognathodes guyanensis</i>	french butterflyfish	0.56
<i>Pronotogrammus martinicensis</i>	roughtongue bass	68.6
<i>Pseudupeneus maculatus</i>	spotted goatfish	2.79
<i>Pterois volitans</i>	lionfish	11.71
<i>Rypticus saponaceus</i>	greater soapfish	2.79
Scorpaenidae	scorpionfish	0.56
<i>Seriola</i> sp.	amberjack	9.48
<i>Serranus phoebe</i>	tattler	11.15
<i>Sparisoma atomarium</i>	greenblotch parrotfish	0.56
<i>Sphoeroides spengleri</i>	bandtail puffer	1.12

Dive Site: ROV 13-15; N. Carolina, South and outside of N. Carolina MPA, N slope of terrace, 80 m

Stegastes partitus

bicolor damselfish

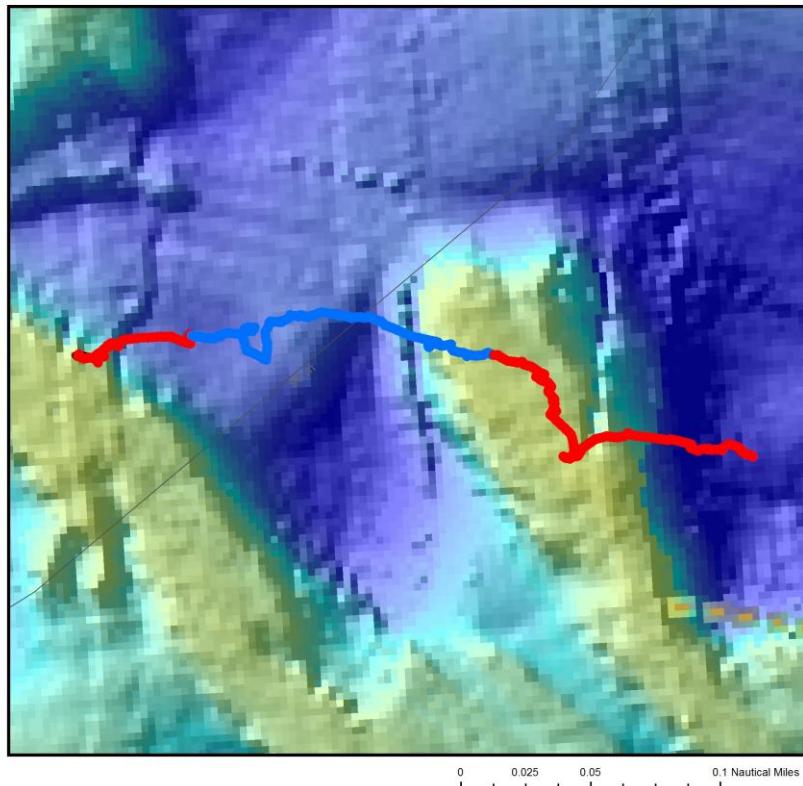
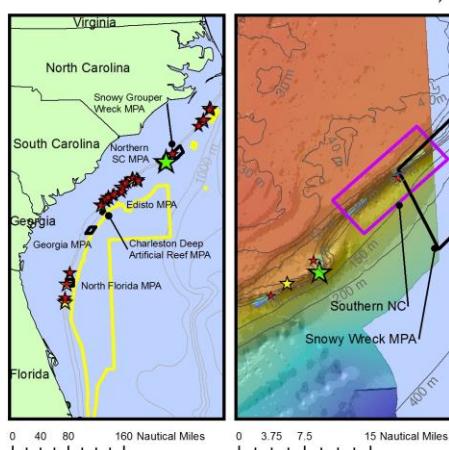
0.56

Dive Site: ROV 13-16; N. Carolina, South and outside of N. Carolina MPA, deep mound E of terrace, 90 m

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
North Carolina, Outside of N. Carolina MPA-
No Protection
6-VII-13-4; ROV 13-16

- ★ ROV 13-16
 - ★ ROV Dives
 - ★ CTD
 - ROV Tracks
 - Hard Bottom
 - Soft Bottom
 - Other ROV Tracks
- MPA
 - Deep Coral HAPC
 - Proposed MPA 2013
 - Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	SnowyWreckTwo
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/6/2013
Specimens:	0
Digital Photos:	2
DVD:	1
Hard Drive:	1

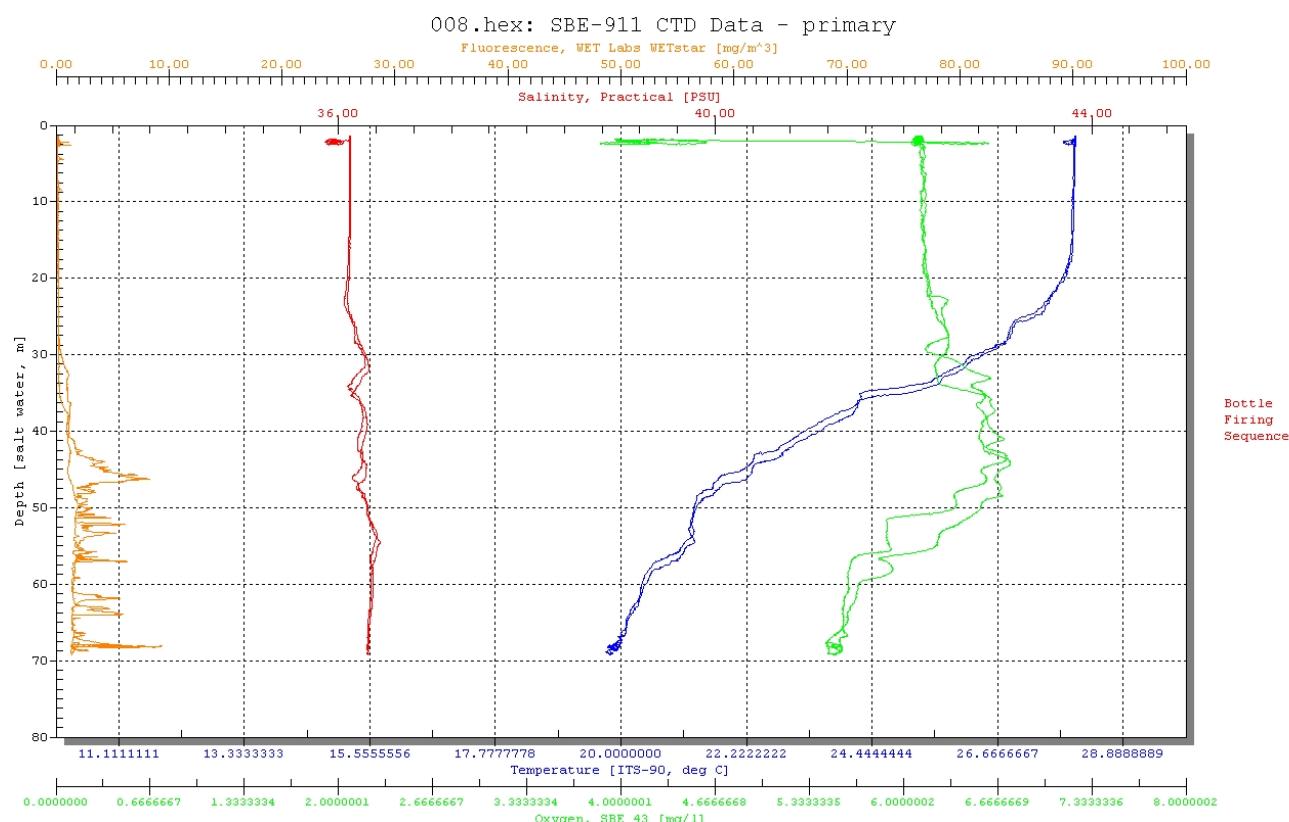
Dive Site: ROV 13-16; N. Carolina, South and outside of N. Carolina MPA, deep mound E of terrace, 90 m

Dive Data:

Minimum Bottom Depth (m):	-65	Total Transect Length (km):	0.51
Maximum Bottom Depth (m):	-97	Surface Current (kn):	2.7
On Bottom (Time- GMT):	13:53	On Bottom (Lat/Long):	33.23°N; -77.27°W
Off Bottom (Time- GMT):	14:10	Off Bottom (Lat/Long):	33.23°N; -77.27°W
Physical (bottom); Temp (°C):	20.00	Salinity:	N/A
		Visibility (ft):	45
		Current (kn):	1

Physical Environment:

Distance from Dive Site(km): 7.21



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-16; N. Carolina, South and outside of N. Carolina MPA, deep mound E of terrace,
90 m

Dive Imagery:

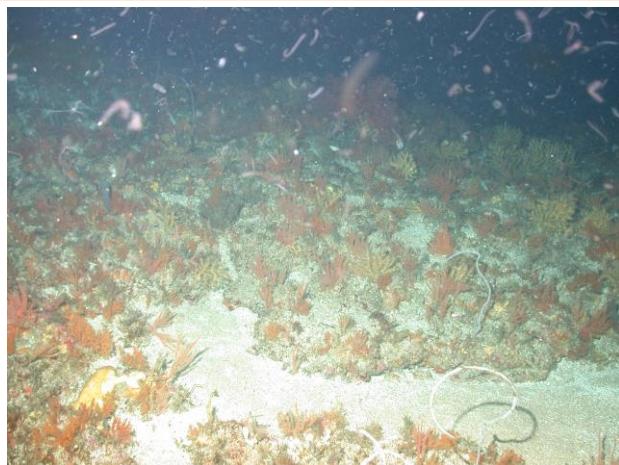


Figure 1: -77.6 m 33.23 °N; -77.27 °W
Low relief hard bottom with dense epifaunal and
algal cover.

Figure 2: N/A
Due to strong current the dive was aborted early
and only one picture was taken.

Dive Site: ROV 13-16; N. Carolina, South and outside of N. Carolina MPA, deep mound E of terrace, 90 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-16, 6-VII-13-4, UNCW SuperPhantom Dive 2251; Site #- 6-VII-13-4. Target Site - N. Carolina, South and outside of N. Carolina MPA, deep mound E of terrace, 90 m. Ground-truth multibeam sonar (2012 Pisces MB: capehope_4m_col.tif). Conduct video/photo transect across feature.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 2.7 Kn. Video camera time in sync with ship's clock. Dive aborted early, unable to station keep on the target site; most of dive off bottom.

Site Description/Habitat/Biota:

Multibeam shows irregular shaped mound at base of terrace; 777x130 m, depth on top 80 m. Base of the mound slope is flat sediment, 100 m deep. The second "mitten shaped" mound top is 80-100% hard bottom cover, flat pavement, 78 m. East slope: larger boulders, 30° slope, high rugosity at edges. 104 m at the bottom of the east slope. Most of dive off bottom, photo transects not very good.

Cnid - *Stichopathes* sp., *Tanacetipathes* sp.; 'Gorgonacea: *Swiftia exserta*; Hydroidolina

Fish:

amberjack - *Seriola* sp.; spotfin hogfish - *Bodianus pulchellus*; tomtate - *Haemulon aurolineatum*; reef butterflyfish - *Chaetodon sedentarius*; roughtongue bass; scamp grouper - *Mycteroperca phenax*; scamp grouper - *Mycteroperca phenax*

Dive Site: ROV 13-16; N. Carolina, South and outside of N. Carolina MPA, deep mound E of terrace,
90 m

Percent Cover of Benthic Macro-Biota and Substrate:

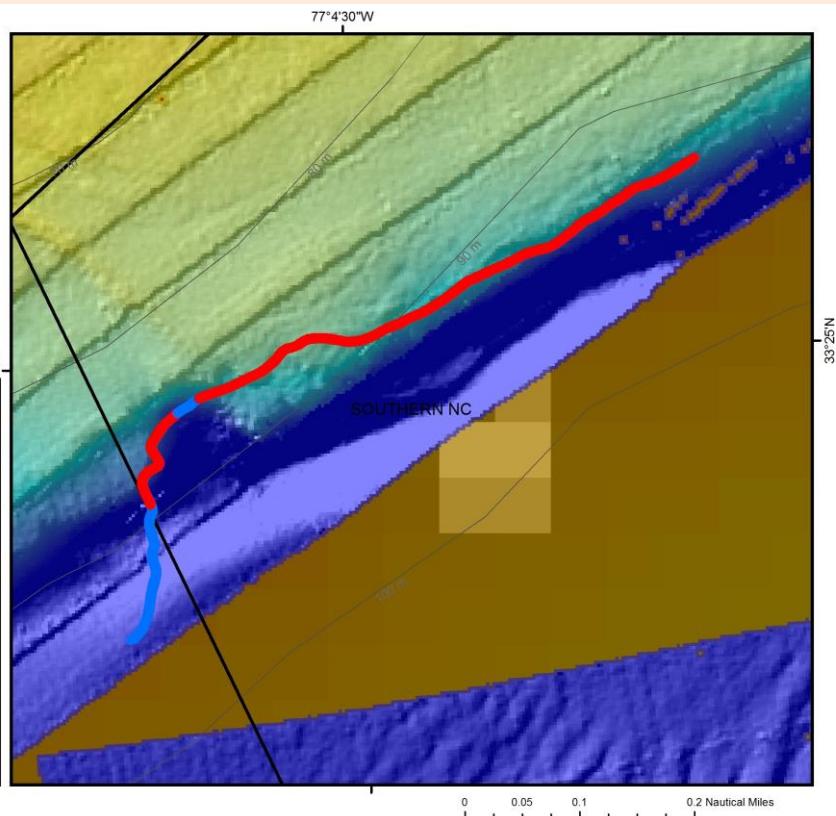
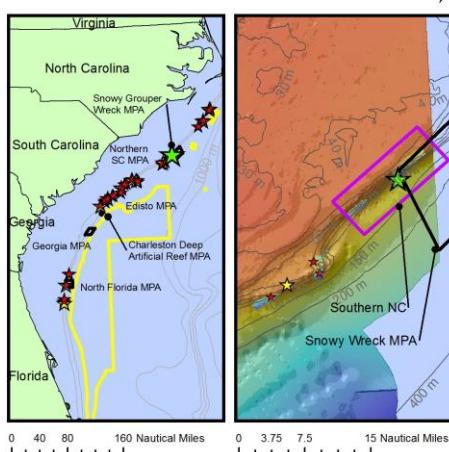
Due to strong currents, the dive was aborted early and no photo transects were completed.

Dive Site: ROV 13-17; N. Carolina, Inside & Outside Snowy Grouper MPA, NW corner, deep rock slope

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
North Carolina, Snowy Wreck MPA
6-VII-13-5; ROV 13-17

- ★ ROV 13-17
 - ★ ROV Dives
 - ★ CTD
 - ROV Tracks**
 - Hard Bottom
 - Soft Bottom
 - Other ROV Tracks
- MPA
■ Deep Coral HAPC
■ Proposed MPA 2013
— Bathymetry Lines (m)



Site Overview:

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ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	SnowyWreckMPA
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/6/2013
Specimens:	0
Digital Photos:	49
DVD:	2
Hard Drive:	1

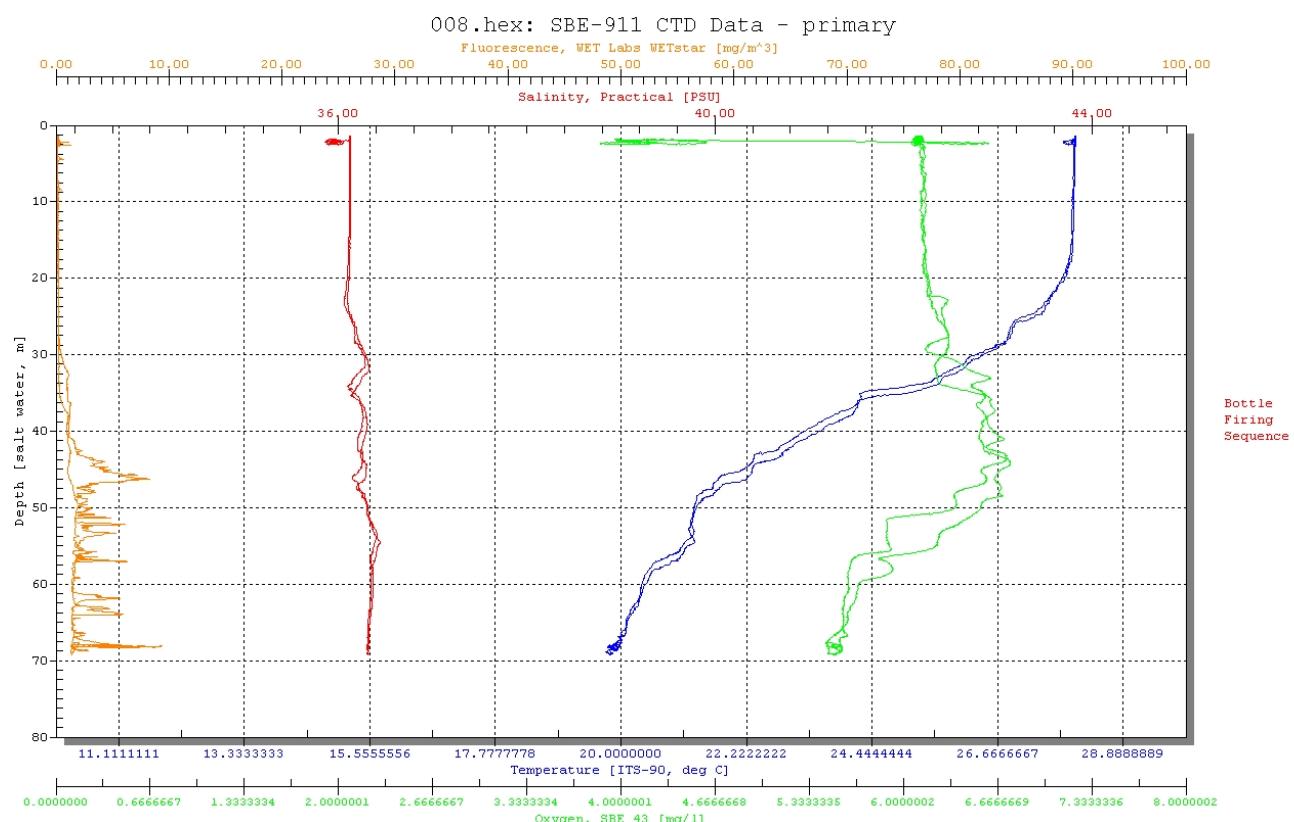
Dive Site: ROV 13-17; N. Carolina, Inside & Outside Snowy Grouper MPA, NW corner, deep rock slope

Dive Data:

Minimum Bottom Depth (m):	-84	Total Transect Length (km):	1.24
Maximum Bottom Depth (m):	-94	Surface Current (kn):	2
On Bottom (Time- GMT):	16:17	On Bottom (Lat/Long):	33.41°N; -77.08°W
Off Bottom (Time- GMT):	17:17	Off Bottom (Lat/Long):	33.42°N; -77.07°W
Physical (bottom); Temp (°C):	19.87	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	0.5

Physical Environment:

Distance from Dive Site(km): 32.38



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-17; N. Carolina, Inside & Outside Snowy Grouper MPA, NW corner, deep rock slope

Dive Imagery:

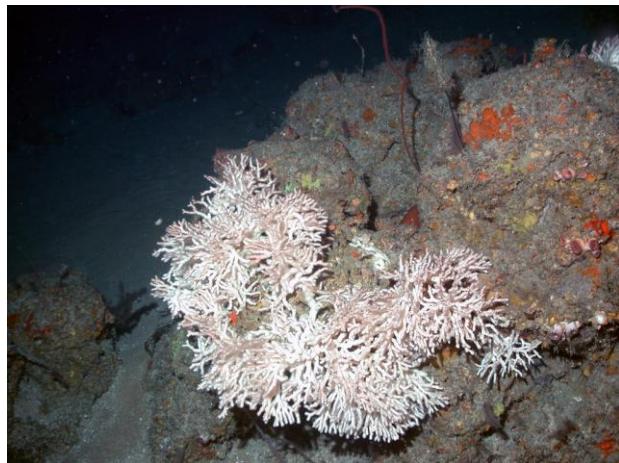


Figure 1: N/A 33.42 °N; -77.08 °W

Large live *Oculina varicosa* coral colony (~50 cm diameter) on rock boulder. The deepwater morph of *O. varicosa* is white, lacking zooxanthellae.

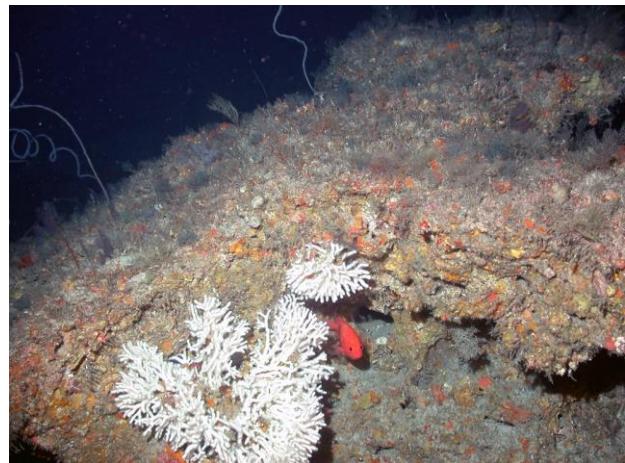


Figure 2: N/A 33.42 -77.08

Live white *Oculina varicosa* coral colonies on rock ledge with a soldierfish (Holocentridae).

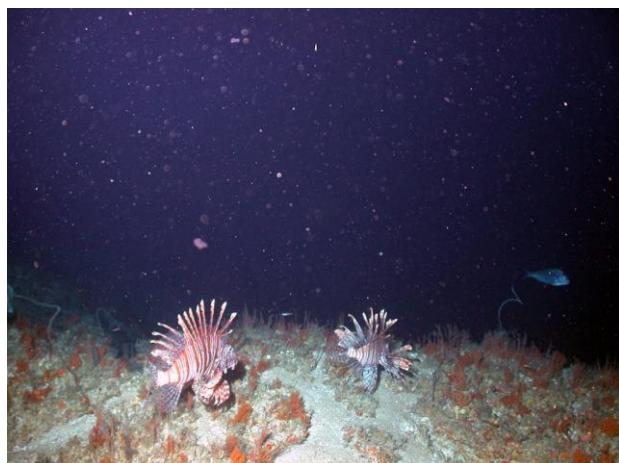


Figure 3: N/A 33.42 °N; -77.07 °W

Pair of Lionfish (*Pterois volitans/miles*) on top of reef.



Figure 4: N/A 33.42 °N; -77.07 °W

Dense population of unidentified Plexauridae gorgonians on rock pavement.

Dive Site: ROV 13-17; N. Carolina, Inside & Outside Snowy Grouper MPA, NW corner, deep rock slope

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-17, UNCW Superphantom ROV Dive 2252; Site #- 6-VII-13-5. Target Site - N. Carolina, Inside & Outside Snowy Grouper MPA (and proposed Southern NC), NW corner, deep south rock slope. Ground truth 2012 Pisces Multibeam- SGW_dive32_33_5Mres.tif

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Surface current approx. 2 Kn. ROV Navigation data was not recorded due to user error. The ship track was used to estimate the location. There is no depth data for this dive.

Site Description/Habitat/Biota:

Transect NW corner of the Snowy Wreck MPA along a deep south rock slope. Landed 200 m south of target: flat sand shell hash, large sand waves, 5 m wave length, 30 cm height. Bottom slopes down at the base of the wall <10°, scattered rocks and cobble 10 cm approaching the base of wall (106 m), sparse biota. Foot of wall: flat, sediment, cobble and small boulders <0.5 m. Bottom of the wall: 0.5-1 m boulders, <1 m relief, 50% cover, 5-10° slope. Rounded indented area on MB: larger 1 m relief 3 m boulders with 10-50 cm Oculina (7+ heads, 10-50 cm, white). Top of wall: low relief pavement with sediment veneer, on top of the wall. Southeast wall is flat pavement with a few rock ledges and 10-30° slope, low rugosity, low relief. Bottom changes to 10-20° slope 1-2 m relief, low slope, undercut ledges (85 m). Midway down the slope the bottom becomes highly rugose boulders, low slope, 1-2 m ledges.

Dominant Benthic Biota:

Cnid - Antipatharia: *Stichopathes* sp., *Tanacetipathes* sp.; Hydroidolina; Gorgonacea: orange fan *Thesea*? Sp., *Bebryce* sp., *Diodogorgia* sp., Ellisellidae, *Swiftia exserta*; Coral- *Oculina varicosa* (13), Solitary Cup Coral; Ech - Asteroidea; Por - Demospongiae; unid, Spirastrellidae.

Fish:

amberjack - *Seriola* sp.; bandtail puffer - *Sphoeroides spengleri*; bank butterflyfish - *Prognathodes aya*; bigeye - *Priacanthus arenatus*; blackbar drum - *Pareques iwamotoi*; Calamus porgy - *Calamus* sp.; cubbyu - *Equetus umbrosus*; doctorfish - *Acanthurus* sp.; graysby grouper - *Epinephelus cruentatus*; hogfish - *Lachnolaimus maximus*; orangeback bass - *Serranus annularis*; reef butterflyfish - *Chaetodon sedentarius*; scamp grouper - *Mycteroperca*; short bigeye - *Pristigenys alta*; soapfish - *Rypticus* sp.; spotfin butterflyfish - *Chaetodon ocellatus*; spotfin hogfish - *Bodianus pulchellus*; spotted goatfish - *Pseudupeneus maculatus*; squirrelfish - *Holocentrus* sp.; tattler - *Serranus phoebe*; tomtate - *Haemulon aurolineatum*; vermillion snapper - *Rhomboplites aurorubens*; wrasse - *Halichoeres* sp.; wrasse bass - *Liopropoma eukrines*; yellowtail reefish - *Chromis encrysurus*

Dive Site: ROV 13-17; N. Carolina, Inside & Outside Snowy Grouper MPA, NW corner, deep rock slope

CPCe Percent Cover Analysis:

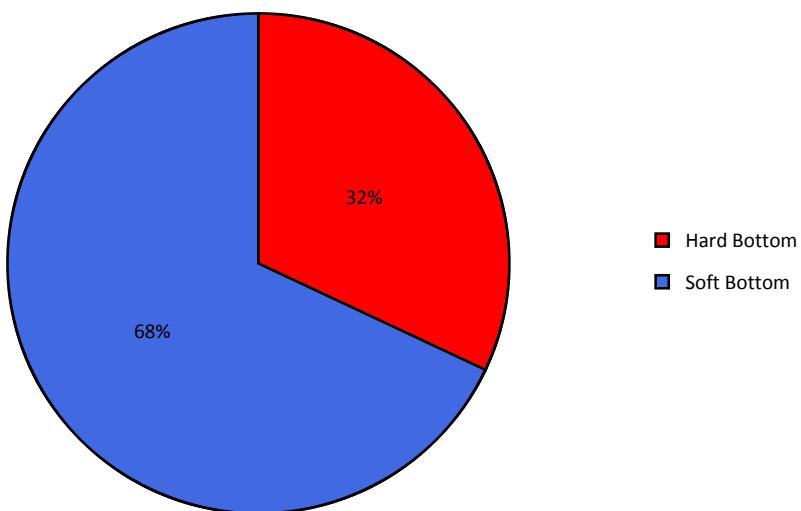


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-17. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

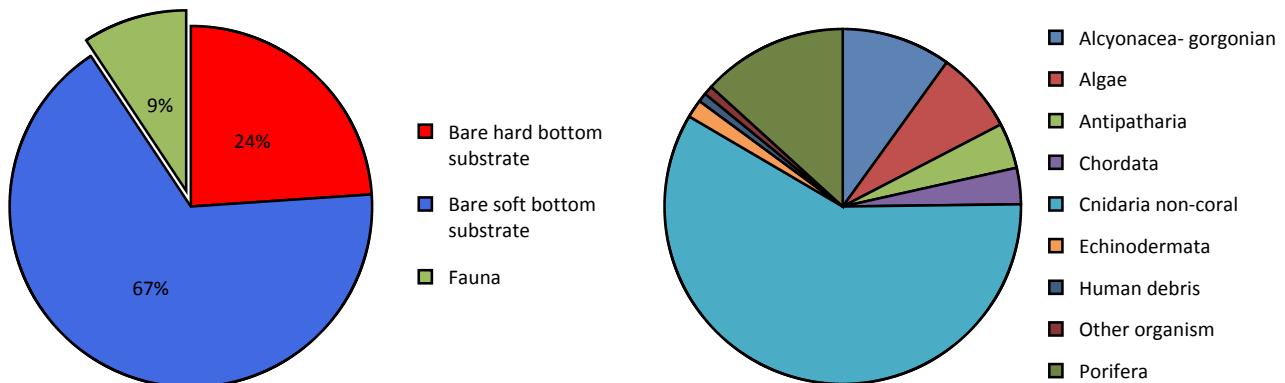


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-17.

Dive Site: ROV 13-17; N. Carolina, Inside & Outside Snowy Grouper MPA, NW corner, deep rock slope

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-17.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	120	9.23%
Algae	9	0.69%
Chlorophyta	1	0.08%
Corallinales/crustose coralline	5	0.38%
Phaeophyta	2	0.15%
Rhodophyta	1	0.08%
Porifera	16	1.23%
Demospongiae	10	0.77%
Scopalina sp.	1	0.08%
Spirastrellidae	5	0.38%
Alcyonacea- gorgonian	12	0.92%
Ellisellidae	1	0.08%
Gorgonacea	5	0.38%
Plexauridiae	6	0.46%
Antipatharia	5	0.38%
Antipatharia	2	0.15%
Stichopathes lutkeni	3	0.23%
Cnidaria non-coral	71	5.46%
Hydroidolina	71	5.46%
Echinodermata	2	0.15%
Crinoidea	1	0.08%
Davidaster sp.	1	0.08%
Chordata	4	0.31%
Didemnidae	1	0.08%
Fish	3	0.23%
Other organism	1	0.08%
Other organism	1	0.08%
Soft bottom substrate	868	66.77%
Soft bottom substrate	868	66.77%
Bare soft bottom substrate	868	66.77%
Hard bottom substrate	311	23.92%
Hard bottom substrate	311	23.92%
Bare rock- pavement boulder ledge	294	22.62%
Bare rubble- rock	17	1.31%
Human debris	1	0.08%
Human debris	1	0.08%
Fishing gear/line/long line	1	0.08%

Dive Site: ROV 13-17; N. Carolina, Inside & Outside Snowy Grouper MPA, NW corner, deep rock slope

Grand Total	1300	100.00%
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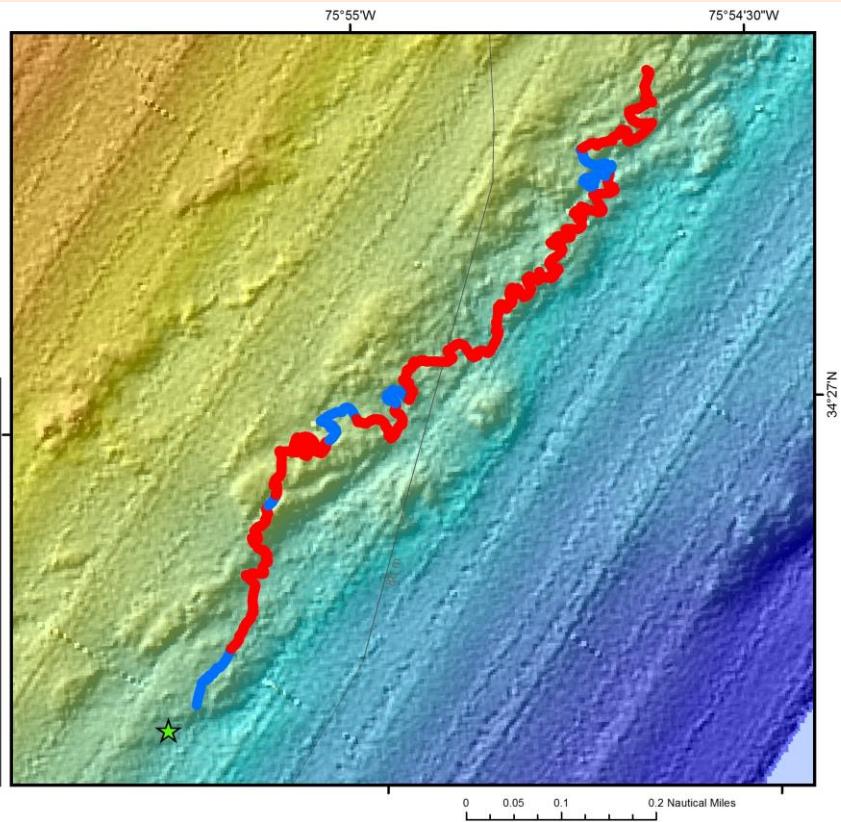
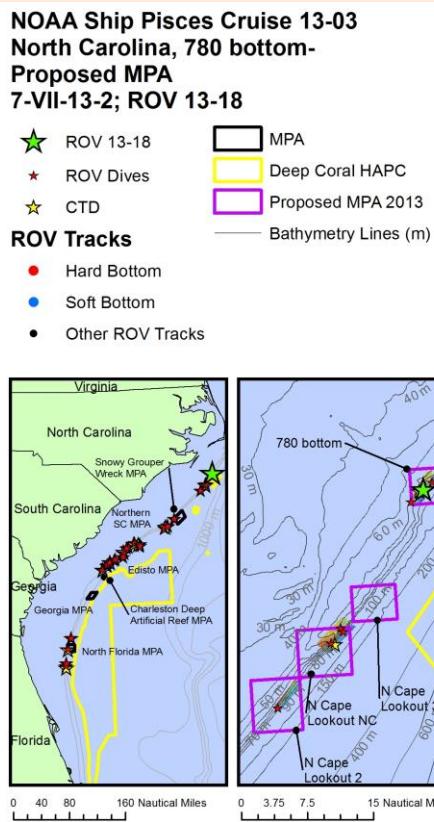
Dive Site: ROV 13-17; N. Carolina, Inside & Outside Snowy Grouper MPA, NW corner, deep rock slope

Density of Fish:

ROV tracking was not available for this dive, therefore, the fish data was not analyzed.

Dive Site: ROV 13-18; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 78 m

General Location and Dive Track:



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	NorthCarolina780.tif
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/7/2013
Specimens:	0
Digital Photos:	114
DVD:	2
Hard Drive:	1

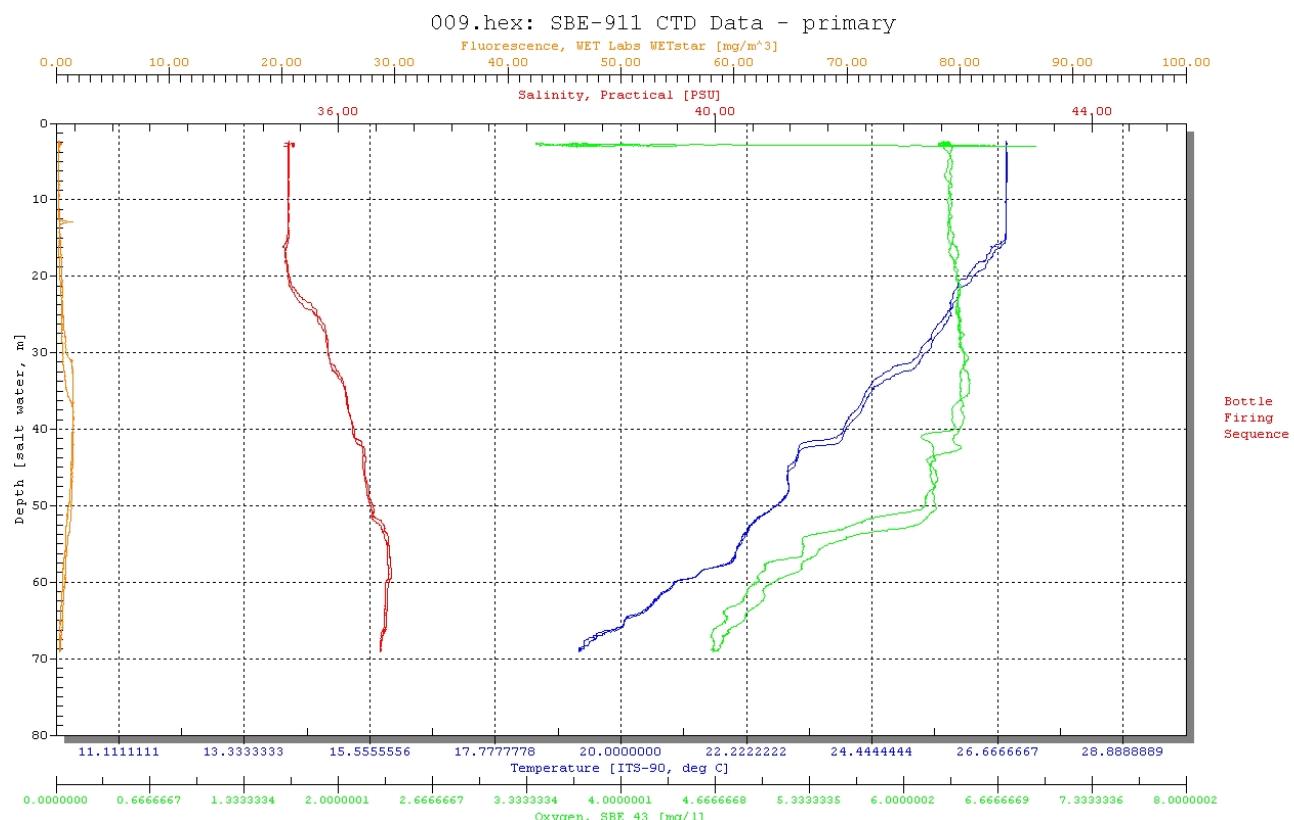
Dive Site: ROV 13-18; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 78 m

Dive Data:

Minimum Bottom Depth (m):	-71	Total Transect Length (km):	1.48
Maximum Bottom Depth (m):	-80	Surface Current (kn):	
On Bottom (Time- GMT):	8:04	On Bottom (Lat/Long):	34.45°N; -75.92°W
Off Bottom (Time- GMT):	9:51	Off Bottom (Lat/Long):	34.46°N; -75.91°W
Physical (bottom); Temp (°C):	19.09	Salinity:	N/A
		Visibility (ft):	45
		Current (kn):	0.25

Physical Environment:

Distance from Dive Site(km): 0.96



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m3). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-18; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 78 m

Dive Imagery:



Figure 1: -77.8 m 34.45 °N; -75.92 °W

Pair of starfish (*Narcissia trigonaria* [top] and *Goniaster tessallatus* [bottom]) on fairly barren rock habitat.



Figure 2: -78.2 m 34.45 °N; -75.91 °W

Corallimorpharia, an order of Cnidaria that is similar in appearance to sea anemones. These usually have a flat oral disc and knobby tentacles.



Figure 3: -77 m 34.45 °N; -75.91 °W

Crown starfish (*Goniaster tessallatus*) and comatulid crinoid (upper right) on low relief rock bottom.



Figure 4: -78.7 m 34.45 °N; -75.91 °W

A small burrow made by the short bigeye (*Pristigenys alta*) [red fish] provides habitat to arrow crabs (*Stenorhynchus seticornis*), wrasse bass (*Liopropoma eukrines*) [stripped fish], and Lionfish (*Pterois volitans/miles*).

Dive Site: ROV 13-18; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 78 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-18, UNCW Superphantom ROV Dive 2253; Site #- 7-VII-13-2. Target Site - N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 78 m ground truth 2013 Pieces Multibeam (780BottomMap.tif).

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted.

Site Description/Habitat/Biota:

Multibeam shows extensive low relief hard bottom feature; (250x >4000 m low relief plateau), with low mounds and ridges. Multibeam appears much more rugged and relief than the actual video. Flat sand bottom and rugose, low relief rock appear the same in the MB. Transect along the eastern edge and slope of the feature. Landed ~300 m south of target area on flat soft bottom, headed north, some scattered pavement, and areas of scoured rock with bigeye burrows, flat slope. Transect crossed low mound #1: 312x130 m mound, 2.5 m (75.5 to 78 m deep) relief; habitat: flat sediment, patchy pavement with patches of exposed rock boulders (1 m diameter, <1/4 m relief), flat, but locally high rugosity, and dense fish, and fish excavated holes in the rock.. Valley to north of mound 1: same habitat. Base of 360x180 m mound #2 (80 m at bottom) is patches of exposed pavement with fish burrows. Base of mound #3 (250x100 m) 80 m deep, same habitat. Top of mound 3 is the same - habitat at 79 m. North base of mound 3: exposed rock boulders, .25 m relief, mostly sediment with areas of exposed pavement, 0 slope. Mound #4, 110x110 m mound, 78 m deep. Base of mound 4 is mostly soft bottom areas of scattered rocks, .25 m relief, 0 slope. 5th mound is part of the main feature. Bottom description is the same.

Dominant Benthic Biota:

Alg - Rhodophyta; *Halymenia* sp.; Art - Decapoda: *Stenorhynchus seticornis*, Anomura, *Stenopus* sp.; Chelicerata; *Pycnogonida*
Cni - Hydroidolina: black bushy, black hairy, black stinging; Pennatulacea; Antipathidae: unid spp., *Stichopathes* sp., *Antipathes* sp., *Bebryce* sp., Ellisellidae unid., *Ellisella barbadensis*; Corallimorpharia; Ech - Crinoidea: *Crinometra brevipenna*; Asteroidea: *Narcissia trigonaria*; Echinoidea: *Eucidaris tribuloides*; Mol - Bivalvia: Ostreidae; Por - Demospongiae: *Ircinia campana*, *Agelas* sp., Spirastrellidae

Fish

lionfish - *Pterois volitans* (28), short bigeye - *Pristigenys alta*, tattler - *Serranus phoebe*, saddle bass - *Serranus notospilus*, amberjack - *Seriola* sp., bank seabass - *Centropristes ocyurus*, reef butterflyfish - *Chaetodon sedentarius*, red porgy - *Pagrus pagrus*, yellowtail reefish - *Chromis encrysurus*, wrasse - *Halichoeres* sp., red hogfish - *Decodon puellaris*, wrasse bass - *Liopropoma eukrines*, Jack-knife fish - *Equetus lanceolatus*, bank butterflyfish - *Prognathodes aya*, *Brotula* sp., red grouper - *Epinephelus morio*, sharpnose puffer - *Canthigaster rostrata*, toadfish - *Opsanus* sp., triggerfish - *Balistes* sp., blue angelfish - *Holacanthus bermudensis*, blueline tilefish - *Caulolatilus microps*, cardinalfish, cubbyu - *Equetus umbrosus*, greenband wrasse - *Halichoeres bathyphilus*, red barbier - *Hemanthias vivenus*, roughtongue bass - *Pronotogrammus martinicensis*, twospot cardinalfish - *Apogon pseudomaculatus*

Dive Site: ROV 13-18; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 78 m

CPCe Percent Cover Analysis:

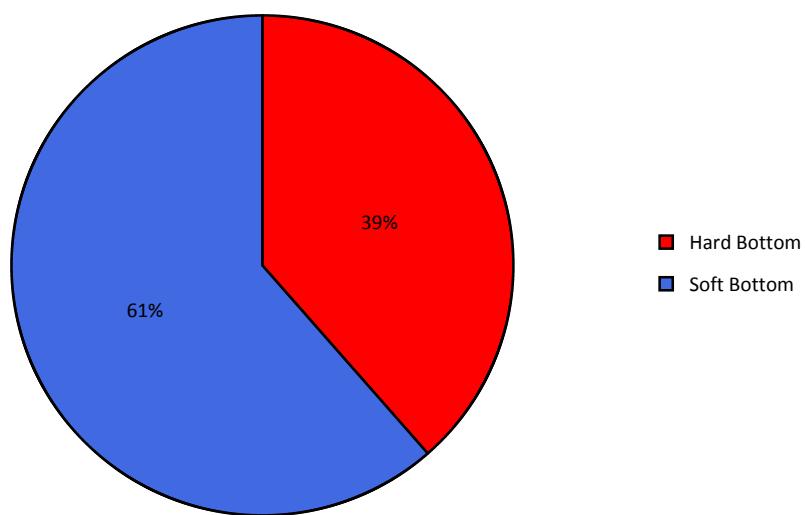


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-18. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

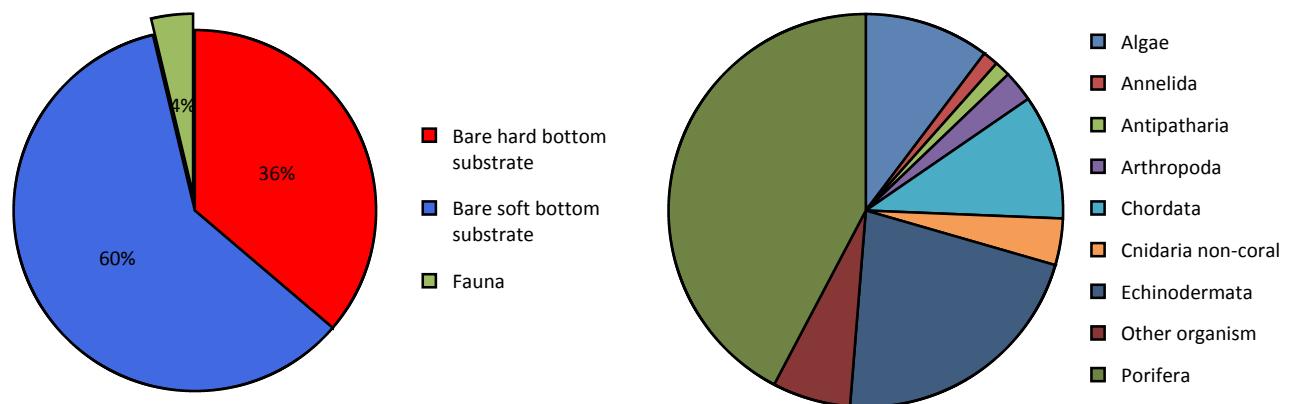


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-18.

Dive Site: ROV 13-18; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 78 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-18.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	78	3.72%
Algae	8	0.38%
Cyanophyta	7	0.33%
Rhodophyta	1	0.05%
Porifera	33	1.57%
Demospongiae	14	0.67%
Ircinia campana	18	0.86%
Spirastrellidae	1	0.05%
Antipatharia	1	0.05%
Antipatharia	1	0.05%
Cnidaria non-coral	3	0.14%
Fam- Zoanthidae	1	0.05%
Hydroidolina	2	0.10%
Annelida	1	0.05%
Sabellidae	1	0.05%
Arthropoda	2	0.10%
Paguridae	1	0.05%
Penaeidae	1	0.05%
Echinodermata	17	0.81%
Crinoidea	14	0.67%
Goniaster tessellatus	1	0.05%
Narcissia trigonaria	1	0.05%
Ophiuroidea	1	0.05%
Chordata	8	0.38%
Asciidiacea	1	0.05%
Fish	7	0.33%
Other organism	5	0.24%
Other organism	5	0.24%
Soft bottom substrate	1260	60.03%
Soft bottom substrate	1260	60.03%
Bare soft bottom substrate	1260	60.03%
Hard bottom substrate	761	36.26%
Hard bottom substrate	761	36.26%
Bare rock- pavement boulder ledge	729	34.73%
Bare rubble- rock	32	1.52%
Grand Total	2099	100.00%

Dive Site: ROV 13-18; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 78 m**Density of Fish:**

Table 1. Density (number individuals/km) of fish for all transects at 13-18.

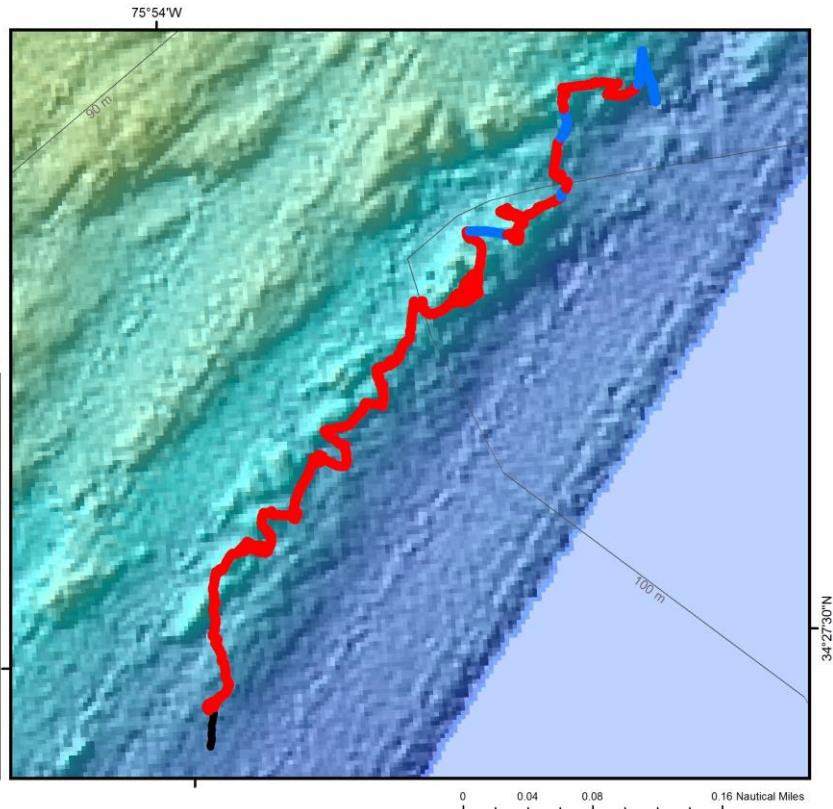
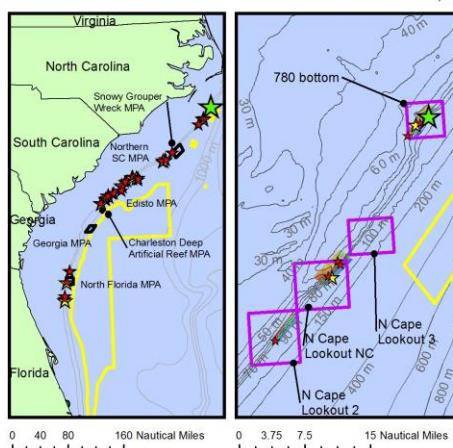
Scientific Name	Common Name	13-18
<i>Anthiinae</i>	anthiid	4.96
<i>Apogon pseudomaculatus</i>	twospot cardinalfish	1.65
<i>Apogon</i> sp.	cardinalfish	0.33
<i>Balistes capriscus</i>	grey triggerfish	0.66
<i>Brotula barbata</i>	bearded brotula	0.66
<i>Canthigaster rostrata</i>	sharpnose puffer	4.63
<i>Caulolatilus microps</i>	blueline tilefish	0.33
<i>Centropristes ocyurus</i>	bank sea bass	3.31
<i>Chaetodon sedentarius</i>	reef butterflyfish	6.95
<i>Chromis encrysurus</i>	yellowtail reefish	5.63
<i>Decodon puellaris</i>	red hogfish	2.65
<i>Epinephelus flavolimbatus</i>	yellowedge grouper	0.33
<i>Epinephelus morio</i>	red grouper	0.66
<i>Equetus lanceolatus</i>	jack-knife fish	1.32
<i>Halichoeres</i> sp.	wrasse	40.04
<i>Hemanthias vivanus</i>	red barbier	1.65
<i>Holacanthus bermudensis</i>	blue angelfish	0.33
<i>Liopropoma eukrines</i>	wrasse bass	1.65
<i>Lutjanus</i> sp.	snapper	0.33
Malacanthidae	tilefish	1.32
Muraenidae	moray eel	0.33
<i>Opsanus</i> sp.	toadfish	0.66
<i>Pagrus pagrus</i>	red porgy	2.98
<i>Pareques umbrosus</i>	cubbyu	3.31
<i>Pristigenys alta</i>	short bigeye	28.46
<i>Prognathodes aya</i>	bank butterflyfish	0.66
<i>Pterois volitans</i>	lionfish	9.27
<i>Seriola dumerili</i>	greater amberjack	0.33
<i>Seriola</i> sp.	amberjack	8.6
<i>Serranus notospilus</i>	saddle bass	28.46
<i>Serranus phoebe</i>	tattler	11.91
<i>Serranus</i> sp.	sea bass	2.65

Dive Site: ROV 13-19; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 80 m

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
North Carolina, 780 bottom-
Proposed MPA
7-VII-13-3; ROV 13-19

- ★ ROV 13-19
 - ★ ROV Dives
 - ★ CTD
 - ROV Tracks**
 - Hard Bottom
 - Soft Bottom
 - Other ROV Tracks
- MPA
 Deep Coral HAPC
 Proposed MPA 2013
 Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	NorthCarolina780.tif
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/7/2013
Specimens:	0
Digital Photos:	65
DVD:	1
Hard Drive:	1

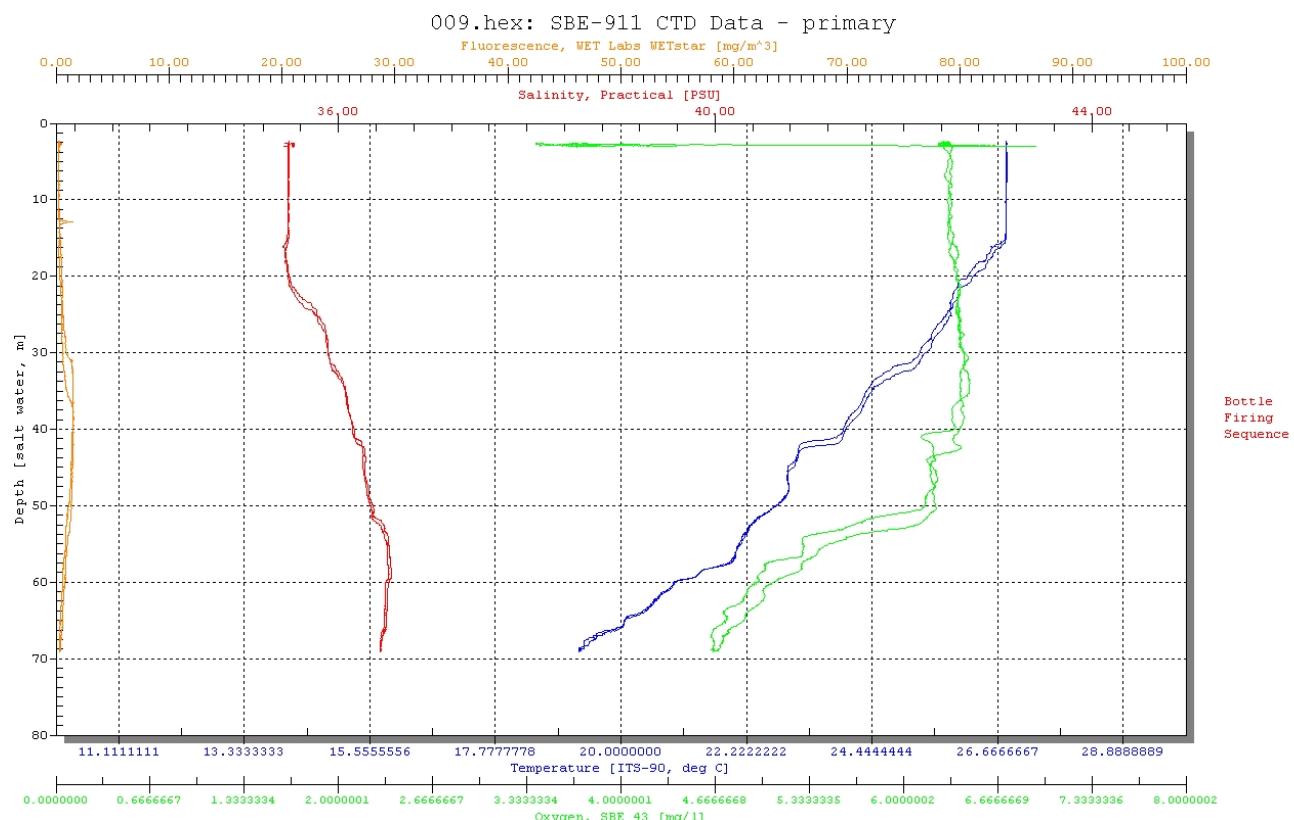
Dive Site: ROV 13-19; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 80 m

Dive Data:

Minimum Bottom Depth (m):	-78	Total Transect Length (km):	0.93
Maximum Bottom Depth (m):	-86	Surface Current (kn):	
On Bottom (Time- GMT):	10:24	On Bottom (Lat/Long):	34.46°N; -75.9°W
Off Bottom (Time- GMT):	11:26	Off Bottom (Lat/Long):	34.46°N; -75.89°W
Physical (bottom); Temp (°C):	19.02	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 3.32



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-19; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 80 m

Dive Imagery:



Figure 1: -82.8 m 34.46 °N; -75.90 °W

Bristle worm (*Hermodice carunculata*) with arrow crab (*Stenorhynchus seticornis*), hermit crab, and arm of giant red brittlestar.



Figure 2: -84.3 m 34.46 °N; -75.90 °W

Short bigeye (*Pristigenys alta*) [red fish] with numerous comatulid crinoids (*Crinometra brevipenna*), moray eel (Muraenidae), and hydroids.

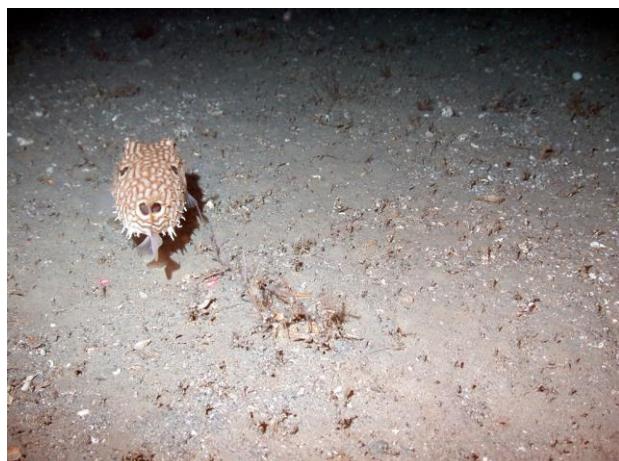


Figure 3: -81.8 m 34.46 °N; -75.89 °W

A web burrfish (*Chilomycterus antillarum*).

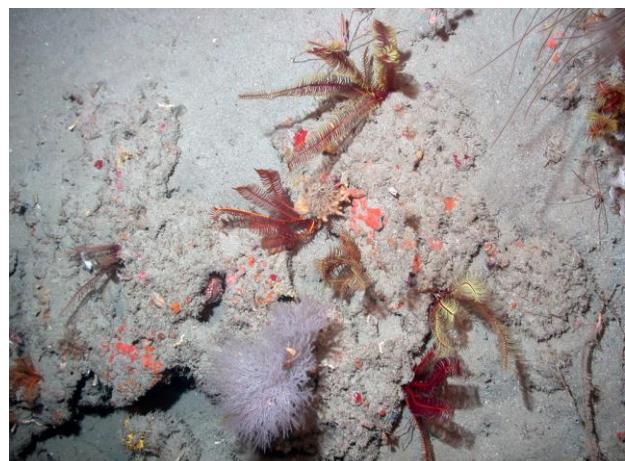


Figure 4: -81.6 m 34.46 °N; -75.89 °W

Cluster of comatulid crinoids (*Crinometra brevipenna*), with bushy white black coral (Antipathidae), and hydroids on low relief rock bottom.

Dive Site: ROV 13-19; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 80 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-19, UNCW Superphantom ROV Dive 2254; Site #- 7-VII-13-3. Target Site - N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 80 m, ground truth 2013 Pieces Multibeam (780BottomMap.tif).

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted.

Site Description/Habitat/Biota:

Continue transect of previous dive, along eastern edge of hard bottom MB feature. Transect paralleled the lower slope of the east edge of feature, heading NNE. Small rock boulders, sediment, low relief pavement at base of feature, low relief, low relief boulders, <0.5 m diameter. Top of 1st rock mound: 0.25-0.5 m low relief, low rugosity rounded rock knolls with pavement, dominated by black hairy hydroids and *Stichopathes* sp. Slope ranges from flat - 0o to low slope 10o. Base of slope (84.5 m) 0.25 m relief, 1 m diameter scattered boulders, mostly sediment veneered pavement and sediment. Low benthic density, and few fish.

Dominant Benthic Biota:

Ann - *Hermodice carunculata*; Art - Decapoda: *Stenorhynchus seticornis*, Anomura; Cni - Antipathidae: *Stichopathes* sp., *Antipathes* sp.; Hydroidolina: black hairy, black stinging, black bushy; Gorgonacea: *Diodogorgia* sp., Ellisellidae, Plexauridae; Alcyonacea: *Nidalia* sp; Ech - Crinoidea: *Crinometra brevipenna*; Ophiuroidea: *Asteroporpa annulata*, *Ophioderma devaneyi*; Ech - Asteroidea; unid. sp., *Narcissia trigonaria*; Mol - Gastropoda: *Busycon* sp.; Por - Demospongiae: Axinellidae, *Geodia* sp., *Ircinia* sp.

Fish

moray eel - Muraenidae, saddle bass - *Serranus notospilus*, short bigeye - *Pristigenys alta*, wrasse - *Halichoeres* sp.,

Dive Site: ROV 13-19; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 80 m

CPCe Percent Cover Analysis:

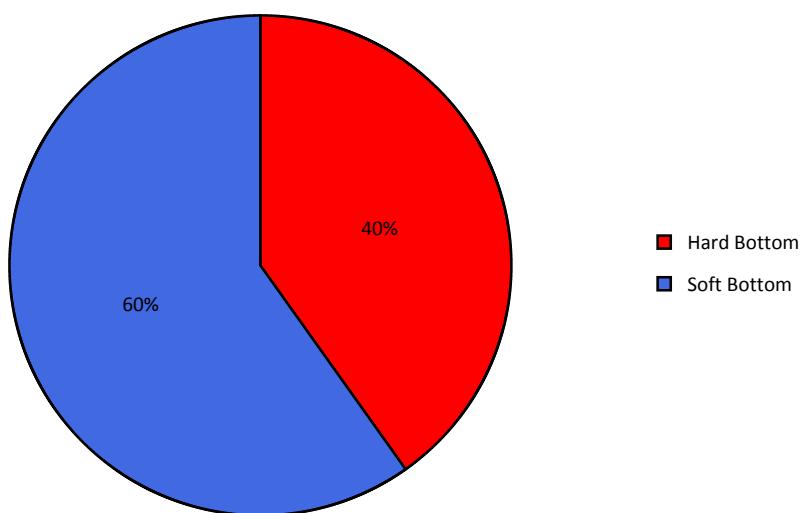


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-19. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

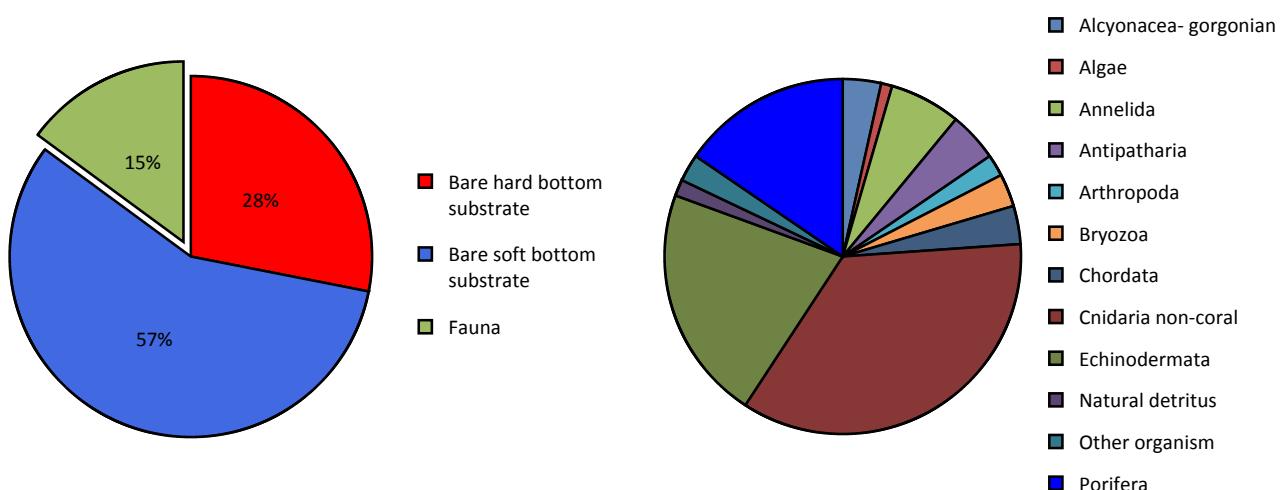


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-19.

Dive Site: ROV 13-19; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 80 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-19.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	201	14.90%
Algae	2	0.15%
Corallinales/crustose coralline	2	0.15%
Porifera	31	2.30%
Astrophorida	7	0.52%
Demospongiae	11	0.82%
Spirastrellidae	13	0.96%
Alcyonacea- gorgonian	7	0.52%
Diodogorgia sp.	1	0.07%
Gorgonacea	5	0.37%
Telesto/Carijoa	1	0.07%
Antipatharia	9	0.67%
Stichopathes lutkeni	4	0.30%
Cnidaria non-coral	71	5.26%
Hydroidolina	71	5.26%
Annelida	13	0.96%
Filograna sp.	1	0.07%
Hermodice carunculata	2	0.15%
Sabellidae	10	0.74%
Arthropoda	4	0.30%
Stenorhynchus seticornis	4	0.30%
Bryozoa	6	0.44%
Bryozoa	6	0.44%
Echinodermata	43	3.19%
Comcatinia meridionalis	39	2.89%
Crinoidea	1	0.07%
Ophioderma devaneyi	2	0.15%
Ophiuroidea	1	0.07%
Chordata	7	0.52%
Didemnidae	1	0.07%
Fish	6	0.44%
Other organism	5	0.37%
Other organism	5	0.37%
Natural detritus	3	0.22%
Natural detritus	3	0.22%
Soft bottom substrate	769	57.01%

Dive Site: ROV 13-19; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 80 m

Soft bottom substrate	769	57.01%
Bare soft bottom substrate	769	57.01%
Hard bottom substrate	379	28.09%
Hard bottom substrate	379	28.09%
Bare rock- pavement boulder ledge	353	26.17%
Bare rubble- rock	26	1.93%
Grand Total	1349	100.00%

Dive Site: ROV 13-19; N. Carolina, proposed 780 bottom MPA, low relief hard bottom, 80 m

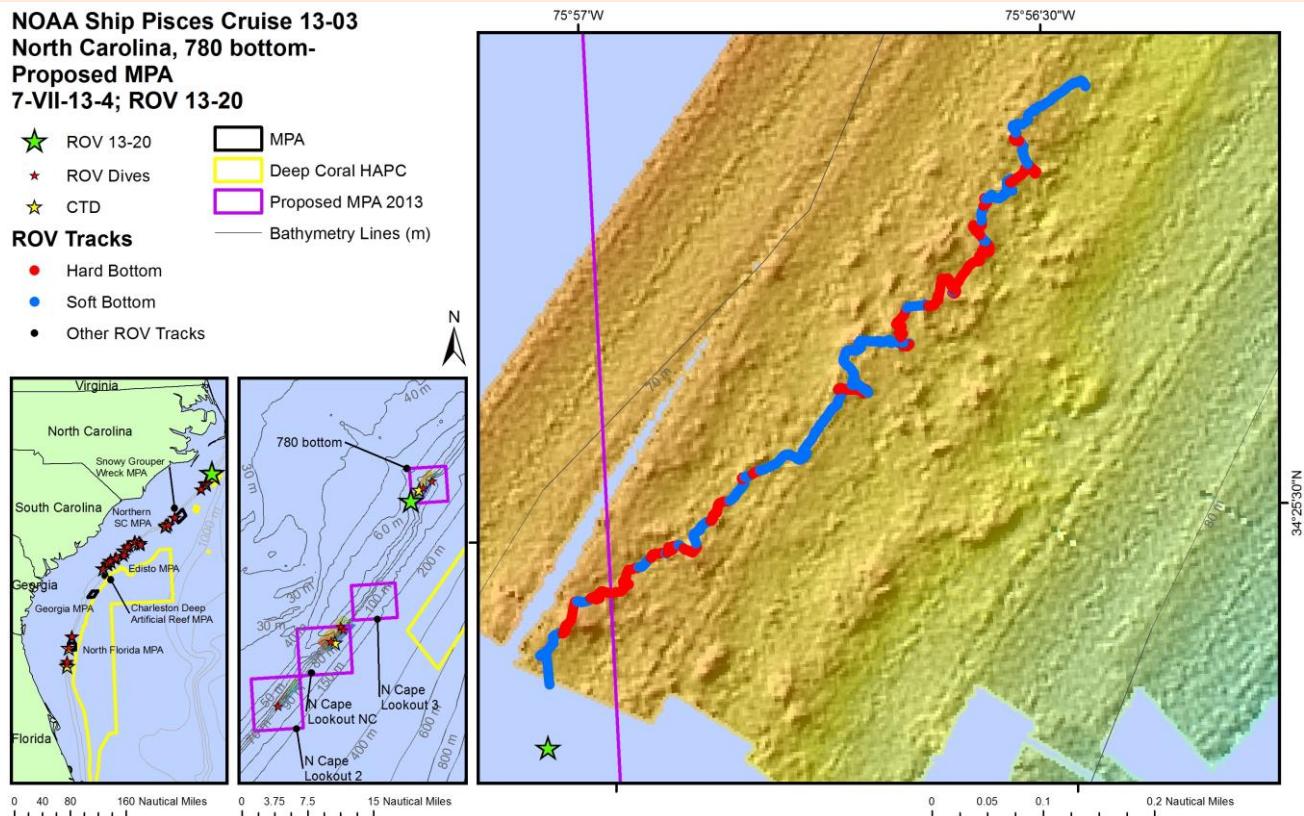
Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-19.

Scientific Name	Common Name	13-19
<i>Apogon pseudomaculatus</i>	twospot cardinalfish	0.62
<i>Brotula barbata</i>	bearded brotula	1.88
<i>Canthigaster rostrata</i>	sharpnose puffer	7.5
<i>Caulolatilus microps</i>	blueline tilefish	0.62
<i>Centropristes oxyurus</i>	bank sea bass	1.25
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	1.25
<i>Chaetodon sedentarius</i>	reef butterflyfish	8.75
<i>Chilomycterus antillarum</i>	web burrfish	0.62
<i>Chromis encrysurus</i>	yellowtail reefish	14.38
<i>Chromis</i> sp.	damselfish	0.62
<i>Decodon puellaris</i>	red hogfish	3.75
<i>Epinephelus flavolimbatus</i>	yellowedge grouper	0.62
<i>Halichoeres</i> sp.	wrasse	70
<i>Holacanthus bermudensis</i>	blue angelfish	3.12
<i>Liopropoma eukrines</i>	wrasse bass	4.38
<i>Muraena retifera</i>	reticulate moray	0.62
Muraenidae	moray eel	0.62
<i>Mycteroperca phenax</i>	scamp	0.62
<i>Opsanus tau</i>	oyster toadfish	0.62
<i>Pagrus pagrus</i>	red porgy	1.25
<i>Pristigenys alta</i>	short bigeye	28.75
<i>Prognathodes aya</i>	bank butterflyfish	1.25
<i>Pterois volitans</i>	lionfish	6.25
<i>Seriola dumerili</i>	greater amberjack	0.62
<i>Seriola rivoliana</i>	almaco jack	1.25
<i>Seriola</i> sp.	amberjack	1.25
<i>Serranus notospilus</i>	saddle bass	7.5
<i>Serranus phoebe</i>	tattler	25
<i>Serranus</i> sp.	sea bass	1.25

Dive Site: ROV 13-20; N. Carolina, proposed 780 bottom MPA, low relief hard bottom rock mounds, 70 m

General Location and Dive Track:



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	NorthCarolina780.tif
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/7/2013
Specimens:	0
Digital Photos:	74
DVD:	2
Hard Drive:	1

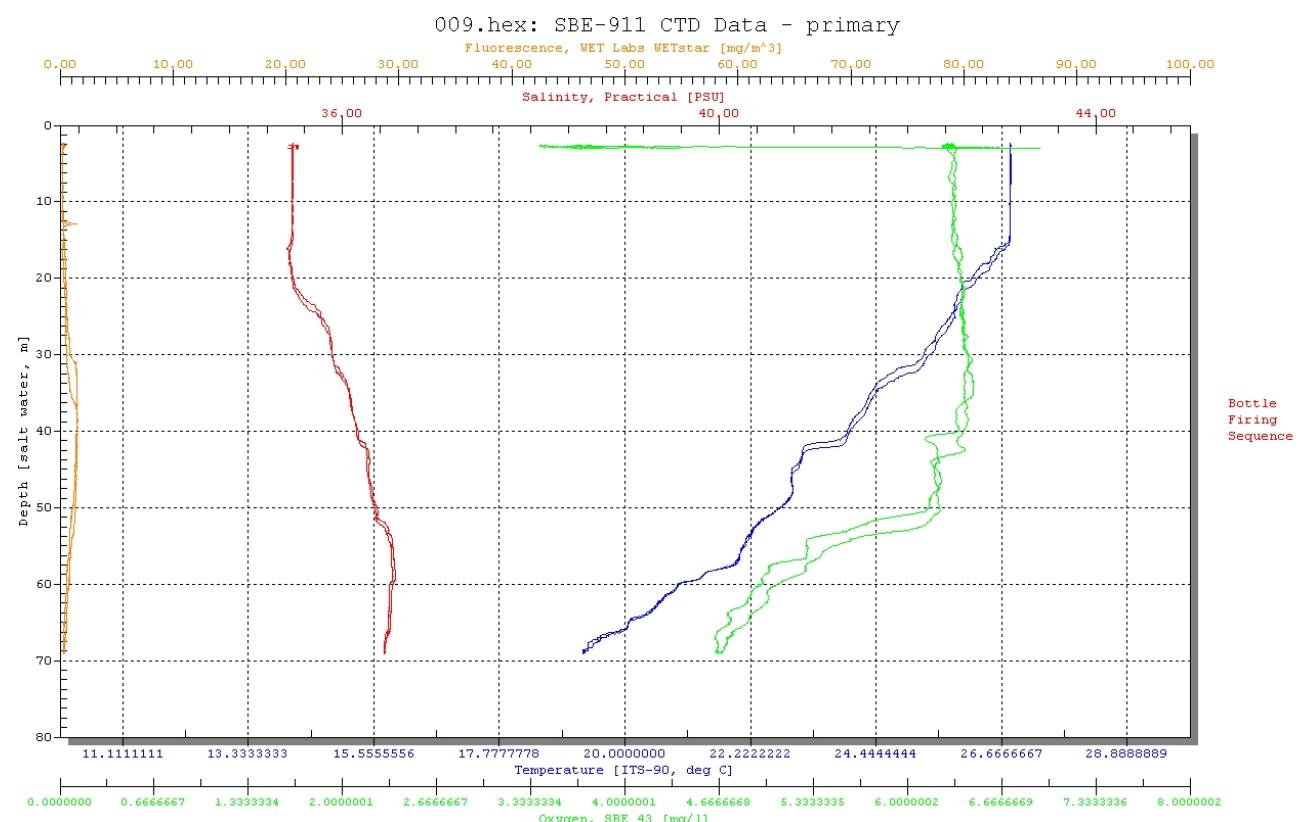
Dive Site: ROV 13-20; N. Carolina, proposed 780 bottom MPA, low relief hard bottom rock mounds, 70 m

Dive Data:

Minimum Bottom Depth (m):	-66	Total Transect Length (km):	1.27
Maximum Bottom Depth (m):	-71	Surface Current (kn):	
On Bottom (Time- GMT):	12:35	On Bottom (Lat/Long):	34.42°N; -75.95°W
Off Bottom (Time- GMT):	13:51	Off Bottom (Lat/Long):	34.43°N; -75.94°W
Physical (bottom); Temp (°C):	19.24	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	0.25

Physical Environment:

Distance from Dive Site(km): 2.84



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-20; N. Carolina, proposed 780 bottom MPA, low relief hard bottom rock mounds, 70 m

Dive Imagery:



Figure 1: -70.1 m 34.43 °N; -75.95 °W

Burrowing sea anemone (*Cerianthidae*).



Figure 2: -69.5 m 34.43 °N; -75.94 °W

Dead lion's paw pecten shell (*Lyropecten nodosus*) on rock.



Figure 3: -69.9 m 34.42 °N; -75.95 °W

Grey triggerfish (*Balistes capriscus*) on nest scoured in sand bottom. Egg mass in bottom of pit.



Figure 4: -69.7 m 34.43 °N; -75.94 °W

Old anchor line buried in sediment with bank sea bass (*Centropristes ocyurus*) [background].

Dive Site: ROV 13-20; N. Carolina, proposed 780 bottom MPA, low relief hard bottom rock mounds, 70 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-20, UNCW Superphantom ROV Dive 2255; Site #- 7-VII-13-4. Target Site - N. Carolina, proposed 780 bottom MPA, low relief hard bottom mounds, 70 m. Ground-truth 2013 Pieces Multibeam (780BottomMap.tif).

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted.

Site Description/Habitat/Biota:

Multibeam: area of patchy, low relief hard bottom, small mounds, at southern end of MB map. Landed 25 m from target: 50x25 m mound. Between the mounds is mostly sand bottom, 70 m depth, with sand waves oriented N-S, 2 m wide waves, and 5 m wave length. Top of sand waves covered with cyanobacteria mat. Top of sand waves 70.8 m - bottom of sand wave 71.0m, 10-20 cm relief. Larger mounds on multibeam were verified as rounded rock knolls, about 10-20 m diam, top 70 m, base in sand at 70.8 m; the rock is very eroded, low relief, with lots of nooks and crannies, < 0.25 m relief, but high localized rugosity. Large swaths of sediment in between the rock mounds. < 50% cover of hard bottom, patchy.

Dominant Benthic Biota:

Alg - Phaeophyta: *Sargassum* sp.; Cyanobacteria; Art - Decapoda: Anomura; Cho - Ascidiacea: Didemnidae; Cni - Gorgonacea: *Titanideum frauenfeldii*; Cni - Pennatulacea: *Virgularia* sp.; Hydroidolina: black stinging; Antipatharia: Stichopathes sp.; Coral- Oculina varicosa

Fish

lionfish - *Pterois volitans* (51), short bigeye - *Pristigenys alta*, reef butterflyfish - *Chaetodon sedentarius*, yellowtail reefish - *Chromis encrysurus*, tattler - *Serranus phoebe*, triggerfish - *Balistes* sp., bank seabass - *Centropristes ocyurus*, wrasse - *Halichoeres* sp., wrasse bass - *Liopropoma eukrines*, amberjack - *Seriola* sp., saddle bass - *Serranus notospilus*, scamp grouper - *Mycteroperca phenax*, sharpnose puffer - *Canthigaster rostrata*, spotfin hogfish - *Bodianus pulchellus*, Jack-knife fish - *Equetus lanceolatus*, red barbier - *Hemanthias vianus*, gray triggerfish - *Balistes capriscus*, twospot cardinalfish - *Apogon pseudomaculatus*, bank butterflyfish - *Prognathodes aya*, creole-fish - *Paranthias furcifer*, french angelfish - *Pomacanthus paru*, porgy - Sparidae, red grouper - *Epinephelus morio*, rock hind - *Epinephelus adscensionis*, spotfin butterflyfish - *Chaetodon ocellatus*

Dive Site: ROV 13-20; N. Carolina, proposed 780 bottom MPA, low relief hard bottom rock mounds, 70 m

CPCe Percent Cover Analysis:

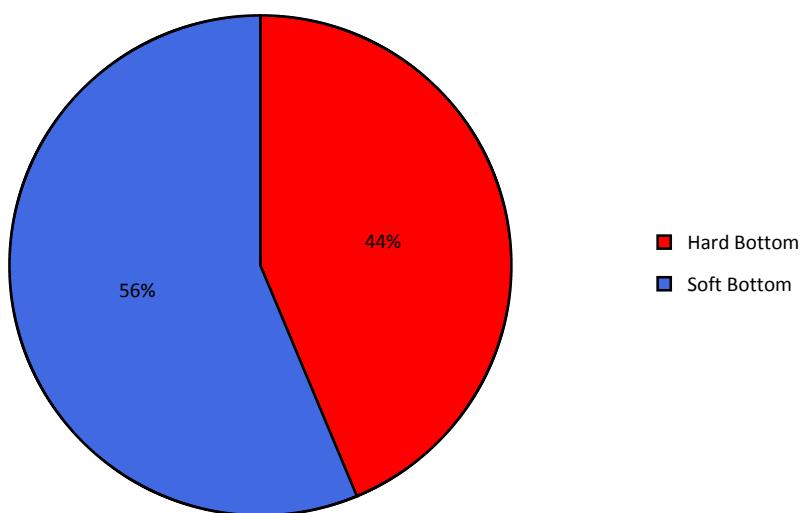


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-20. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

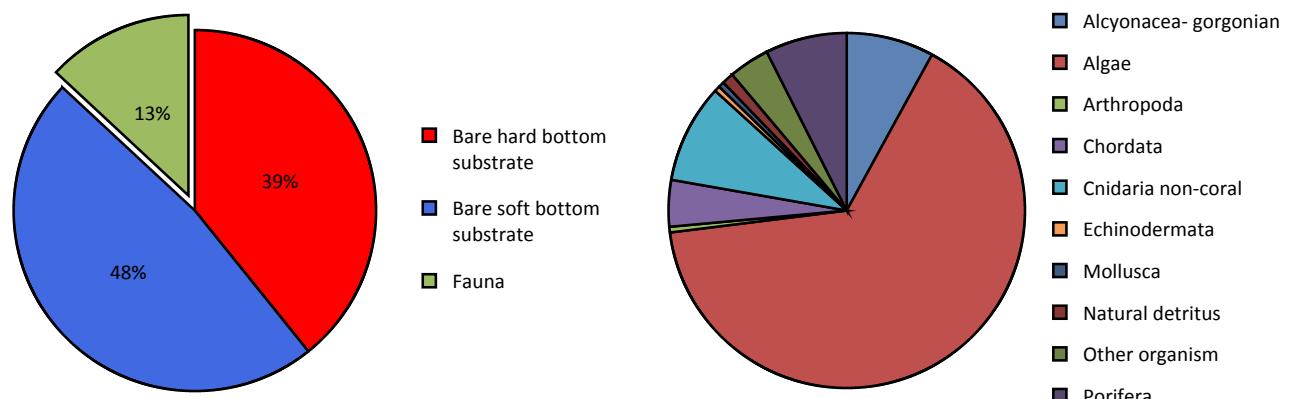


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-20.

Dive Site: ROV 13-20; N. Carolina, proposed 780 bottom MPA, low relief hard bottom rock mounds, 70 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-20.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	189	13.03%
Algae	123	8.48%
Corallinales/crustose coralline	1	0.07%
Cyanophyta	122	8.41%
Porifera	14	0.97%
Demospongiae	10	0.69%
Spirastrellidae	4	0.28%
Alcyonacea- gorgonian	15	1.03%
Telesto/Carijoa	14	0.97%
Titanideum frauenfeldii	1	0.07%
Cnidaria non-coral	17	1.17%
Hydroidolina	17	1.17%
Mollusca	1	0.07%
Gastropoda	1	0.07%
Arthropoda	1	0.07%
Stenorhynchus seticornis	1	0.07%
Echinodermata	1	0.07%
Crinoidea	1	0.07%
Chordata	8	0.55%
Asciidiacea	2	0.14%
Fish	6	0.41%
Other organism	7	0.48%
Other organism	7	0.48%
Natural detritus	2	0.14%
Natural detritus	2	0.14%
Soft bottom substrate	692	47.72%
Soft bottom substrate	692	47.72%
Bare soft bottom substrate	692	47.72%
Hard bottom substrate	569	39.24%
Hard bottom substrate	569	39.24%
Bare rock- pavement boulder ledge	534	36.83%
Bare rubble- coral	5	0.34%
Bare rubble- rock	30	2.07%
Grand Total	1450	100.00%

Dive Site: ROV 13-20; N. Carolina, proposed 780 bottom MPA, low relief hard bottom rock mounds, 70 m

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-20.

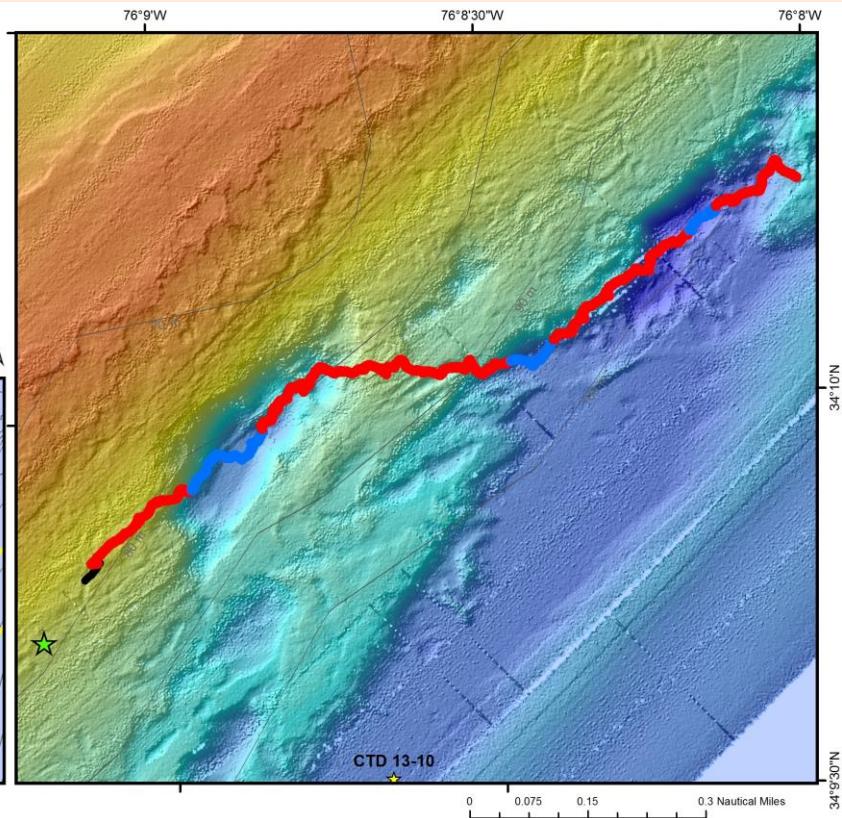
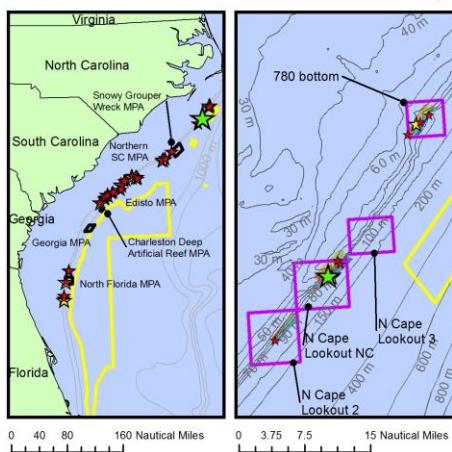
Scientific Name	Common Name	13-20
<i>Acanthurus</i> sp.	doctorfish	0.52
<i>Apogon pseudomaculatus</i>	twospot cardinalfish	1.04
<i>Balistes capriscus</i>	grey triggerfish	49.22
<i>Bodianus pulchellus</i>	spotfin hogfish	5.18
<i>Canthigaster rostrata</i>	sharpnose puffer	4.66
<i>Centropristes ocyurus</i>	bank sea bass	9.33
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	1.04
<i>Chaetodon sedentarius</i>	reef butterflyfish	12.44
<i>Chromis encrysurus</i>	yellowtail reefish	88.08
<i>Epinephelus adscensionis</i>	rock hind	1.04
<i>Epinephelus morio</i>	red grouper	0.52
<i>Equetus lanceolatus</i>	jack-knife fish	2.07
<i>Halichoeres</i> sp.	wrasse	39.38
<i>Hemanthias vivenus</i>	red barbier	3.11
<i>Hyporthodus niveatus</i>	snowy grouper	0.52
<i>Liopropoma eukrines</i>	wrasse bass	6.74
<i>Mycteroperca phenax</i>	scamp	2.07
<i>Paranthias furcifer</i>	creole-fish	1.55
<i>Pomacanthus paru</i>	french angelfish	0.52
<i>Pristigenys alta</i>	short bigeye	41.97
<i>Prognathodes aya</i>	bank butterflyfish	1.04
<i>Pterois volitans</i>	lionfish	21.24
<i>Seriola rivoliana</i>	almaco jack	5.7
<i>Seriola</i> sp.	amberjack	12.44
<i>Serranus notospilus</i>	saddle bass	12.44
<i>Serranus phoebe</i>	tattler	10.36
<i>Sparidae</i>	porgy	1.04

Dive Site: ROV 13-21; N. Carolina, Proposed N Cape Lookout NC MPA, deep slope and scour valley, 125 m

General Location and Dive Track:

**NOAA Ship Pisces Cruise 13-03
North Carolina, N Cape Lookout NC-
Proposed MPA
8-VII-13-2; ROV 13-21**

- ★ ROV 13-21
 - ★ ROV Dives
 - ★ CTD
 - ROV Tracks**
 - Hard Bottom
 - Soft Bottom
 - Other ROV Tracks
- MPA
 Deep Coral HAPC
 Proposed MPA 2013
 Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	CapeLookoutOne
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/8/2013
Specimens:	0
Digital Photos:	173
DVD:	2
Hard Drive:	1

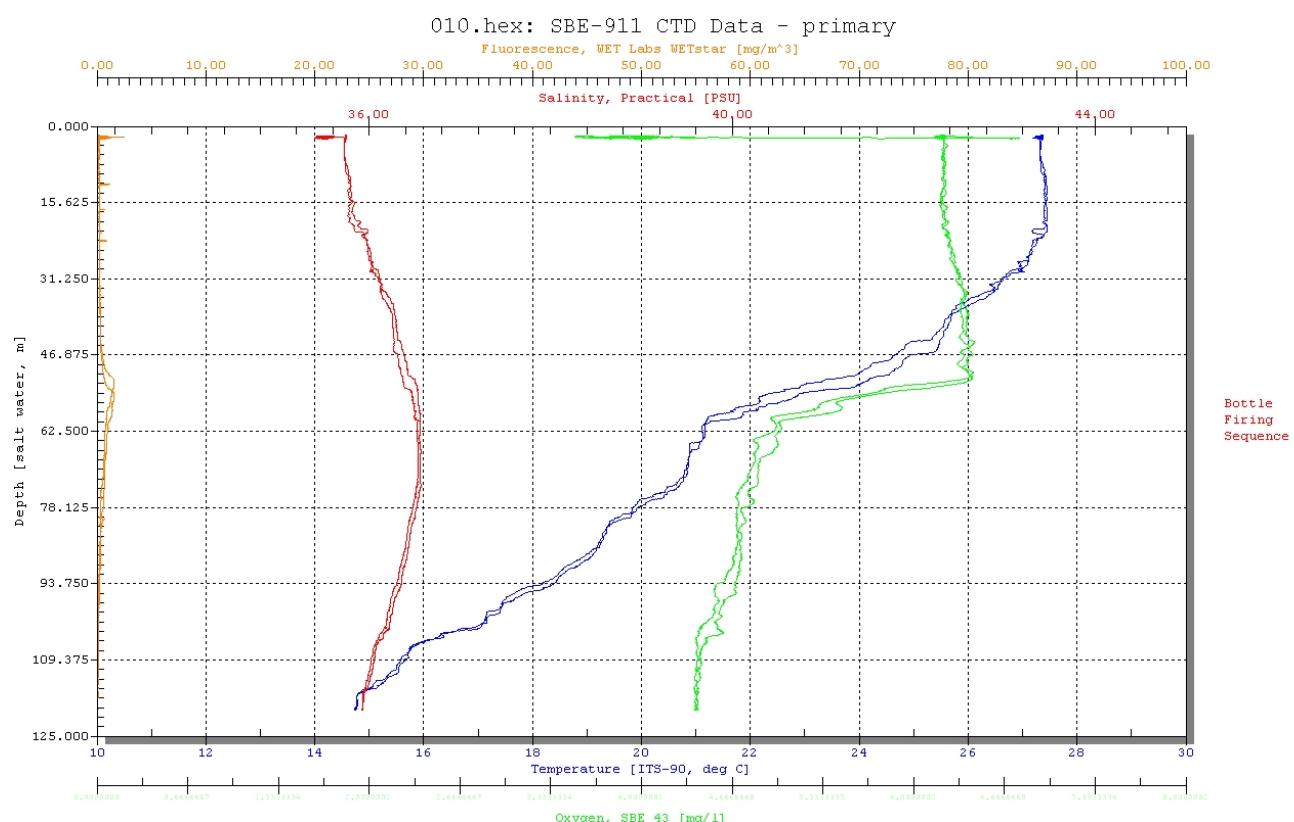
Dive Site: ROV 13-21; N. Carolina, Proposed N Cape Lookout NC MPA, deep slope and scour valley, 125 m

Dive Data:

Minimum Bottom Depth (m):	-67	Total Transect Length (km):	2.06
Maximum Bottom Depth (m):	-135	Surface Current (kn):	1.5
On Bottom (Time- GMT):	8:05	On Bottom (Lat/Long):	34.16°N; -76.15°W
Off Bottom (Time- GMT):	9:59	Off Bottom (Lat/Long):	34.17°N; -76.13°W
Physical (bottom); Temp (°C):	14.40	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 0.88



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-21; N. Carolina, Proposed N Cape Lookout NC MPA, deep slope and scour valley, 125 m

Dive Imagery:



Figure 1: -90.7 m 34.17 °N; -76.14 °W
Oculina varicosa coral on live bottom habitat with comatulid crinoids, demosponges, plexaurid gorgonian, and black coral.



Figure 2: -106.4 m 34.17 °N; -76.14 °W
Scamp grouper (*Mycteroperca phenax*) under rock ledge of forereef.



Figure 3: -100.5 m 34.17 °N; -76.15 °W
Large cluster of live *Oculina varicosa* coral colonies (~ 1m diameter) on rock ledge.



Figure 4: -129.3 m 34.17 °N; -76.14 °W
Plastic debris with giant red brittlestars (*Ophioderma devaneyi*).

Dive Site: ROV 13-21; N. Carolina, Proposed N Cape Lookout NC MPA, deep slope and scour valley, 125 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-21, UNCW Superphantom ROV Dive 2256; Site #- 8-VII-13-2. Target Site - N. Carolina, Proposed N Cape Lookout NC MPA, deep slope and scour valley, 125 m Ground truth 2013 Pisces Multibeam (CapeLookout1.tif- 3 m resolution).

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted.

Site Description/Habitat/Biota:

Multibeam shows rugged topography along the SE slope of a 70 m terrace. Scour at south base is 666 x 216 m SW-NE with a max depth 123 m. Slope and escarpments along the east slope. Landed on top of the terrace, 155 m from scour edge, 81 m deep. Bottom is rock pavement, 10-20 cm ledges, with small boulders and cobble. Didemnidae and crinoids are dominate. Top of the slope into the scour 30-40° slope, <1 m relief eroded rock, 90% cover of HB. 107 m slope decreases and macro fauna decreases however Oculina varicosa colonies are abundant. Base of scour is rubble bottom, low relief rock cobble, 25 cm boulders. Mound at the base of scour, 116 m at the base, ~110 m at the top of the mound very irregular eroded rocks - looks like an old coral reef. Finger sticking out of north end of scour on MB, heading upslope, 1-3 m rugose rock ledges, moderate relief 30° slope. Rock is fairly barren except scattered large heads of Oculina. Northern slope of scour, 1 m rock ledges changing to pavement. The top ledge of the ridge, low relief rock boulders and cobble. Heading into scour # 2, <1 m relief, undercut ledges and 0.25-0.5 m boulders/cobble, high rugosity. Eastern eroded rocky bottom, 10-20° slope, 0.5 to > 1 m relief along the eastern slope. Base of the eastern slope is 120 m at the base sediment, 10-20 % cover rubble, small cobble. Low relief, low slope, low rugosity. Back up the eastern slope, 10-30° slope, 1 m undercut rocks, highly rugose. Top of ledge: moderate relief, boulders. High relief hard bottom, 0-slope.

Oculina varicosa very common: 91-124 m on boulders of lower slope, all live, 10-50 cm, few 100 cm, all white.

One area with what appear to be 10 cm white *Lophelia*; possibly *Madrepora*, but does not look zigzag, and polyps flared: 125-134 m; ROV CTD showed minimum temp of 14°C.

Dominant Benthic Biota:

Coral- *Oculina varicosa* (154), *Lophelia pertusa* or *Madrepora oculata*? (8+); Alg - Rhodophyta: *Halymenia* sp.; Art - Decapoda: Anomura; Cho - Ascidiacea Didemnidae; Cni - Antipathidae: *Stichopathes* sp., *Antipathes* sp.; Gorgonacea: unid. Spp., *Titanideum frauenfeldii*; Hydroidolina; Ech - Crinoidea: *Crinometra brevipenna*?, Ophiuroidea: *Ophioderma devaneyi*, *Asteroporpa annulata*; Por - Demospongiae: Spirastrellidae, Axinellidae

Fish

amberjack - *Seriola* sp., apricot bass, bank butterflyfish - *Prognathodes aya*, cornetfish - *Fistularia* sp., cubbyu - *Equetus umbrosus*, french butterflyfish, lionfish - *Pterois volitans* (6), lizardfish - *Synodus* sp., longsnout butterflyfish - *Chaetodon aculeatus*, orangeback bass - *Serranus annularis*, red barbier - *Hemanthias vittatus*, reef butterflyfish - *Chaetodon sedentarius*, roughtongue bass - *Pronotogrammus martinicensis*, scamp grouper - *Mycteroperca phenax*, scorpionfish - Scorpidae, sharpnose puffer - *Canthigaster rostrata*, short bigeye - *Pristigenys alta*, soldierfish, spotfin hogfish - *Bodianus pulchellus*,

Dive Site: ROV 13-21; N. Carolina, Proposed N Cape Lookout NC MPA, deep slope and scour valley,
125 m

squirrelfish - *Holocentrus* sp., tattler - *Serranus phoebe*, tomate - *Haemulon aurolineatum*, wrasse -
Halichoeres sp., wrasse bass - *Liopropoma eukrines*, yellowmouth grouper - *Mycteroperca interstitialis*

Dive Site: ROV 13-21; N. Carolina, Proposed N Cape Lookout NC MPA, deep slope and scour valley, 125 m

CPCe Percent Cover Analysis:

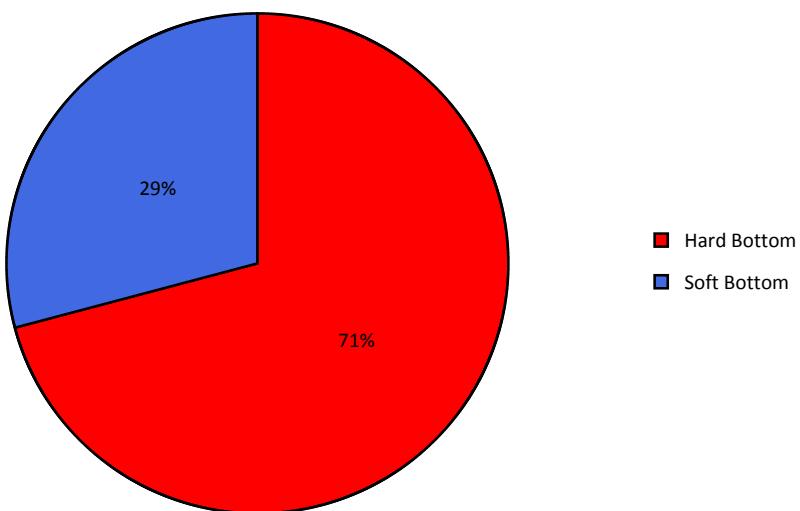


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-21. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

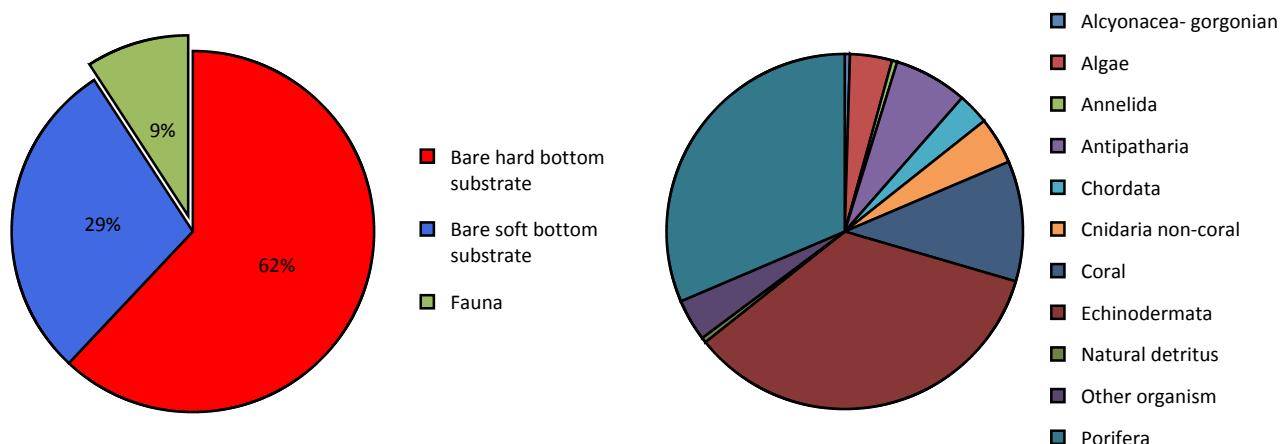


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-21.

Dive Site: ROV 13-21; N. Carolina, Proposed N Cape Lookout NC MPA, deep slope and scour valley, 125 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-21.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	210	9.17%
Algae	8	0.35%
Corallinales/crustose coralline	8	0.35%
Porifera	66	2.88%
Demospongiae	43	1.88%
Spirastrellidae	23	1.00%
Coral	23	1.00%
Madrepora oculata/carolina	3	0.13%
Oculina varicosa	20	0.87%
Alcyonacea- gorgonian	1	0.04%
Gorgonacea	1	0.04%
Antipatharia	14	0.61%
Antipatharia	12	0.52%
Tanacetipathes hirta	2	0.09%
Cnidaria non-coral	9	0.39%
Fam- Zoanthidae	1	0.04%
Hydroidolina	8	0.35%
Annelida	1	0.04%
Serpulidae	1	0.04%
Echinodermata	73	3.19%
Centrostephanus longispinus	1	0.04%
Comcatinia meridionalis	52	2.27%
Crinoidea	2	0.09%
Davidaster sp.	5	0.22%
Echinoidea	1	0.04%
Ophioderma devaneyi	12	0.52%
Chordata	6	0.26%
Didemnidae	1	0.04%
Fish	5	0.22%
Other organism	8	0.35%
Other organism	8	0.35%
Natural detritus	1	0.04%
Natural detritus	1	0.04%
Soft bottom substrate	660	28.83%
Soft bottom substrate	660	28.83%
Bare soft bottom substrate	660	28.83%
Hard bottom substrate	1419	61.99%

Dive Site: ROV 13-21; N. Carolina, Proposed N Cape Lookout NC MPA, deep slope and scour valley,
125 m

Hard bottom substrate	1419	61.99%
Bare rock- pavement boulder ledge	1374	60.03%
Bare rubble- coral	2	0.09%
Bare rubble- rock	41	1.79%
Standing dead coral	2	0.09%
Grand Total	2289	100.00%

Dive Site: ROV 13-21; N. Carolina, Proposed N Cape Lookout NC MPA, deep slope and scour valley, 125 m

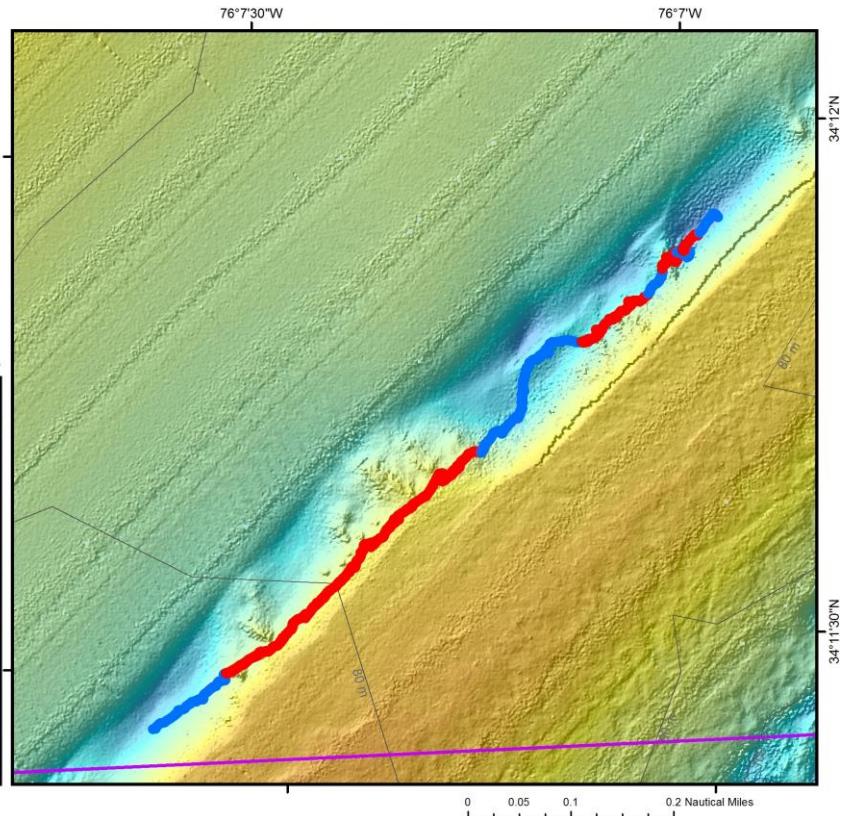
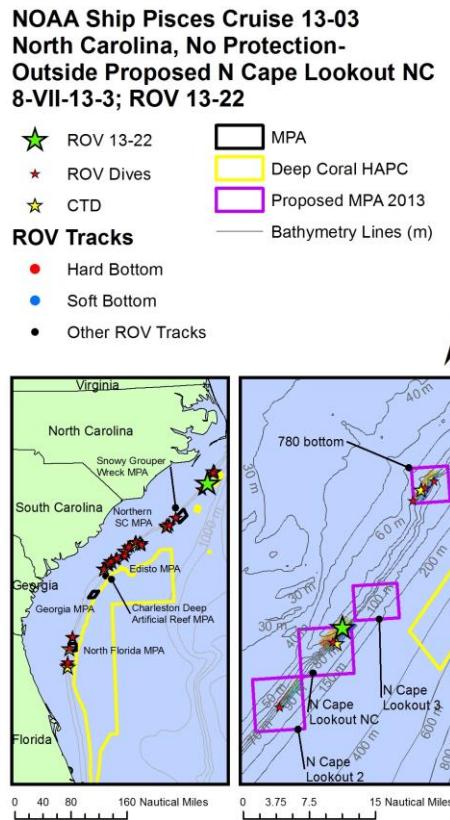
Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-21.

Scientific Name	Common Name	13-21
<i>Anthiinae</i>	anthiid	301.96
<i>Apogon</i> sp.	cardinalfish	0.39
<i>Bodianus pulchellus</i>	spotfin hogfish	1.18
<i>Canthigaster rostrata</i>	sharpnose puffer	1.96
<i>Chaetodon aculeatus</i>	longsnout butterflyfish	1.57
<i>Chaetodon sedentarius</i>	reef butterflyfish	8.24
<i>Chromis enchrissurus</i>	yellowtail reefish	0.39
<i>Decodon puellaris</i>	red hogfish	1.96
<i>Fistularia petimba</i>	red cornetfish	0.39
<i>Haemulon aurolineatum</i>	tomtate	3.53
<i>Halichoeres</i> sp.	wrasse	13.33
<i>Hemanthias vivanus</i>	red barbier	5.88
Holocentridae		4.71
<i>Holocentrus</i> sp.	squirrelfish	0.39
<i>Liopropoma eukrines</i>	wrasse bass	5.49
<i>Mycteroperca interstitialis</i>	yellowmouth grouper	0.39
<i>Mycteroperca phenax</i>	scamp	0.78
<i>Ostichthys trachypoma</i>	bigeye soldierfish	0.39
<i>Pagrus pagrus</i>	red porgy	3.14
<i>Pareques iwamotoi</i>	blackbar drum	0.78
<i>Pareques umbrosus</i>	cubbyu	10.59
<i>Plectranthias garrupellus</i>	apricot bass	7.06
<i>Plectrypops retrospinus</i>	cardinal soldierfish	0.39
<i>Pristigenys alta</i>	short bigeye	6.67
<i>Prognathodes aya</i>	bank butterflyfish	8.63
<i>Prognathodes guyanensis</i>	french butterflyfish	0.39
<i>Pronotogrammus martinicensis</i>	roughtongue bass	436.08
<i>Pterois volitans</i>	lionfish	3.14
Scorpaenidae	scorpionfish	14.12
<i>Seriola</i> sp.	amberjack	1.96
<i>Serranus annularis</i>	orangeback bass	0.78
<i>Serranus phoebe</i>	tattler	15.29
<i>Synodus intermedius</i>	sand diver	0.39
<i>Synodus</i> sp.	lizardfish	0.39

Dive Site: ROV 13-22; N. Carolina, Outside Proposed N Cape Lookout NC MPA, deep slope and scour valley, 110 m

General Location and Dive Track:



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	CapeLookoutOne
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/8/2013
Specimens:	0
Digital Photos:	118
DVD:	2
Hard Drive:	1

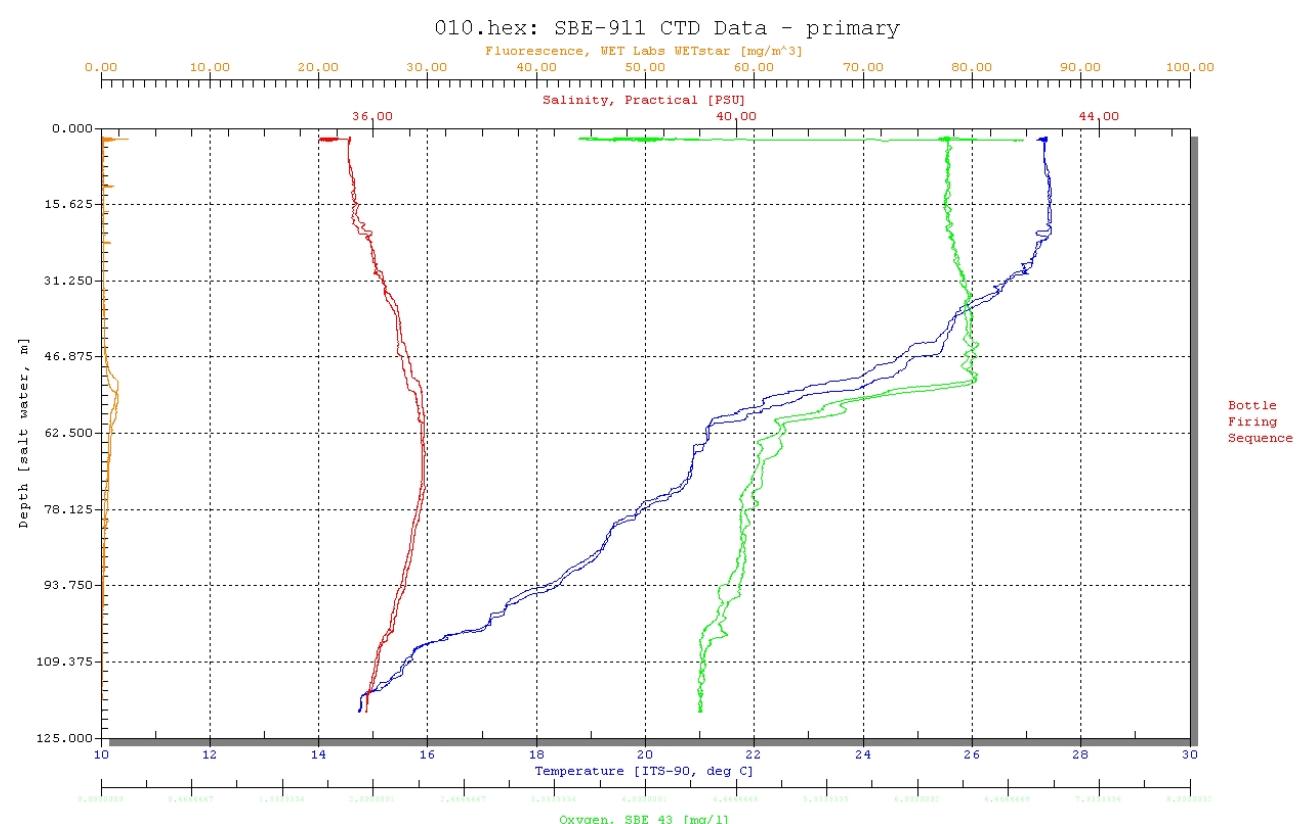
Dive Site: ROV 13-22; N. Carolina, Outside Proposed N Cape Lookout NC MPA, deep slope and scour valley, 110 m

Dive Data:

Minimum Bottom Depth (m):	-77	Total Transect Length (km):	1.28
Maximum Bottom Depth (m):	-117	Surface Current (kn):	
On Bottom (Time- GMT):	10:35	On Bottom (Lat/Long):	34.19°N; -76.13°W
Off Bottom (Time- GMT):	11:59	Off Bottom (Lat/Long):	34.2°N; -76.12°W
Physical (bottom); Temp (°C):	19.10	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	0

Physical Environment:

Distance from Dive Site(km): 3.65



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-22; N. Carolina, Outside Proposed N Cape Lookout NC MPA, deep slope and scour valley, 110 m

Dive Imagery:



Figure 1: -99.1 m 34.20 °N; -76.12 °W

A 'pride' of Lionfish (*Pterois volitans/miles*) is unfortunately becoming a familiar image on these shelf-edge reefs.

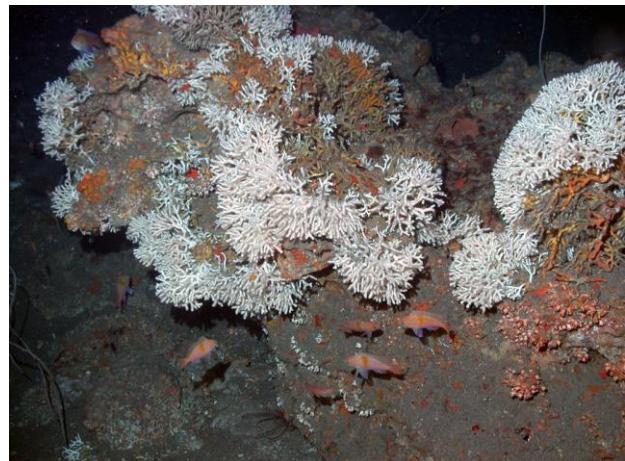


Figure 2: -108.2 m 34.20 °N; -76.12 °W

Large clusters of deepwater *Oculina varicosa* coral on rock outcrops with school of roughtongue bass (*Pronotogrammus martinicensis*).



Figure 3: -90.1 m 34.19 °N; -76.13 °W

Clusters of *Erylus*? sp. finger sponges and solitary corals on rock outcrop.



Figure 4: -84.7 m 34.19 °N; -76.12 °W

Sharptail snake eel (*Myrichthys acuminatus*) on low relief hard bottom with a variety of Plexauridae gorgonians, hydroids, and comatulid crinoids (*Crinometra brevipenna*).

Dive Site: ROV 13-22; N. Carolina, Outside Proposed N Cape Lookout NC MPA, deep slope and scour valley, 110 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-22, UNCW Superphantom ROV Dive 2257; Site #- 8-VII-13-3. Target Site - N. Carolina, Outside Proposed N Cape Lookout NC MPA, deep slope and scour valley, 110 m. Ground truth 2013 Pisces Multibeam (CapeLookout1.tif- 3 m resolution).

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Clock video 1 second ahead of GMT

Site Description/Habitat/Biota:

Multibeam shows NW slope of the 70 m terrace; elongated scour valley 217 m wide x 4700+ m long paralleling the western base; max depth ~120 m. Western slope of the terrace: Jumbled rock boulders and ledges, moderate relief, high rugosity, 30-40° slope to 10-30o, dense biota. Parts of this have a steep slope. MB shows large rock boulders, these are verified on the video. 78 m top, 83 at base of the larger boulders, approx. 10 m diameter on the low slope. In-between the large rock mounds is moderate relief, 80% cover of rock/hard bottom which is 100% covered in fauna. Slope ranges from 10-30°. Rounded northern area in MB of the western slope is pavement, low to 0 slope, low relief, low rugosity, 80% cover of small cobble/rock. All hard bottom is 100% covered in fauna and dominated by *Stichopathes* sp., *Crinometra brevipenna*. At beginning of dive was very dense cover of macro-sponges, several spp: 35 cm clusters of finger sponge with apical oscula- *Aplysina*?, thick lobate grey encrusting sponge- *Chondrosia*? On MB rough area at dog leg are large irregular eroded rock outcrops - 93 m. Base is the scour: sediment with rock rubble. 30% cover of rock. Base of western slope: moderate 1-2 m relief, 20-30° slope, high rugosity under cut ledges on 5-6 m diameter boulders, 103 m - appears as a rough area on the MB at the base on the western slope. Around these large outcrops it is flat pavement, 100% rock, these large boulder/rocky areas are moderate slope, 30-60° high relief > 3 m and undercut ledges. Base of scour- 10 cm rock cobble on sediment. 10 m tall N-S ridge, 106-96 m, within the scour valley (appears on MB): ridge is rugged vertical wall with 16+ *Oculina varicosa* colonies, white 10-50 cm diameter. 96 m numerous *Oculina* heads abundant in the area. North side of ridge is pavement with scattered large 1-2 m rock boulders with 1 m relief. Tapering out into sediment sand small scattered rocks to the north (117 m).

Dominant Benthic Biota:

Coral- *Oculina varicosa* (101- depth 76-112 m; mostly 10-25 cm, few 50 cm, some 1 m, all white and healthy); Ann - *Filograna* sp., *Hermodice carunculata*; Cho - *Pyrosoma* sp.; Cni - Antipathidae: *Stichopathes* sp., Tanacetipathes; Gorgonacea: *Diodogorgia* sp., *Telesto* sp.; Ech - Crinoidea: *Crinometra brevipenna*; Ophiuroidea: *Asteropora annulata*, *Ophioderma devaneyi*; Por - Demospongiae: white fingers (50 cm rubbery cluster of 1 cm diam fingers, apical osculum *Aplysina*?), unid "Titalist" orange ball sponge, *Chondrosia* sp., Spirastrellidae, unid black blob, unid lobate encrusting.

Fish:

amberjack - *Seriola* sp., apricot bass, bank butterflyfish - *Prognathodes aya*, bank seabass - *Centropristes ocyurus*, blue angelfish - *Holacanthus bermudensis*, blueline tilefish - *Caulolatilus microps*, *Brotula* sp., burrfish, Calamus porgy - *Calamus* sp., cardinalfish, cubbyu - *Equetus umbrosus*, gag grouper - *Mycteroperca*

Dive Site: ROV 13-22; N. Carolina, Outside Proposed N Cape Lookout NC MPA, deep slope and scour valley, 110 m

microlepis, lionfish - *Pterois volitans* (24), lizardfish - *Synodus* sp., moray eel - Muraenidae, purple reefish - *Chromis scotti*, red barbier - *Hemanthias vivenus*, red hogfish - *Decodon puellaris*, red porgy - *Pagrus pagrus*, reef butterflyfish - *Chaetodon sedentarius*, roughtongue bass - *Pronotogrammus martinicensis*, saddle bass - *Serranus notospilus*, scamp grouper - *Mycteroperca phenax*, sharpnose puffer - *Canthigaster rostrata*, sharptail snake eel - *Myrichthys acuminatus*, short bigeye - *Pristigenys alta*, speckled hind - *Epinephelus drummondhayi*, spotfin butterflyfish - *Chaetodon ocellatus*, spotfin hogfish - *Bodianus pulchellus*, spotted goatfish - *Pseudupeneus maculatus*, squirrelfish - *Holocentrus* sp., tattler - *Serranus phoebe*, toadfish - *Opsanus* sp., wrasse - *Halichoeres* sp., wrasse bass - *Liopropoma eukrines*, yellowtail reefish - *Chromis enchyrsurus*

Dive Site: ROV 13-22; N. Carolina, Outside Proposed N Cape Lookout NC MPA, deep slope and scour valley, 110 m

CPCe Percent Cover Analysis:

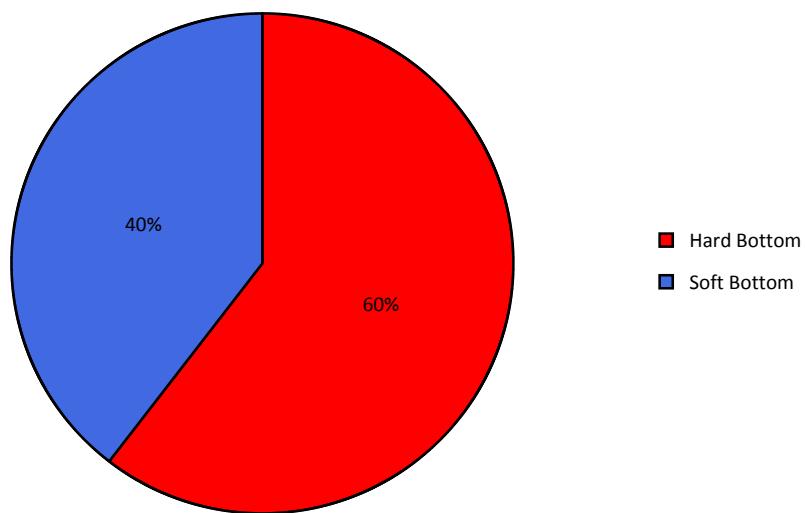


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-22. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

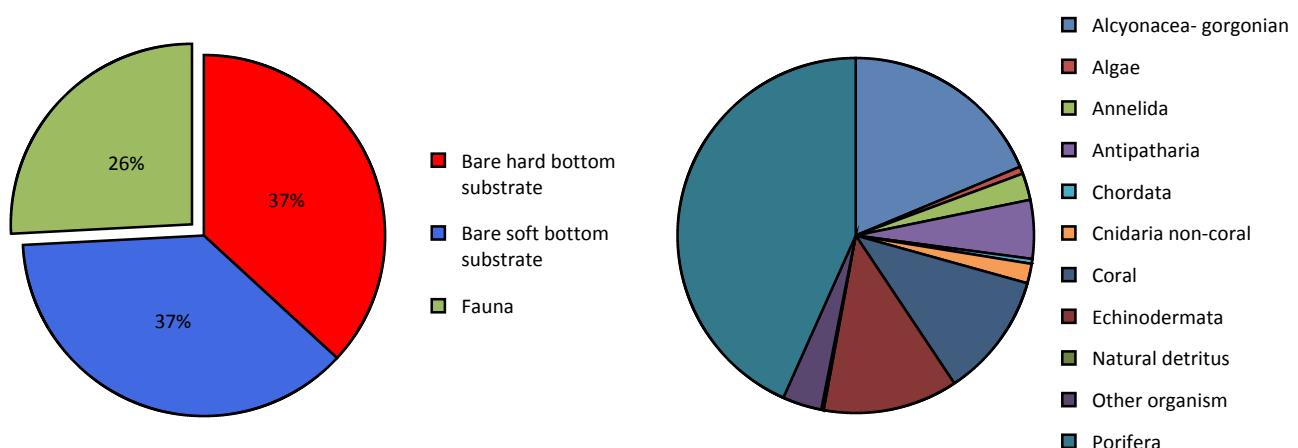


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-22.

Dive Site: ROV 13-22; N. Carolina, Outside Proposed N Cape Lookout NC MPA, deep slope and scour valley, 110 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-22.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	450	25.83%
Algae	3	0.17%
Corallinales/crustose coralline	2	0.11%
Cyanophyta	1	0.06%
Porifera	195	11.19%
Chondrilla sp.	77	4.42%
Demospongiae	78	4.48%
Halisarca sp.	6	0.34%
Spirastrellidae	34	1.95%
Coral	51	2.93%
Oculina varicosa	29	1.66%
Phyllangia americana	2	0.11%
Scleractinia solitary	20	1.15%
Alcyonacea- gorgonian	84	4.82%
Diodogorgia sp.	4	0.23%
Leptogorgia	3	0.17%
Telesto/Carijoa	77	4.42%
Antipatharia	24	1.38%
Antipatharia	8	0.46%
Stichopathes lutkeni	13	0.75%
Tanacetipathes hirta	3	0.17%
Cnidaria non-coral	8	0.46%
Hydroidolina	8	0.46%
Annelida	11	0.63%
Filograna sp.	9	0.52%
Hermodice carunculata	1	0.06%
Serpulidae	1	0.06%
Echinodermata	55	3.16%
Arbacia punctulata	1	0.06%
Asteropora annulata	1	0.06%
Comcatinia meridionalis	39	2.24%
Crinoidea	10	0.57%
Davidaster sp.	1	0.06%
Luidia alternata	1	0.06%
Ophioderma devaneyi	1	0.06%
Stylocidaris sp.	1	0.06%
Chordata	2	0.11%

Dive Site: ROV 13-22; N. Carolina, Outside Proposed N Cape Lookout NC MPA, deep slope and scour valley, 110 m

Didemnidae	1	0.06%
Fish	1	0.06%
Other organism	16	0.92%
Other organism	16	0.92%
Natural detritus	1	0.06%
Natural detritus	1	0.06%
Soft bottom substrate	650	37.31%
Soft bottom substrate	650	37.31%
Bare soft bottom substrate	650	37.31%
Hard bottom substrate	642	36.85%
Hard bottom substrate	642	36.85%
Bare rock- pavement boulder ledge	479	27.50%
Bare rubble- rock	163	9.36%
Grand Total	1742	100.00%

Dive Site: ROV 13-22; N. Carolina, Outside Proposed N Cape Lookout NC MPA, deep slope and scour valley, 110 m

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-22.

Scientific Name	Common Name	13-22
<i>Anthiinae</i>	anthiid	423.95
<i>Bodianus pulchellus</i>	spotfin hogfish	1.29
<i>Calamus</i> sp.	porgy	0.65
<i>Canthigaster rostrata</i>	sharpnose puffer	10.36
<i>Centropristes ocyurus</i>	bank sea bass	1.94
<i>Chaetodon sedentarius</i>	reef butterflyfish	18.12
<i>Chaetodon</i> sp.	butterflyfish	0.65
<i>Chromis encrysurus</i>	yellowtail reefish	0.65
<i>Chromis scotti</i>	purple reefish	20.06
<i>Chromis</i> sp.	damselfish	2.59
<i>Epinephelus drummondhayi</i>	speckled hind	0.65
<i>Halichoeres</i> sp.	wrasse	53.07
<i>Hemanthias vivanus</i>	red barbier	200.65
<i>Holacanthus tricolor</i>	rock beauty	1.29
<i>Holocentridae</i>		1.94
<i>Liopropoma eukrines</i>	wrasse bass	3.88
<i>Mycteroperca microlepis</i>	gag grouper	0.65
<i>Mycteroperca phenax</i>	scamp	1.29
<i>Myrichthys acuminatus</i>	sharptail eel	0.65
<i>Ogcocephalus</i> sp.	batfish	0.65
<i>Pagrus pagrus</i>	red porgy	7.12
<i>Pareques umbrosus</i>	cubbyu	3.88
<i>Plectranthias garrupellus</i>	apricot bass	1.29
<i>Pristigenys alta</i>	short bigeye	3.88
<i>Prognathodes aya</i>	bank butterflyfish	5.83
<i>Pronotogrammus martinicensis</i>	roughtongue bass	233.66
<i>Pseudupeneus maculatus</i>	spotted goatfish	1.29
<i>Pterois volitans</i>	lionfish	18.77
<i>Rypticus</i> sp.	soapfish	0.65
<i>Seriola dumerili</i>	greater amberjack	0.65
<i>Seriola rivoliana</i>	almaco jack	0.65
<i>Serranus phoebe</i>	tattler	18.12
<i>Synodus intermedius</i>	sand diver	0.65

Dive Site: ROV 13-23; N. Carolina, In and Out Proposed N Cape Lookout NC MPA, SE slope and deep scour, 120 m

General Location and Dive Track:

**NOAA Ship Pisces Cruise 13-03
North Carolina, N Cape Lookout NC-
Proposed MPA
8-VII-13-4; ROV 13-23**

★ ROV 13-23

★ ROV Dives

★ CTD

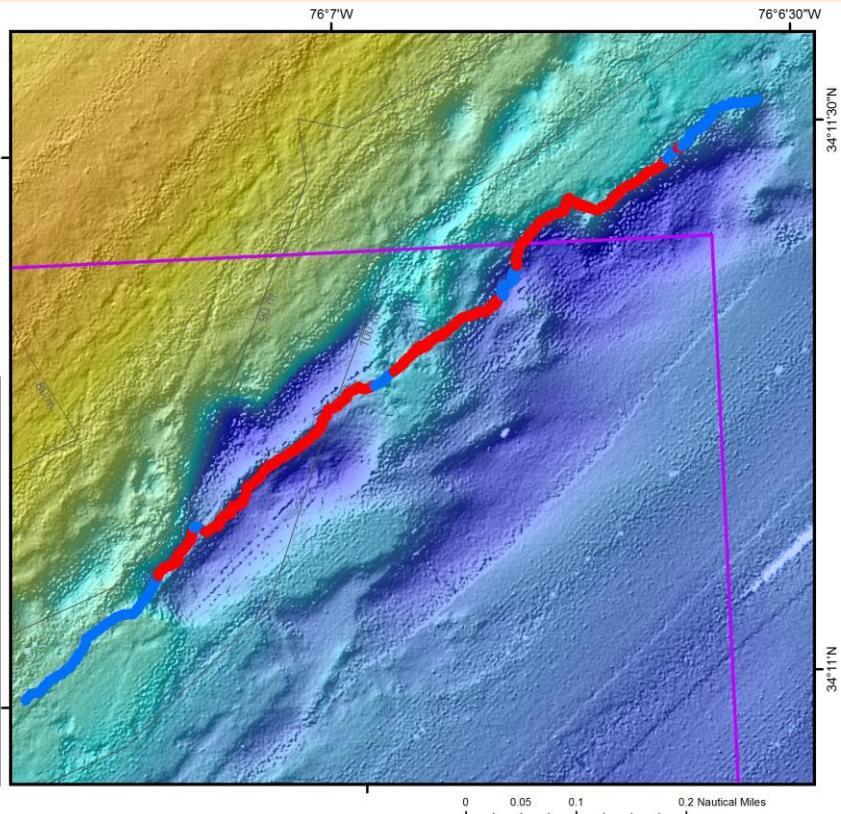
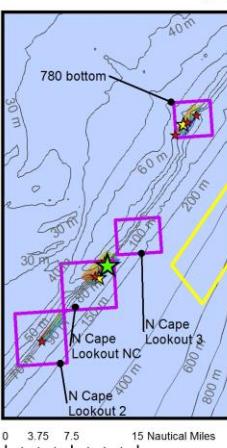
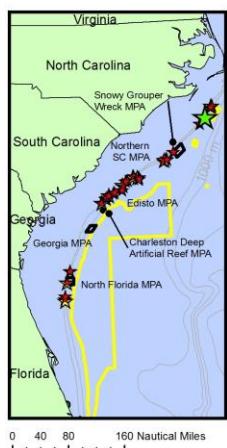
ROV Tracks

- Hard Bottom

- Soft Bottom

- Other ROV Tracks

- MPA
- Deep Coral HAPC
- Proposed MPA 2013
- Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	CapeLookoutOne
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/8/2013
Specimens:	0
Digital Photos:	80
DVD:	2
Hard Drive:	1

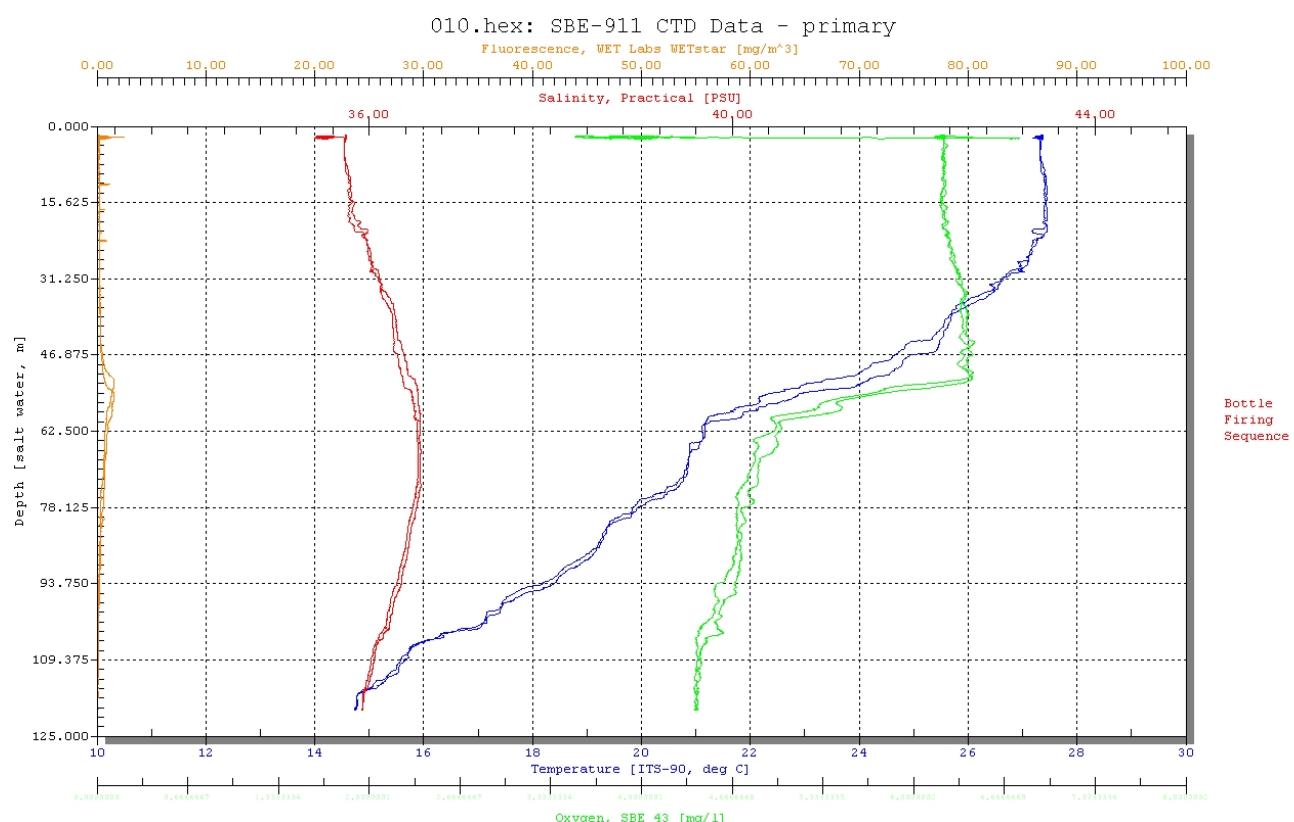
Dive Site: ROV 13-23; N. Carolina, In and Out Proposed N Cape Lookout NC MPA, SE slope and deep scour, 120 m

Dive Data:

Minimum Bottom Depth (m):	-99	Total Transect Length (km):	1.57
Maximum Bottom Depth (m):	-130	Surface Current (kn):	1
On Bottom (Time- GMT):	12:57	On Bottom (Lat/Long):	34.18°N; -76.12°W
Off Bottom (Time- GMT):	14:24	Off Bottom (Lat/Long):	34.19°N; -76.11°W
Physical (bottom); Temp (°C):	14.37	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 3.24



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-23; N. Carolina, In and Out Proposed N Cape Lookout NC MPA, SE slope and deep scour, 120 m

Dive Imagery:

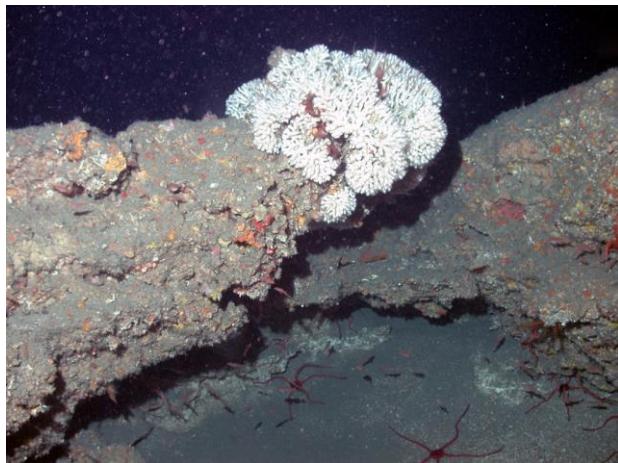


Figure 1: -119.1 m 34.19 °N; -76.12 °W
Colony of live deepwater *Oculina varicosa* coral (~30 cm diameter) with cluster on red brittlestars (*Ophioderma devaneyi*).



Figure 2: -108.9 m 34.19 °N; -76.11 °W
Multicolored comatulid crinoids (*Crinometra brevipenna*) on rock ledge.



Figure 3: -110.3 m 34.19 °N; -76.11 °W
Scamp grouper (*Mycteroperca phenax*) on fairly barren rock bottom.



Figure 4: -111.6 m 34.19 °N; -76.11 °W
Live deepwater *Oculina varicosa* coral colony (~25 cm diameter) with comatulid crinoids (*Crinometra brevipenna*) and giant red brittlestar (*Ophioderma devaneyi*).

Dive Site: ROV 13-23; N. Carolina, In and Out Proposed N Cape Lookout NC MPA, SE slope and deep scour, 120 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-23, UNCW Superphantom ROV Dive 2258; Site #- 8-VII-13-4. Target Site - N. Carolina, In and Out Proposed N Cape Lookout NC MPA, SE slope and deep scour, 120 m. Ground truth 2013 Pisces Multibeam (CapeLookout1.tif- 3 m resolution).

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. video is 4 seconds ahead of GMT

Site Description/Habitat/Biota:

Multibeam shows a slope and deep scoured valleys along the SE slope of an extensive 70 low relief terrace. Transect to NE along the face of the slope and scour zones. Landed inside the proposed North Cape Lookout NC MPA, 223 m south of a large scour valley, 460 x 250 m. Flat sediment with rocks/pavement. Sparse fauna. Upper edge of scour is moderate slope with low relief smooth rocks 1 m diameter, low rugosity. Western part of scour: base of scour is sediment. Ridge in middle of scour zone: 20o slope, 1 m relief ledges, jumbled flat rock slabs, 120m. Western side of mid scour ridge: smooth rock slabs, 123 m deep. Moderate slope, 1 m relief, soft sediment between the rocks. Large rock outcrops with overhangs, 2-3 m relief. Flattened terrace on west slope of scour: 0 slope, low relief rocks and sediment/pavement; rock ledge at top edge of scour zone, 110-114m deep. Base of the intra-scour mound: moderate relief, 1-3 m ledges, irregular eroded, high relief, 112m. Upper slope of scour zone (311x102 m)- rubble, small boulders, low rugosity, low relief, 115 m at top. Scour slope becomes flat sediment and rubble at 130 m in the center of scour. Slope of scour: relief increasing, 1 m smooth rock boulders, with undercuts and jumbles of .5-1 m rocks, barren, 118 m. Top of scour slope on the west side of scour 2: low slope, low relief <1 m relief rock boulders, becomes rugged eroded rocks, with large undercuts, flat topped rocks with 1 m ledges. Slope of scour: 2 m relief and moderate slope, jumble of large smooth rock slabs -barren with a few scamp groupers. Top edge of west slope of scour: scattered rock boulders on smooth sediment/ pavement, 111 m, scattered rocks on pavement with 2-3 m diameter highly rugose rocks scattered.

Dominant Benthic Biota:

Coral- *Oculina varicosa* (63)- Oculina 10-30 cm diameter, white, common to abundant on scour slope and near base, some on rugose high rugose rock boulders, others on flat, sediment with rubble and cobble; 113-125 m.

Ann - Serpulidae; Art - Decapoda: Anomura (with Bry - *Hippoporella* sp.); Cni - Gorgonacea: *Diodogorgia* sp.; Hydroidolina;

Ech - Crinoidea; Ophiuroidea: *Ophioderma devaneyi*, *Asteroporpa annulata*; Echinoidea: *Eucidaris tribuloides*, *Centrostephanus* sp.; Mol - Bivalvia: Ostreidae?; Gastropoda;

Fish

roughtongue bass - *Pronotogrammus martinicensis*, red barbier - *Hemanthias vivanus*, tattler - *Serranus phoebe*, bank butterflyfish - *Prognathodes aya*, wrasse - *Halichoeres* sp., blackbar drum - *Pareques iwamotoi*, scamp grouper - *Mycteroperca phenax*, cubbyu - *Equetus umbrosus*, scorpionfish - *Scorpaenidae*, short bigeye - *Pristigenys alta*, wrasse bass - *Liopropoma eukrines*, cardinal soldierfish - *Plectrypops retrospinus*,

Dive Site: ROV 13-23; N. Carolina, In and Out Proposed N Cape Lookout NC MPA, SE slope and deep scour, 120 m

french butterflyfish, red porgy - *Pagrus pagrus*, reef butterflyfish - *Chaetodon sedentarius*, amberjack - *Seriola* sp., blueline tilefish - *Caulolatilus microps*, Jack-knife fish - *Equetus lanceolatus*, red hogfish - *Decodon puellaris*, saddle bass - *Serranus notospilus*,

Dive Site: ROV 13-23; N. Carolina, In and Out Proposed N Cape Lookout NC MPA, SE slope and deep scour, 120 m

CPCe Percent Cover Analysis:

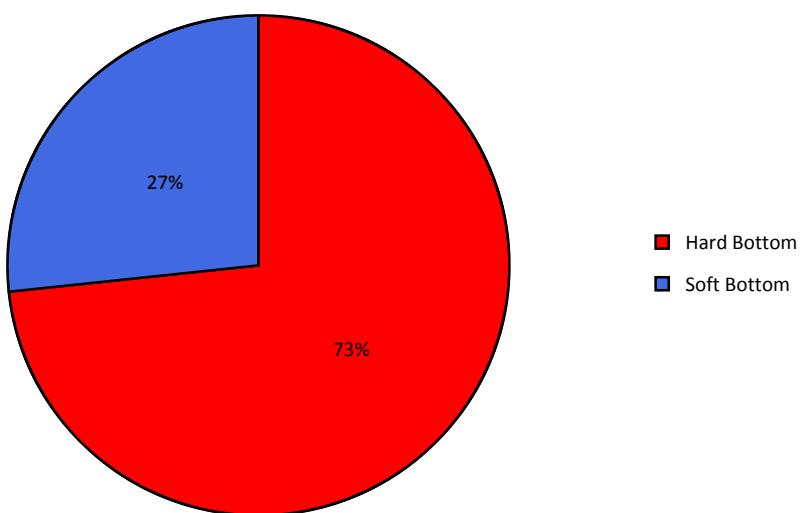


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-23. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

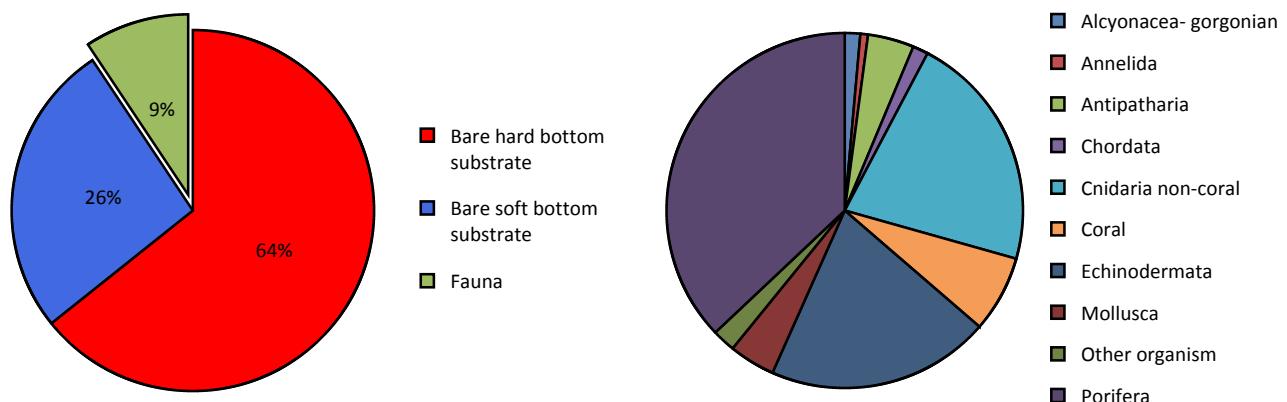


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-23.

Dive Site: ROV 13-23; N. Carolina, In and Out Proposed N Cape Lookout NC MPA, SE slope and deep

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-23.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	143	9.33%
Porifera	53	3.46%
Demospongiae	45	2.94%
Spirastrellidae	8	0.52%
Coral	10	0.65%
Madrepora oculata/carolina	3	0.20%
Oculina varicosa	6	0.39%
Phyllangia americana	1	0.07%
Alcyonacea- gorgonian	2	0.13%
Gorgonacea	1	0.07%
Telesto/Carijoa	1	0.07%
Antipatharia	6	0.39%
Antipatharia	6	0.39%
Cnidaria non-coral	31	2.02%
Hydroidolina	31	2.02%
Annelida	1	0.07%
Sabellidae	1	0.07%
Mollusca	6	0.39%
Bivalvia	6	0.39%
Echinodermata	29	1.89%
Comcatinia meridionalis	26	1.70%
Echinoidea	2	0.13%
Ophioderma devaneyi	1	0.07%
Chordata	2	0.13%
Fish	2	0.13%
Other organism	3	0.20%
Other organism	3	0.20%
Soft bottom substrate	405	26.42%
Soft bottom substrate	405	26.42%
Bare soft bottom substrate	405	26.42%
Hard bottom substrate	985	64.25%
Hard bottom substrate	985	64.25%
Bare rock- pavement boulder ledge	888	57.93%
Bare rubble- coral	1	0.07%
Bare rubble- rock	96	6.26%
Grand Total	1533	100.00%

Dive Site: ROV 13-23; N. Carolina, In and Out Proposed N Cape Lookout NC MPA, SE slope and deep

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-23.

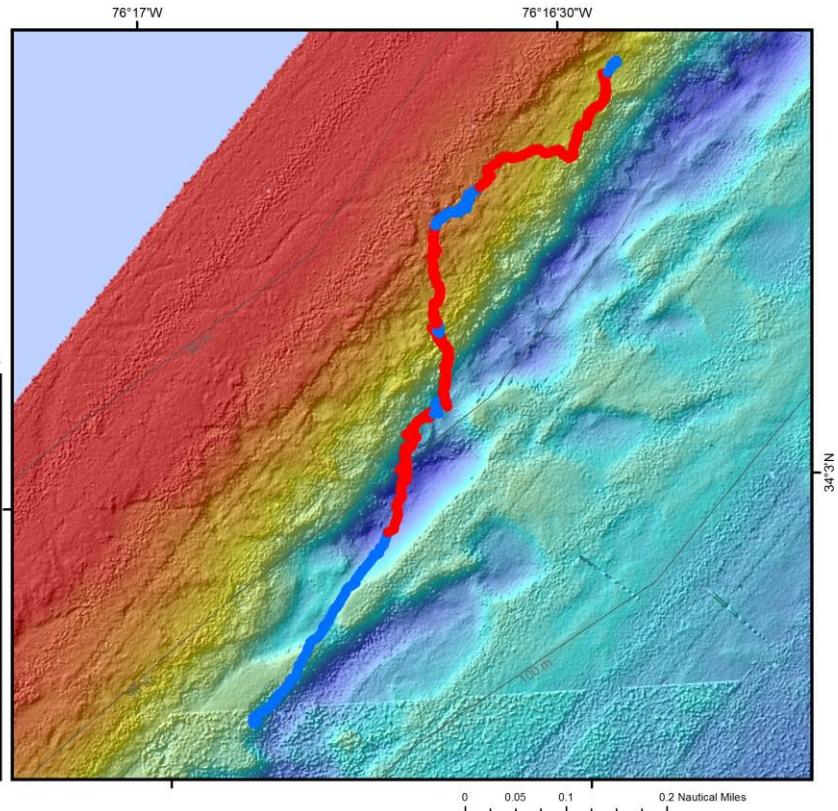
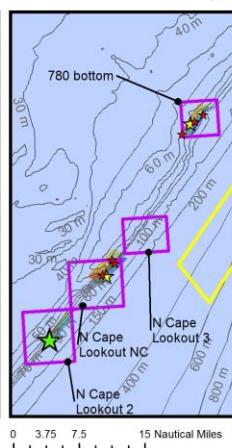
Scientific Name	Common Name	13-23
<i>Anthiinae</i>	anthiid	6532.07
<i>Caulolatilus microps</i>	blueline tilefish	0.54
<i>Chaetodon sedentarius</i>	reef butterflyfish	2.72
<i>Halichoeres</i> sp.	wrasse	23.37
<i>Hemanthias vivianus</i>	red barbier	24.46
Holocentridae		2.17
<i>Liopropoma eukrines</i>	wrasse bass	3.26
Muraenidae	moray eel	0.54
<i>Mycteroperca phenax</i>	scamp	3.8
<i>Pagrus pagrus</i>	red porgy	1.63
<i>Pareques iwamotoi</i>	blackbar drum	15.22
<i>Plectranthias garrupellus</i>	apricot bass	2.72
<i>Pristigenys alta</i>	short bigeye	3.8
<i>Prognathodes aya</i>	bank butterflyfish	6.52
<i>Prognathodes guyanensis</i>	french butterflyfish	1.63
<i>Pronotogrammus martinicensis</i>	roughtongue bass	70.11
Scorpaenidae	scorpionfish	8.15
<i>Seriola dumerili</i>	greater amberjack	0.54
<i>Serranus notospilus</i>	saddle bass	0.54
<i>Serranus phoebe</i>	tattler	11.41
<i>Serranus</i> sp.	sea bass	1.09

Dive Site: ROV 13-24; N. Carolina, Proposed N Cape Lookout 2 MPA, east slope of 70 m terrace, 105 m

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
North Carolina, N Cape Lookout 2-
Proposed MPA
8-VII-13-5; ROV 13-24

- ★ ROV 13-24
 - MPA
 - ★ ROV Dives
 - Deep Coral HAPC
 - ★ CTD
 - Proposed MPA 2013
 - Bathymetry Lines (m)
- ROV Tracks**
- Hard Bottom
 - Soft Bottom
 - Other ROV Tracks



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	CapeLookoutTwo
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/8/2013
Specimens:	0
Digital Photos:	60
DVD:	1
Hard Drive:	1

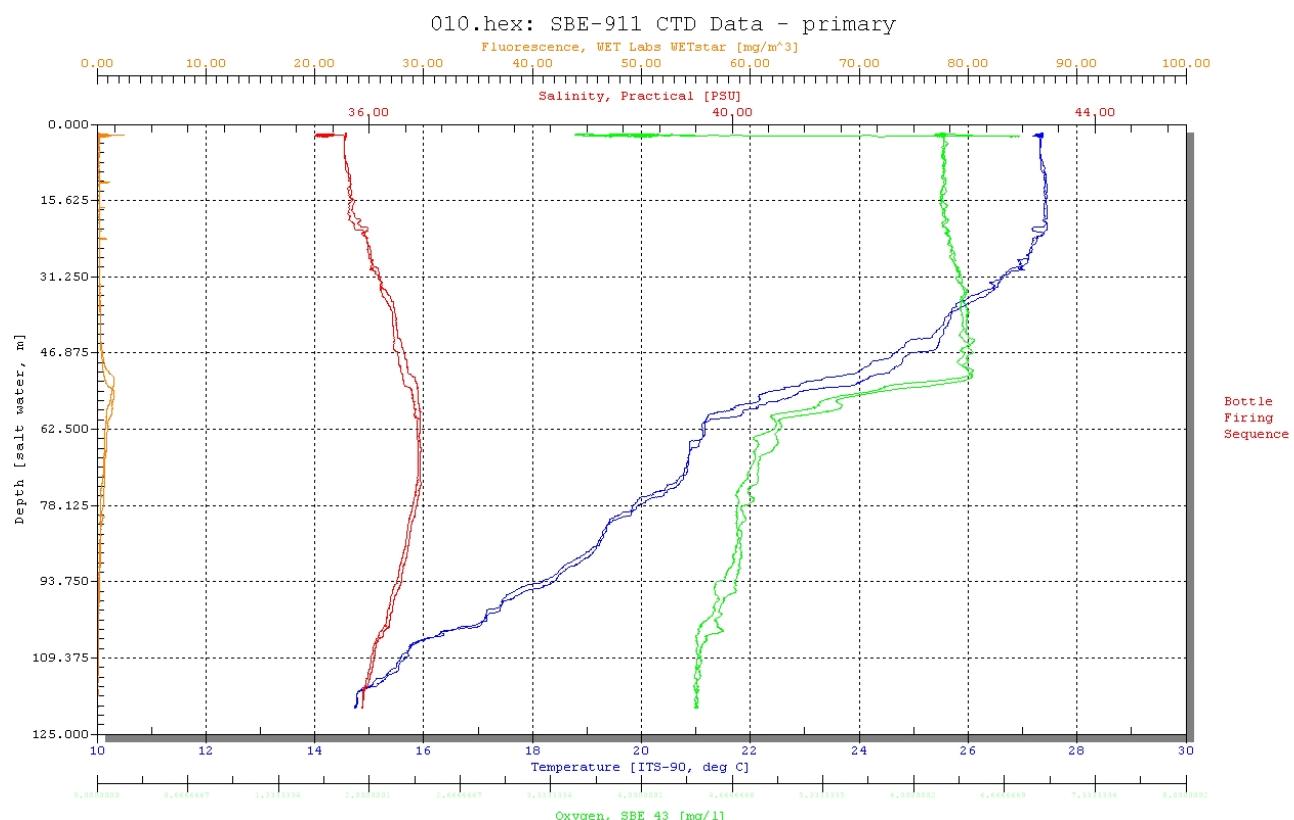
Dive Site: ROV 13-24; N. Carolina, Proposed N Cape Lookout 2 MPA, east slope of 70 m terrace, 105 m

Dive Data:

Minimum Bottom Depth (m):	-80	Total Transect Length (km):	1.44
Maximum Bottom Depth (m):	-115	Surface Current (kn):	2
On Bottom (Time- GMT):	16:34	On Bottom (Lat/Long):	34.05°N; -76.28°W
Off Bottom (Time- GMT):	17:33	Off Bottom (Lat/Long):	34.06°N; -76.27°W
Physical (bottom); Temp (°C):	14.45	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 18.07



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-24; N. Carolina, Proposed N Cape Lookout 2 MPA, east slope of 70 m terrace, 105 m

Dive Imagery:



Figure 1: -105.1 m 34.05 °N; -76.28 °W

White mash potato sponge (*Zyzya?* sp.) with clusters of comatulid crinoids (*Crinometra brevipenna*) on low relief rock bottom.



Figure 2: -82 m 34.05 °N; -76.28 °W

Small school of roughtongue bass (*Pronotogrammus martinicensis*) and yellowtail reefish (*Chromis enchrysurus*) [foreground].



Figure 3: -91.6 m 34.06 °N; -76.27 °W

Dense congregation of multicolored comatulid crinoids (*Crinometra brevipenna*) with striped burrfish (*Chilomycterus schoepfi*).



Figure 4: -90.3 m 34.06 °N; -76.27 °W

Clusters of multicolored comatulid crinoids (*Crinometra brevipenna*) with wrasse bass (*Liopropoma eukrines* [stripped]) and red hogfish (*Decodon puellaris*)[right].

Dive Site: ROV 13-24; N. Carolina, Proposed N Cape Lookout 2 MPA, east slope of 70 m terrace, 105 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-24, UNCW Superphantom ROV Dive 2259; Site #- 8-VII-13-5. Target Site - N. Carolina, Proposed N Cape Lookout 2 MPA, east slope of 70 m terrace, 105 m. Ground truth 2013 multibeam (CapeLookout2.tif).

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted.

Site Description/Habitat/Biota:

Multibeam shows NNE-SSW oriented terrace at 70 m ; transect along east slope and base of terrace. Landed on east slope on the western side of a scour valley at the base of the terrace slope. Soft bottom with 20-30 cm rocks low relief, low slope, low rugosity, 105 m. Scour valley, 340 m x 130 m diameter; 10% cover HB, low slope, mostly sediment (110 m, 115 m max in base of scour). Terrace-east slope and upper slope of scour: pavement, low relief. Dominated by crinoids. Heading NW up to top ledge, <.5 m relief. Rock boulders on sediment, dominated by crinoids. Top edge of slope and east edge of terrace: pavement with small cobble low relief; changing to flat sediment/pavement with few rocks at the top of the slope. Top of terrace is pavement with small rock cobble, low relief, low rugosity, 0 slope. Eastern slope of the terrace HD back into scour zone: 0.5 m relief, rock ledges and .5 m boulders. Low slope and low rugosity. Except for dense crinoids, very little benthic macro-biota, or fish.

Dominant Benthic Biota:

Coral- *Oculina varicosa* (10-20 cm, white, common in some areas, 105 m, rock pavement and cobble; Ann - Filograna sp., Sabellidae; Bry - *Hippoporella* sp.; Cni - Antipathidae: unid. Spp., *Stichopathes* sp.; Ech - Crinoidea: *Crinometra brevipenna*, Comactinia; Ophiuroidea: *Ophioderma devaneyi*; Mol - Bivalvia; thorny oyster; Por - Demospongiae: unid. spp., Spirastrellidae

Fish

bank butterflyfish - *Prognathodes aya*, bigeye - *Priacanthus arenatus*, blue angelfish - *Holacanthus bermudensis*, burrfish, lionfish - *Pterois volitans* (5), porgy - Sparidae, red hogfish - *Decodon puellaris*, reef butterflyfish - *Chaetodon sedentarius*, roughtongue bass - *Pronotogrammus martinicensis*, saddle bass - *Serranus notospilus*, scamp grouper - *Mycteroperca phenax*, sharpnose puffer - *Canthigaster rostrata*, short bigeye - *Pristigenys alta*, soapfish - *Rypticus* sp., spotfin butterflyfish - *Chaetodon ocellatus*, spotfin hogfish - *Bodianus pulchellus*, stingray - *Raja* sp., tattler - *Serranus phoebe*, wrasse - *Halichoeres* sp., wrasse bass - *Liopropoma eukrines*, yellowtail reefish - *Chromis enchrissurus*,

Dive Site: ROV 13-24; N. Carolina, Proposed N Cape Lookout 2 MPA, east slope of 70 m terrace, 105 m

CPCe Percent Cover Analysis:

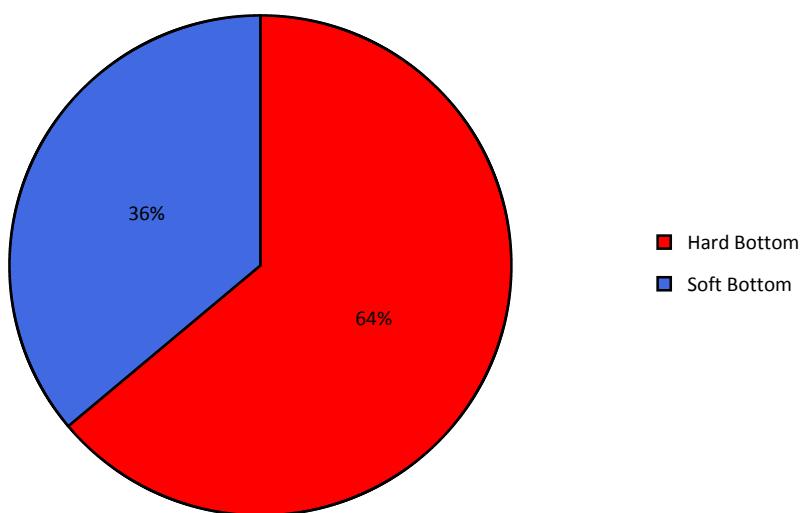


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-24. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

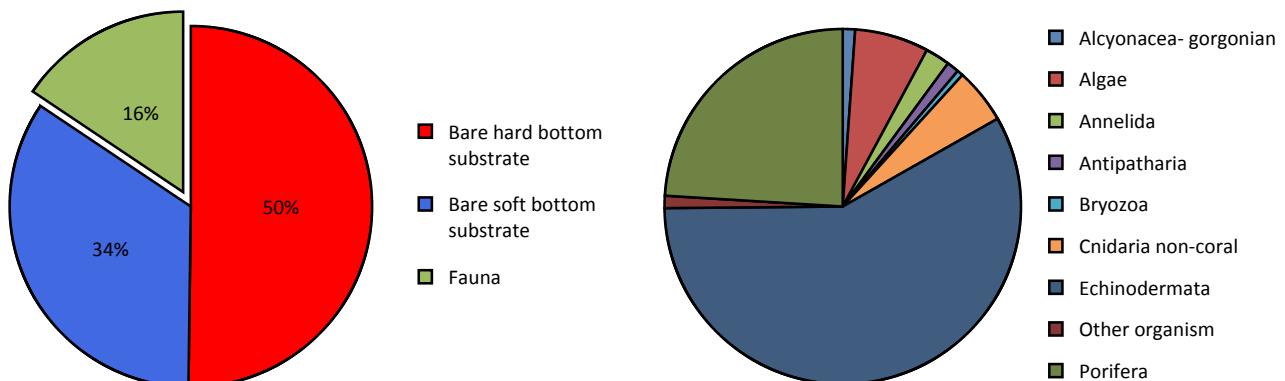


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-24.

Dive Site: ROV 13-24; N. Carolina, Proposed N Cape Lookout 2 MPA, east slope of 70 m terrace, 105 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-24.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	179	15.58%
Algae	12	1.04%
Corallinales/crustose coralline	5	0.44%
Cyanophyta	7	0.61%
Porifera	43	3.74%
Demospongiae	20	1.74%
Ircinia sp.	2	0.17%
Spirastrellidae	21	1.83%
Alcyonacea- gorgonian	2	0.17%
Titanideum frauenfeldii	2	0.17%
Antipatharia	2	0.17%
Antipatharia	1	0.09%
Stichopathes lutkeni	1	0.09%
Cnidaria non-coral	9	0.78%
Hydroidolina	9	0.78%
Annelida	4	0.35%
Filograna sp.	3	0.26%
Sabellidae	1	0.09%
Bryozoa	1	0.09%
Bryozoa	1	0.09%
Echinodermata	104	9.05%
Astroidea	1	0.09%
Comcatinia meridionalis	97	8.44%
Crinoidea	6	0.52%
Other organism	2	0.17%
Other organism	2	0.17%
Soft bottom substrate	393	34.20%
Soft bottom substrate	393	34.20%
Bare soft bottom substrate	393	34.20%
Hard bottom substrate	577	50.22%
Hard bottom substrate	577	50.22%
Bare rock- pavement boulder ledge	517	45.00%
Bare rubble- rock	60	5.22%
Grand Total	1149	100.00%

Dive Site: ROV 13-24; N. Carolina, Proposed N Cape Lookout 2 MPA, east slope of 70 m terrace, 105 m

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-24.

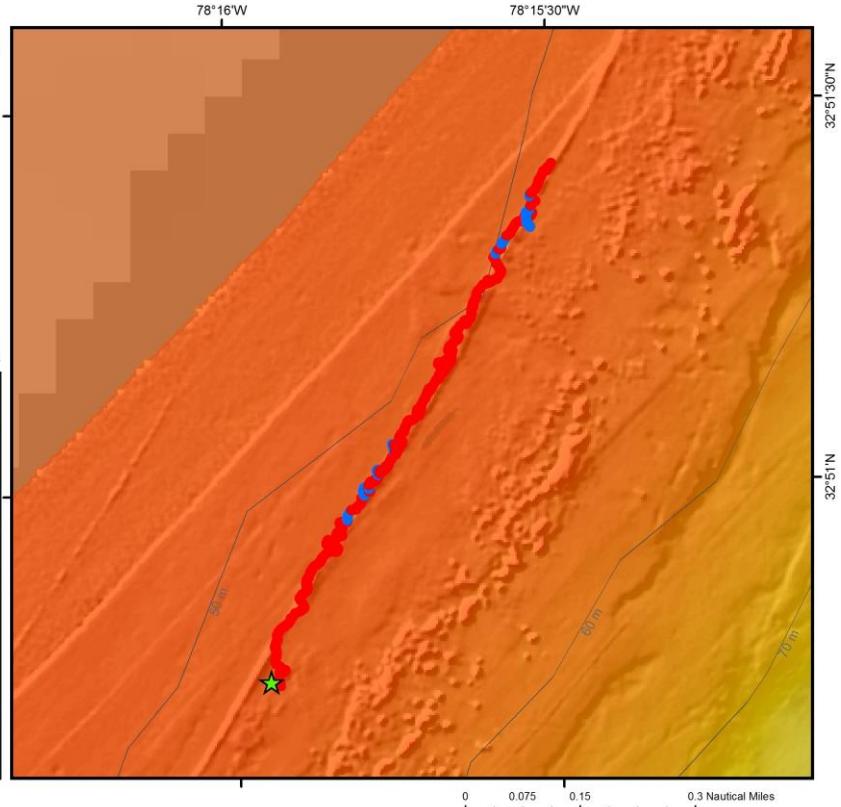
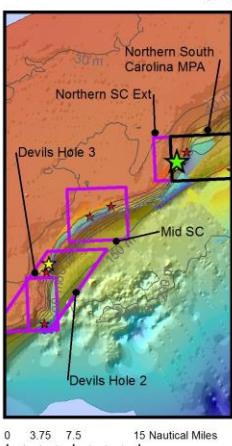
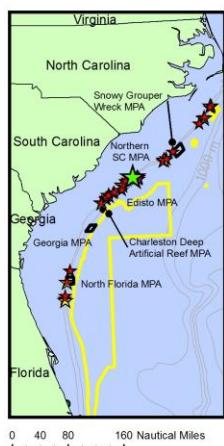
Scientific Name	Common Name	13-24
<i>Bodianus pulchellus</i>	spotfin hogfish	1.01
<i>Canthigaster rostrata</i>	sharpnose puffer	3.54
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	1.01
<i>Chaetodon sedentarius</i>	reef butterflyfish	3.54
<i>Chilomycterus schoepfi</i>	striped burrfish	0.51
<i>Chilomycterus</i> sp.	burrfish	0.51
<i>Chromis enchrurus</i>	yellowtail reeffish	4.55
<i>Decodon puellaris</i>	red hogfish	1.01
<i>Halichoeres</i> sp.	wrasse	18.2
<i>Holacanthus bermudensis</i>	blue angelfish	2.02
<i>Liopropoma eukrines</i>	wrasse bass	0.51
<i>Mycteroperca phenax</i>	scamp	1.01
<i>Pagrus pagrus</i>	red porgy	0.51
<i>Priacanthus arenatus</i>	bigeye	0.51
<i>Pristigenys alta</i>	short bigeye	14.66
<i>Prognathodes aya</i>	bank butterflyfish	2.53
<i>Prognathodes guyanensis</i>	french butterflyfish	0.51
<i>Pronotogrammus martinicensis</i>	roughtongue bass	58.14
<i>Pterois volitans</i>	lionfish	2.53
<i>Rypticus saponaceus</i>	greater soapfish	0.51
Scorpaenidae	scorpionfish	0.51
<i>Serranus notospilus</i>	saddle bass	0.51
<i>Serranus phoebe</i>	tattler	18.71
Sparidae	porgy	0.51

Dive Site: ROV 13-25; S. Carolina, Northern South Carolina MPA, NE-SW ridge, 50 m

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
South Carolina, Northern South Carolina MPA
9-VII-13-2; ROV 13-25

- ★ ROV 13-25
 - ★ ROV Dives
 - ★ CTD
 - ROV Tracks**
 - Hard Bottom
 - Soft Bottom
 - Other ROV Tracks
- MPA
■ Deep Coral HAPC
■ Proposed MPA 2013
— Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	oe_block1
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/9/2013
Specimens:	0
Digital Photos:	151
DVD:	2
Hard Drive:	1

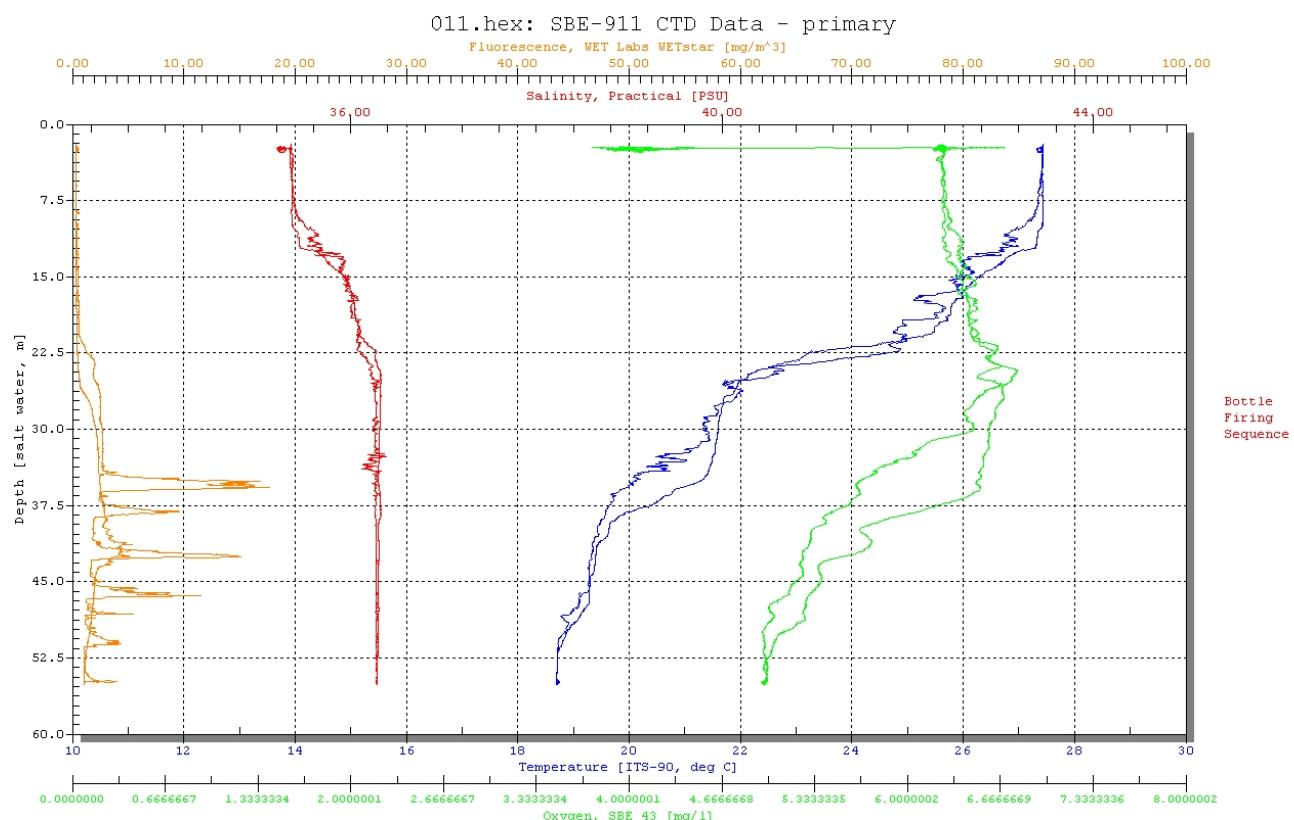
Dive Site: ROV 13-25; S. Carolina, Northern South Carolina MPA, NE-SW ridge, 50 m

Dive Data:

Minimum Bottom Depth (m):	-44	Total Transect Length (km):	1.41
Maximum Bottom Depth (m):	-51	Surface Current (kn):	0.5
On Bottom (Time- GMT):	8:00	On Bottom (Lat/Long):	32.85°N; -78.27°W
Off Bottom (Time- GMT):	9:38	Off Bottom (Lat/Long):	32.86°N; -78.26°W
Physical (bottom); Temp (°C):	18.73	Salinity:	N/A
		Visibility (ft):	45
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 1.05



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Imagery:



Figure 1: -49.5 m 32.85 °N; -78.26 °W
Scamp grouper (*Mycteroperca phenax*) with red gorgonian (*Swiftia exerta*).



Figure 2: -49.5 m 32.85 °N; -78.26 °W
Large male hogfish (*Lachnolaimus maximus*) in dominant color pattern.



Figure 3: -49.3 m 32.85 °N; -78.26 °W
Sharptail snake eel (*Myrichthys acuminatus*) on hard bottom with dense brown algae cover (*Dictyota* sp.).



Figure 4: -49.1 m 32.85 °N; -78.27 °W
Dense cover of brown algae (*Styopodium* sp.).

Dive Site: ROV 13-25; S. Carolina, Northern South Carolina MPA, NE-SW ridge, 50 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-25, UNCW Superphantom ROV Dive 2260; Site #- 9-VII-13-2. Target Site - S. Carolina, Northern South Carolina MPA, NE-SW ridge, 50 m; ground truth 2012 Pisces Multibeam, saved in a higher resolution on 2013 Pisces cruise (SCMPA.tif) and 2012 oe_block1

ROV Setup/Dive Events:

Added a GoPro camera mounted of top bar to the left of the strobe on front of ROV. Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted.

Site Description/Habitat/Biota:

MB shows target is a narrow 20 m wide x 3000 m long ridge along the west side of a NE-SW oriented flat, low relief terrace, 6500 m x 624 m. Landed 40 m east of ridge; 0.5 m low relief rock knolls with 50% sediment between. Rock is covered in very dense Phaeophyta- Stylopodium, Dictyota sp. Ridge west slope: boulders, 0.5 m relief, smooth rock, 10-15o slope, 50 m depth. West ridge slope: some areas with 1-2 m diameter jumbled boulders, 0.5 - 2 m relief, high rugosity with undercut ledges. Minimum depth on top 49-49.5 m, max depth at west base- 51 m. Ridge abruptly ends to the west in sediment/rubble, 51 m with sparse 1 m boulders. The north end of the dive, the ridge has less relief, is less rugose, and has some 10-15 m wide sediment gaps. This change from moderate relief, high rugosity, to low relief, smooth rock is not apparent on the MB.

Dominant Benthic Biota:

Alg - Phaeophyta: *Dictyota* sp., *Stylopodium* sp., *Sargassum* sp.; Chlorophyta: *Ulva* sp.; Rhodophyta: *Halymenia* sp.; Ann - *Filograna* sp.; Art - Decapoda: *Panulirus argus*, *Anomura*, *Scyllarides* sp.; Cho - Asciidae: *Didemnidae*, *Eudistoma* sp.; Cni - Gorgonacea: *Ellisellidae*, *Ellisella barbadensis*, *Swiftia exserta*, *Diogorgia* sp., *Nicella* sp., *Titanideum frauenfeldii*; Hydroidolina: white bushy; Antipathidae: unid, *Stichopathes* sp.; Ech - Asteroidea: *Narcissia trigonaria*, Echinoidea: *Centrostephanus* sp.; Mol - Bivalvia: thorny oyster- *Spondylus* sp.; Por - Demospongiae: *Agelas* sp., *Ircinia campana*, *Agelas clathrodes*, *Aiolochroia crassa*, Axinellidae, *Chondrosia* sp., Forcepia? sp.

Fish

amberjack - *Seriola* sp., bank butterflyfish - *Prognathodes aya*, bicolor damselfish - *Pomacentrus partitus*, blue angelfish - *Holacanthus bermudensis*, bluespotted cornetfish - *Fistularia tabacaria*, Calamus porgy - *Calamus* sp., cowfish - *Lactophrys* sp., cubbyu - *Equetus umbrosus*, doctorfish, french angelfish - *Pomacanthus paru*, gag grouper - *Mycteroperca microlepis*, gray angelfish - *Pomacanthus arcuatus*, graysby grouper - *Epinephelus cruentatus*, greenblotch parrotfish - *Sparisoma atomarium*, grunt - *Haemulon* sp., hake, hogfish - *Lachnolaimus maximus*, Jack-knife fish - *Equetus lanceolatus*, lionfish - *Pterois volitans* (71), lizardfish - *Synodus* sp., longsnout butterflyfish - *Chaetodon aculeatus*, moray eel - *Muraenidae*, orangeback bass - *Serranus annularis*, parrotfish - *Sparisoma* sp., purple reeffish - *Chromis scotti*, red grouper - *Epinephelus morio*, reef butterflyfish - *Chaetodon sedentarius*, rock beauty - *Holacanthus tricolor*, rock hind - *Epinephelus adscensionis*, scamp grouper - *Mycteroperca phenax*, scorpionfish - *Scorpaenidae*, sharpnose puffer - *Canthigaster rostrata*, sharptail snake eel - *Myrichthys acuminatus*, soapfish - *Rypticus* sp., spanish hogfish, spotfin butterflyfish - *Chaetodon ocellatus*, spotfin hogfish - *Bodianus pulchellus*, spotted goatfish -

Dive Site: ROV 13-25; S. Carolina, Northern South Carolina MPA, NE-SW ridge, 50 m

Pseudupeneus maculatus, squirrelfish - *Holocentrus* sp., sunshinefish - *Chromis insolata*, tattler - *Serranus phoebe*, tomtate - *Haemulon aurolineatum*, triggerfish - *Balistes* sp., trumpetfish - *Aulostomus maculatus*, vermilion snapper - *Rhomboplites aurorubens*, white grunt - *Haemulon plumieri*, wrasse - *Halichoeres* sp., wrasse bass - *Liopropoma eukrines*, yellowhead wrasse - *Halichoeres garnoti*, yellowtail reefish - *Chromis enchyrsurus*; amberjack - *Seriola* sp.

Dive Site: ROV 13-25; S. Carolina, Northern South Carolina MPA, NE-SW ridge, 50 m

CPCe Percent Cover Analysis:

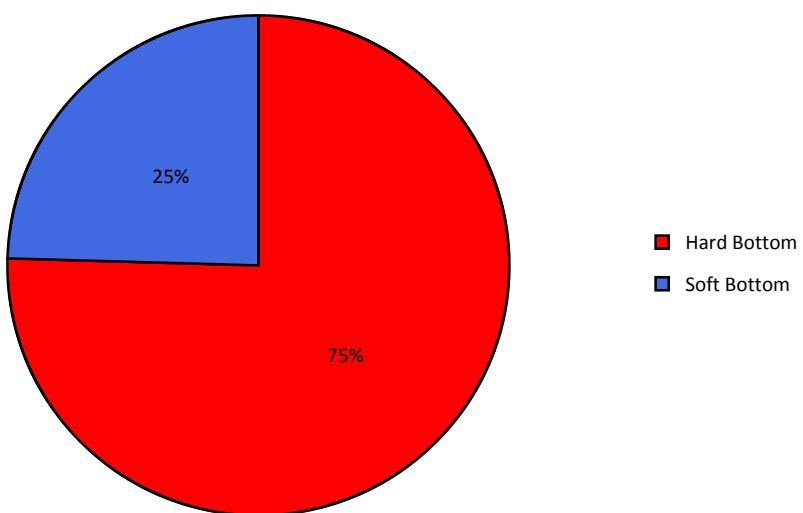


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-25. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

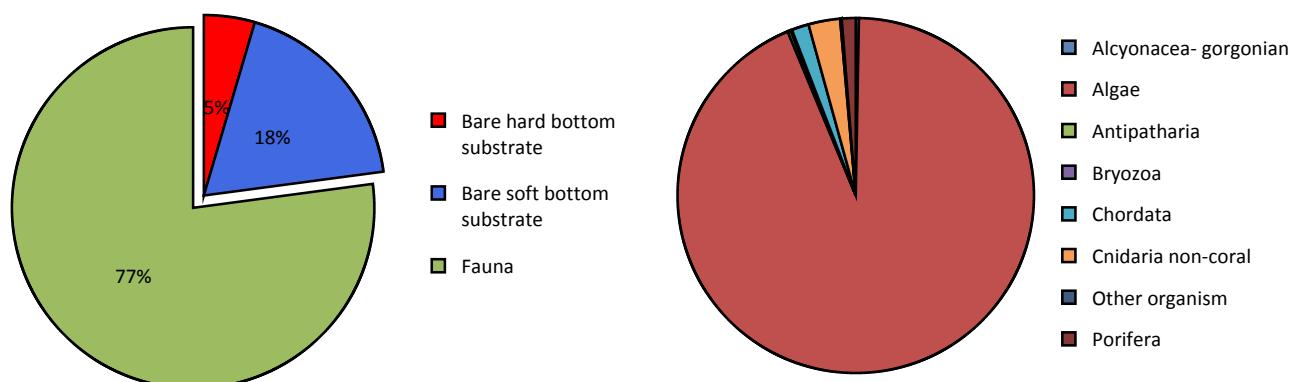


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-25.

Dive Site: ROV 13-25; S. Carolina, Northern South Carolina MPA, NE-SW ridge, 50 m**Percent Cover of Benthic Macro-Biota and Substrate:**

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-25.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	1426	77.12%
Algae	1333	72.09%
Chlorophyta	4	0.22%
Corallinales/crustose coralline	14	0.76%
Phaeophyta	1176	63.60%
Rhodophyta	139	7.52%
Porifera	18	0.97%
Agelas sp.	9	0.49%
Aka sp.	1	0.05%
Demospongiae	5	0.27%
Demospongiae- ze tan starlet	1	0.05%
Spirastrellidae	2	0.11%
Alcyonacea- gorgonian	4	0.22%
Ellisellidae	3	0.16%
Primnoidae	1	0.05%
Antipatharia	4	0.22%
Antipatharia	1	0.05%
Tanacetipathes hirta	3	0.16%
Cnidaria non-coral	41	2.22%
Hydroidolina	41	2.22%
Bryozoa	2	0.11%
Bryozoa	1	0.05%
Schizoporella sp.	1	0.05%
Chordata	22	1.19%
Ascidiaecea	1	0.05%
Didemnidae	9	0.49%
Fish	12	0.65%
Other organism	2	0.11%
Other organism	2	0.11%
Soft bottom substrate	339	18.33%
Soft bottom substrate	339	18.33%
Bare soft bottom substrate	339	18.33%
Hard bottom substrate	84	4.54%
Hard bottom substrate	84	4.54%
Bare rock- pavement boulder ledge	78	4.22%
Bare rubble- rock	6	0.32%
Grand Total	1849	100.00%

Dive Site: ROV 13-25; S. Carolina, Northern South Carolina MPA, NE-SW ridge, 50 m

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-25.

Scientific Name	Common Name	13-25
<i>Acanthurus</i> sp.	doctorfish	25.44
<i>Aulostomus maculatus</i>	trumpetfish	0.47
<i>Balistes capriscus</i>	grey triggerfish	1.41
<i>Balistes vetula</i>	queen triggerfish	0.47
<i>Bodianus pulchellus</i>	spotfin hogfish	21.67
<i>Bodianus rufus</i>	spanish hogfish	0.47
<i>Calamus</i> sp.	porgy	17.9
<i>Canthigaster rostrata</i>	sharpnose puffer	41.92
<i>Chaetodon aculeatus</i>	longsnout butterflyfish	0.47
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	15.07
<i>Chaetodon sedentarius</i>	reef butterflyfish	30.15
<i>Chromis cyaneus</i>	blue chromis	6.12
<i>Chromis enchrysurus</i>	yellowtail reeffish	4.24
<i>Chromis insolatus</i>	sunshinefish	1.88
<i>Chromis scotti</i>	purple reefish	19.78
<i>Chromis</i> sp.	damselish	3.3
<i>Epinephelus adscensionis</i>	rock hind	1.41
<i>Epinephelus cruentatus</i>	graysby	5.18
<i>Epinephelus drummondhayi</i>	speckled hind	0.47
<i>Epinephelus morio</i>	red grouper	0.47
<i>Equetus lanceolatus</i>	jack-knife fish	8.48
<i>Fistularia</i> sp.	cornetfish	0.94
<i>Fistularia tabacaria</i>	bluespotted cornetfish	0.94
<i>Gymnothorax</i> sp.	moray eel	0.47
<i>Haemulon aurolineatum</i>	tomtate	5473.39
<i>Haemulon plumieri</i>	white grunt	80.08
<i>Haemulon striatum</i>	striped grunt	154.97
<i>Halichoeres garnoti</i>	yellowhead wrasse	21.67
<i>Halichoeres</i> sp.	wrasse	43.33
<i>Holacanthus bermudensis</i>	blue angelfish	12.25
<i>Holacanthus tricolor</i>	rock beauty	8.48
<i>Holocentrus</i> sp.	squirrelfish	19.31
<i>Lachnolaimus maximus</i>	hogfish	2.36
<i>Liopropoma eukrines</i>	wrasse bass	0.94
<i>Muraena robusta</i>	stout moray	0.47
<i>Mycteroperca microlepis</i>	gag grouper	5.65
<i>Mycteroperca phenax</i>	scamp	21.67
<i>Mycteroperca</i> sp.	grouper	0.47

Dive Site: ROV 13-25; S. Carolina, Northern South Carolina MPA, NE-SW ridge, 50 m

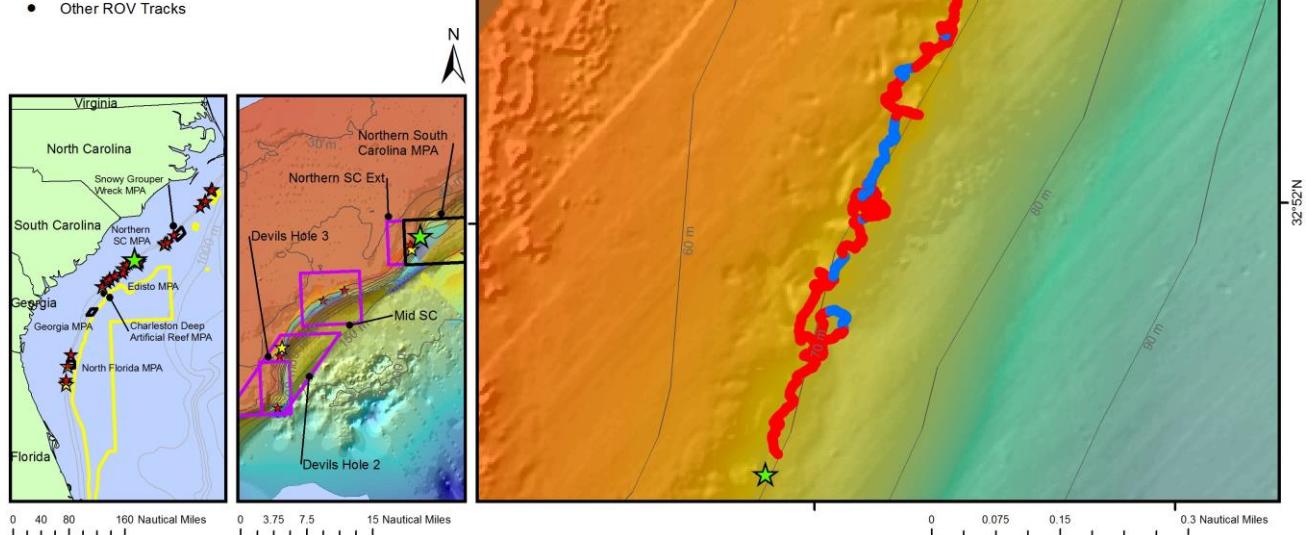
<i>Myrichthys acuminatus</i>	sharptail eel	0.94
<i>Myripristis jacobus</i>	blackbar soldierfish	0.47
<i>Pareques umbrosus</i>	cubbyu	178.99
<i>Pomacanthus arcuatus</i>	grey angelfish	1.41
<i>Pomacanthus paru</i>	french angelfish	1.88
<i>Prognathodes aya</i>	bank butterflyfish	1.41
<i>Pseudupeneus maculatus</i>	spotted goatfish	3.3
<i>Pterois volitans</i>	lionfish	36.74
<i>Rhomboplites aurorubens</i>	vermillion snapper	24.96
<i>Rypticus saponaceus</i>	greater soapfish	1.41
<i>Rypticus</i> sp.	soapfish	0.47
Scorpaenidae	scorpionfish	0.94
<i>Seriola dumerili</i>	greater amberjack	1.88
<i>Seriola rivoliana</i>	almao jack	2.83
<i>Seriola</i> sp.	amberjack	2.83
<i>Serranus annularis</i>	orangeback bass	0.94
<i>Serranus phoebe</i>	tattler	7.07
<i>Sparisoma atomarium</i>	greenblotch parrotfish	7.07
<i>Sphoeroides spengleri</i>	bandtail puffer	0.94
<i>Stegastes partitus</i>	bicolor damselfish	2.83
<i>Synodus</i> sp.	lizardfish	0.47
<i>Urophycis earlii</i>	carolina hake	1.41

Dive Site: ROV 13-26; S. Carolina, inside Northern South Carolina MPA, east slope of terrace, 70 m

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
South Carolina, Northern South Carolina MPA
9-VII-13-3; ROV 13-26

- ★ ROV 13-26
 - ★ ROV Dives
 - ★ CTD
 - ROV Tracks**
 - Hard Bottom
 - Soft Bottom
 - Other ROV Tracks
- MPA
■ Deep Coral HAPC
■ Proposed MPA 2013
— Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	oe_block1
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/9/2013
Specimens:	0
Digital Photos:	84
DVD:	2
Hard Drive:	1

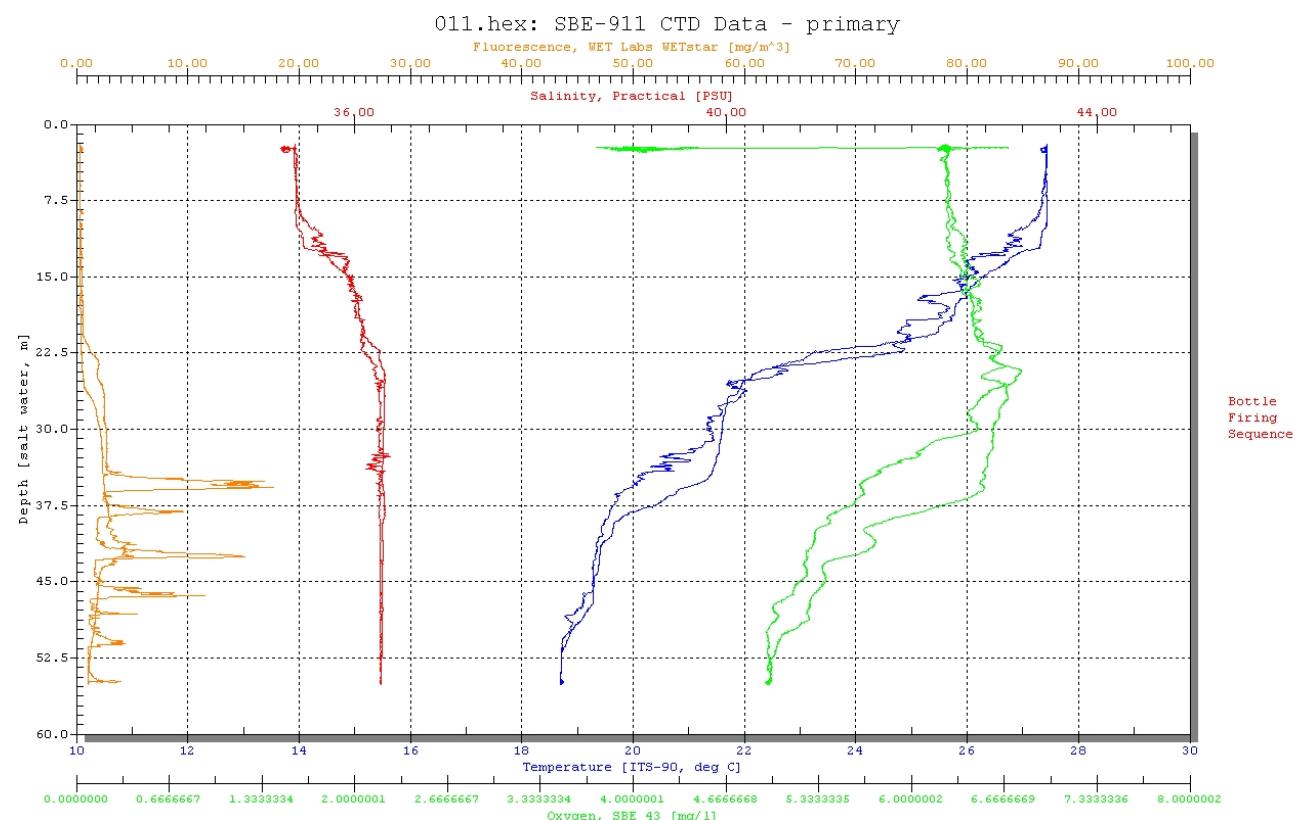
Dive Site: ROV 13-26; S. Carolina, inside Northern South Carolina MPA, east slope of terrace, 70 m

Dive Data:

Minimum Bottom Depth (m):	-56	Total Transect Length (km):	1.44
Maximum Bottom Depth (m):	-76	Surface Current (kn):	0.8
On Bottom (Time- GMT):	10:10	On Bottom (Lat/Long):	32.86°N; -78.24°W
Off Bottom (Time- GMT):	11:44	Off Bottom (Lat/Long):	32.87°N; -78.24°W
Physical (bottom); Temp (°C):	18.00	Salinity:	N/A
		Visibility (ft):	45
		Current (kn):	0.8

Physical Environment:

Distance from Dive Site(km): 3.33



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m3). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-26; S. Carolina, inside Northern South Carolina MPA, east slope of terrace, 70 m

Dive Imagery:



Figure 1: -70.1 m 32.87 °N; -78.24 °W
Speckled hind (*Epinephelus drummondhayi*) with school of cubbyu (*Equetus umbrosus*) on moderate relief rock ledge.



Figure 2: -66.8 m 32.87 °N; -78.24 °W
Scamp grouper (*Mycteroperca phenax*) and male hogfish (*Lachnolaimus maximus*) on rugose rock habitat.



Figure 3: -70.8 m 32.87 °N; -78.24 °W
Speckled hind (*Epinephelus drummondhayi*).



Figure 4: -70.3 m 32.86 °N; -78.24 °W
Lionfish (*Pterois volitans/miles*) on low relief rock bottom.

Dive Site: ROV 13-26; S. Carolina, inside Northern South Carolina MPA, east slope of terrace, 70 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-26, UNCW Superphantom ROV Dive 2261; Site #- 9-VII-13-3. Target Site - S. Carolina, inside Northern South Carolina MPA, east slope of terrace, 70 m. Ground-truth 2012 Pisces multibeam - rerendered to 5 m resolution (SCMPA.tif) and 2012 oe_block1.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted.

Site Description/Habitat/Biota:

Multibeam shows elongate flat topped terrace, ~60 m with rugged east slope. Transect parallel along east slope heading NE. On bottom: pavement at eastern base of slope, with low relief, rock 1-2 m outcrops. Top ledge of slope: top ledge of MB, 90% cover of pavement and rock boulders with 0.5-1 m relief, and high rugosity, 68-70 m; base of slope, 74 m. East slope: low relief pavement, sediment veneer, low relief ledges, mostly low rugosity, but some small areas of high rugosity, low slope 5o. Cross 90 x 57 m mound on MB: low relief ledge, rolling pavement. Northern end of dive on east slope: Cross a groove on the MB that ends in a valley to the north: half way through channel in MB. Some undercut ledges, 10-20o slope. Sand patch with 1-2 m relief. On MB transect a valley the is perpendicular to the slope: ~100 m long x 50 m wide: sediment at bottom of feature, 65 m. Undercut rock ledges. Top of slope on terrace edge: low relief rock ledge/pavement, with larger swaths of sediment between. Dense schools of fish, tomtate, scamp, several gag, and 4 speckled hind. Sparse biota, mostly Stichopathes, Diodogorgia, hydroids, some sponges.

Dominant Benthic Biota:

Alg - Chlorophyta: *Ulva* sp.; Phaeophyta: *Sargassum* sp.; Rhodophyta: *Halymenia* sp.; Ann - *Filograna* sp.; Art - Decapoda; Anomura

Fish:

amberjack - *Seriola* sp.; bank butterflyfish - *Prognathodes aya*; bigeye - *Priacanthus arenatus*; blackbar drum - *Pareques iwamotoi*; blue angelfish - *Holacanthus bermudensis*; Calamus porgy - *Calamus* sp.; cowfish - *Lactophrys* sp.; creole-fish - *Paranthias furcifer*; cubbyu - *Equetus umbrosus*; french angelfish - *Pomacanthus paru*; gray triggerfish - *Balistes capriscus*; graysby grouper - *Epinephelus cruentatus*; greenblotch parrotfish - *Sparisoma atomarium*; hogfish - *Lachnolaimus maximus*; Jack - *Carangidae*; lionfish - *Pterois volitans* (47); moray eel - *Muraenidae*; orangeback bass - *Serranus annularis*; porgy - *Sparidae*; purple reefish - *Chromis scotti*; red porgy - *Pagrus pagrus*; reef butterflyfish - *Chaetodon sedentarius*; roughtongue bass - *Pronotogrammus martinicensis*; saddle bass - *Serranus notospilus*; sand diver; scamp grouper - *Mycteroperca phenax*; scorpionfish - *Scorpaenidae*; sharpnose puffer - *Canthigaster rostrata*; short bigeye - *Pristigenys alta*; speckled hind - *Epinephelus drummondhayi*; spotfin butterflyfish - *Chaetodon ocellatus*; spotfin hogfish - *Bodianus pulchellus*; squirrelfish - *Holocentrus* sp.; sunshinefish - *Chromis insolata*; tattler - *Serranus phoebe*; white grunt - *Haemulon plumieri*; wrasse - *Halichoeres* sp.; wrasse bass - *Liopropoma eukrines*; yellowtail reefish - *Chromis encrysurus*;

Dive Site: ROV 13-26; S. Carolina, inside Northern South Carolina MPA, east slope of terrace, 70 m

CPCe Percent Cover Analysis:

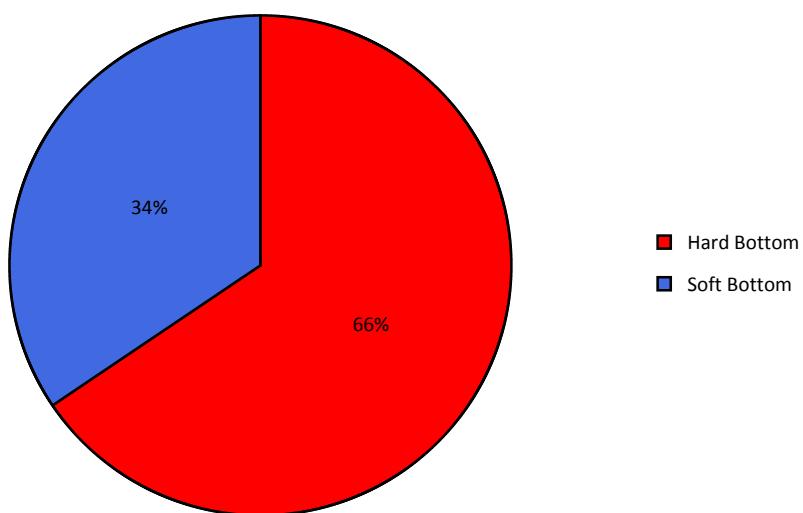


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-26. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

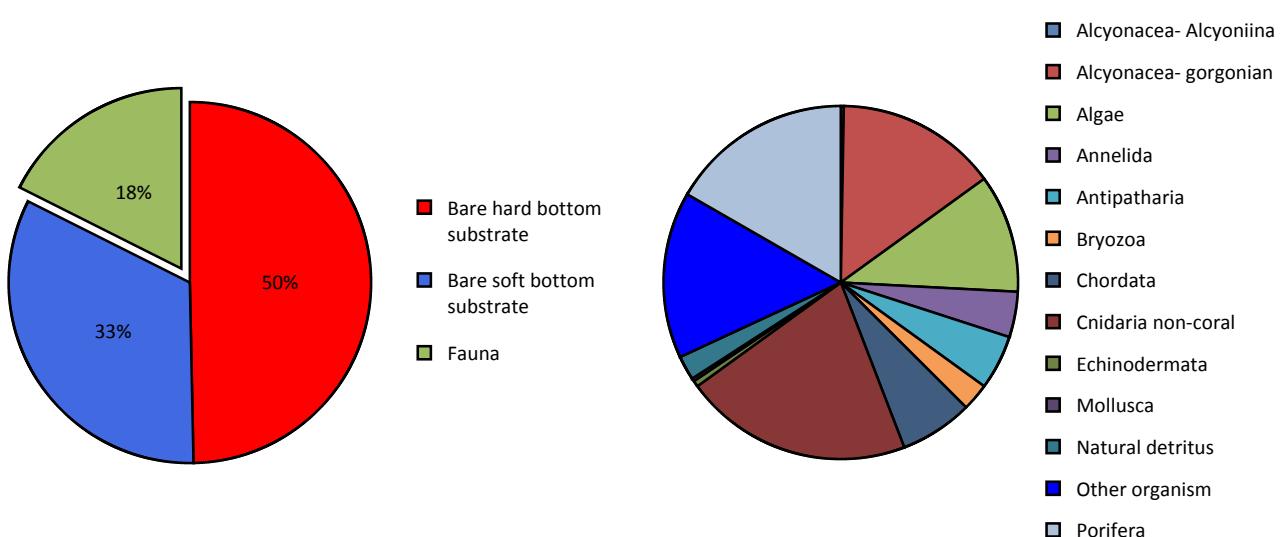


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-26.

Dive Site: ROV 13-26; S. Carolina, inside Northern South Carolina MPA, east slope of terrace, 70 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-26.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	360	17.57%
Algae	39	1.90%
Corallinales/crustose coralline	27	1.32%
Cyanophyta	5	0.24%
Phaeophyta	1	0.05%
Rhodophyta	6	0.29%
Porifera	60	2.93%
Agelas sp.	1	0.05%
Demospongiae	33	1.61%
Demospongiae- MPA01	9	0.44%
Demospongiae- ze tan starlet	1	0.05%
Geodia sp.	1	0.05%
Poecilosclerida	1	0.05%
Spirastrellidae	14	0.68%
Alcyonacea- gorgonian	53	2.59%
Bebryce sp.	1	0.05%
Diodogorgia sp.	10	0.49%
Ellisella sp.	8	0.39%
Gorgonacea	4	0.20%
Leptogorgia	5	0.24%
Nicella sp.	23	1.12%
Plexauridiae	2	0.10%
Alcyonacea- Alcyoniina	1	0.05%
Chironephthya caribaea	1	0.05%
Antipatharia	18	0.88%
Antipatharia	5	0.24%
Stichopathes lutkeni	9	0.44%
Tanacetipathes hirta	4	0.20%
Cnidaria non-coral	75	3.66%
Actiniaria	1	0.05%
Fam- Zoanthidae	1	0.05%
Hydroidolina	73	3.56%
Annelida	15	0.73%
Filograna sp.	15	0.73%
Mollusca	1	0.05%
Bivalvia	1	0.05%
Bryozoa	9	0.44%

Dive Site: ROV 13-26; S. Carolina, inside Northern South Carolina MPA, east slope of terrace, 70 m

Schizoporella sp.	9	0.44%
Echinodermata	2	0.10%
Asteroidea	1	0.05%
Crinoidea	1	0.05%
Chordata	24	1.17%
Ascidiacea	15	0.73%
Didemnidae	6	0.29%
Fish	3	0.15%
Other organism	55	2.68%
Other organism	55	2.68%
Natural detritus	8	0.39%
Natural detritus	8	0.39%
Soft bottom substrate	671	32.75%
Soft bottom substrate	671	32.75%
Bare soft bottom substrate	671	32.75%
Hard bottom substrate	1018	49.68%
Hard bottom substrate	1018	49.68%
Bare rock- pavement boulder ledge	938	45.78%
Bare rubble- coral	1	0.05%
Bare rubble- rock	79	3.86%
Grand Total	2049	100.00%

Dive Site: ROV 13-26; S. Carolina, inside Northern South Carolina MPA, east slope of terrace, 70 m

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-26.

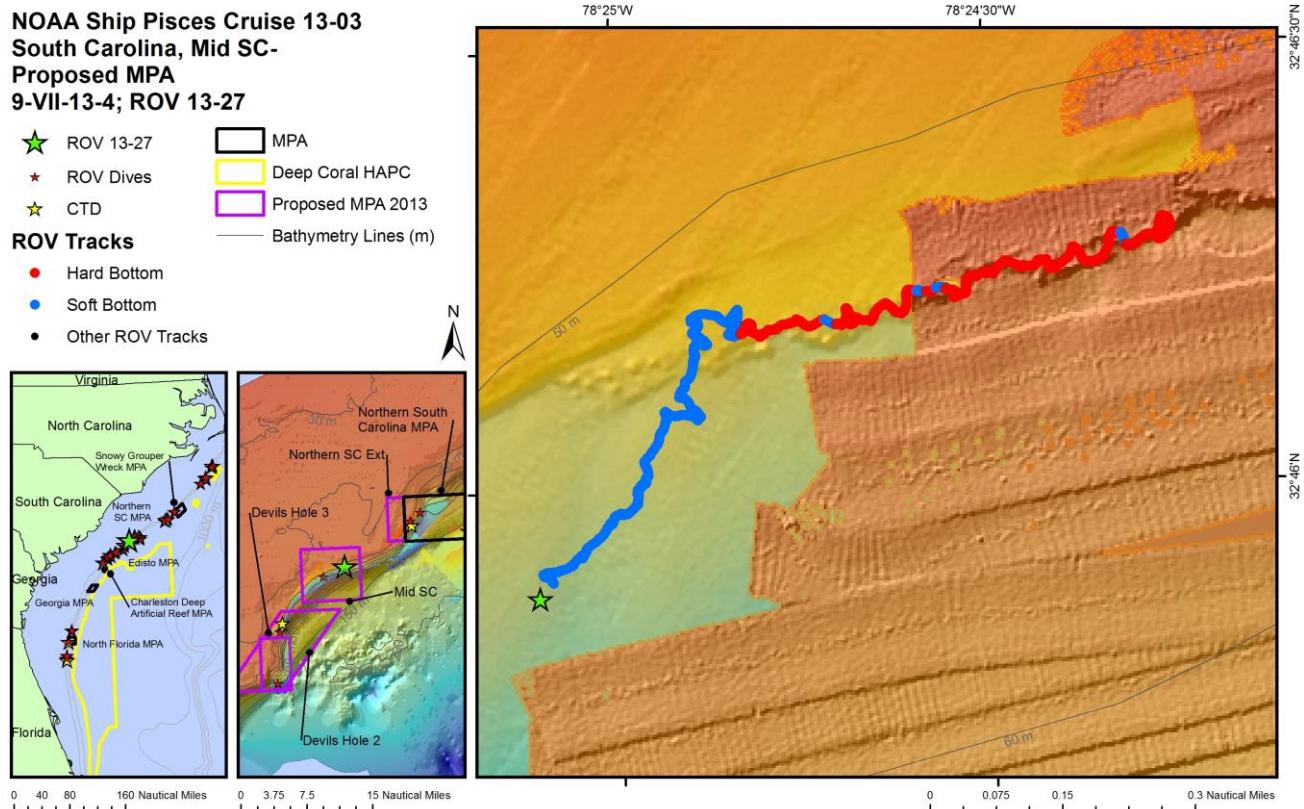
Scientific Name	Common Name	13-26
<i>Balistes capriscus</i>	grey triggerfish	1.02
<i>Bodianus pulchellus</i>	spotfin hogfish	12.61
<i>Calamus</i> sp.	porgy	12.95
<i>Canthigaster rostrata</i>	sharpnose puffer	44.65
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	3.75
<i>Chaetodon sedentarius</i>	reef butterflyfish	26.24
<i>Chaetodon</i> sp.	butterflyfish	1.02
<i>Chromis encrysurus</i>	yellowtail reefish	13.97
<i>Chromis insolatus</i>	sunshinefish	0.68
<i>Chromis scotti</i>	purple reefish	0.68
<i>Chromis</i> sp.	damselfish	2.39
<i>Epinephelus cruentatus</i>	graysby	1.02
<i>Epinephelus drummondhayi</i>	speckled hind	1.36
<i>Haemulon plumieri</i>	white grunt	1.02
<i>Halichoeres</i> sp.	wrasse	141.1
<i>Holacanthus bermudensis</i>	blue angelfish	7.16
<i>Holocentrus</i> sp.	squirrelfish	5.79
<i>Lachnolaimus maximus</i>	hogfish	4.77
<i>Lactophrys</i> sp.	cowfish	1.02
<i>Liopropoma eukrines</i>	wrasse bass	5.11
Muraenidae	moray eel	0.34
<i>Mycteroperca phenax</i>	scamp	9.54
<i>Pagrus pagrus</i>	red porgy	16.7
<i>Paranthias furcifer</i>	creole-fish	0.68
<i>Pareques iwamotoi</i>	blackbar drum	14.31
<i>Pareques umbrosus</i>	cubbyu	18.06
<i>Pomacanthus paru</i>	french angelfish	0.68
<i>Priacanthus arenatus</i>	bigeye	1.7
<i>Pristigenys alta</i>	short bigeye	19.43
<i>Prognathodes aya</i>	bank butterflyfish	12.27
<i>Pronotogrammus martinicensis</i>	roughtongue bass	17.04
<i>Pterois volitans</i>	lionfish	18.4
<i>Rypticus saponaceus</i>	greater soapfish	0.34
<i>Seriola</i> sp.	amberjack	31.7
<i>Serranus annularis</i>	orangeback bass	7.16
<i>Serranus phoebe</i>	tattler	50.78
Sparidae	porgy	2.04
<i>Spalisoma atomarium</i>	greenblotch parrotfish	0.34

Dive Site: ROV 13-26; S. Carolina, inside Northern South Carolina MPA, east slope of terrace, 70 m

<i>Sphoeroides spengleri</i>	bandtail puffer	0.34
<i>Synodus intermedius</i>	sand diver	0.34

Dive Site: ROV 13-27; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

General Location and Dive Track:



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	OE_block9_5m
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/9/2013
Specimens:	0
Digital Photos:	74
DVD:	2
Hard Drive:	1

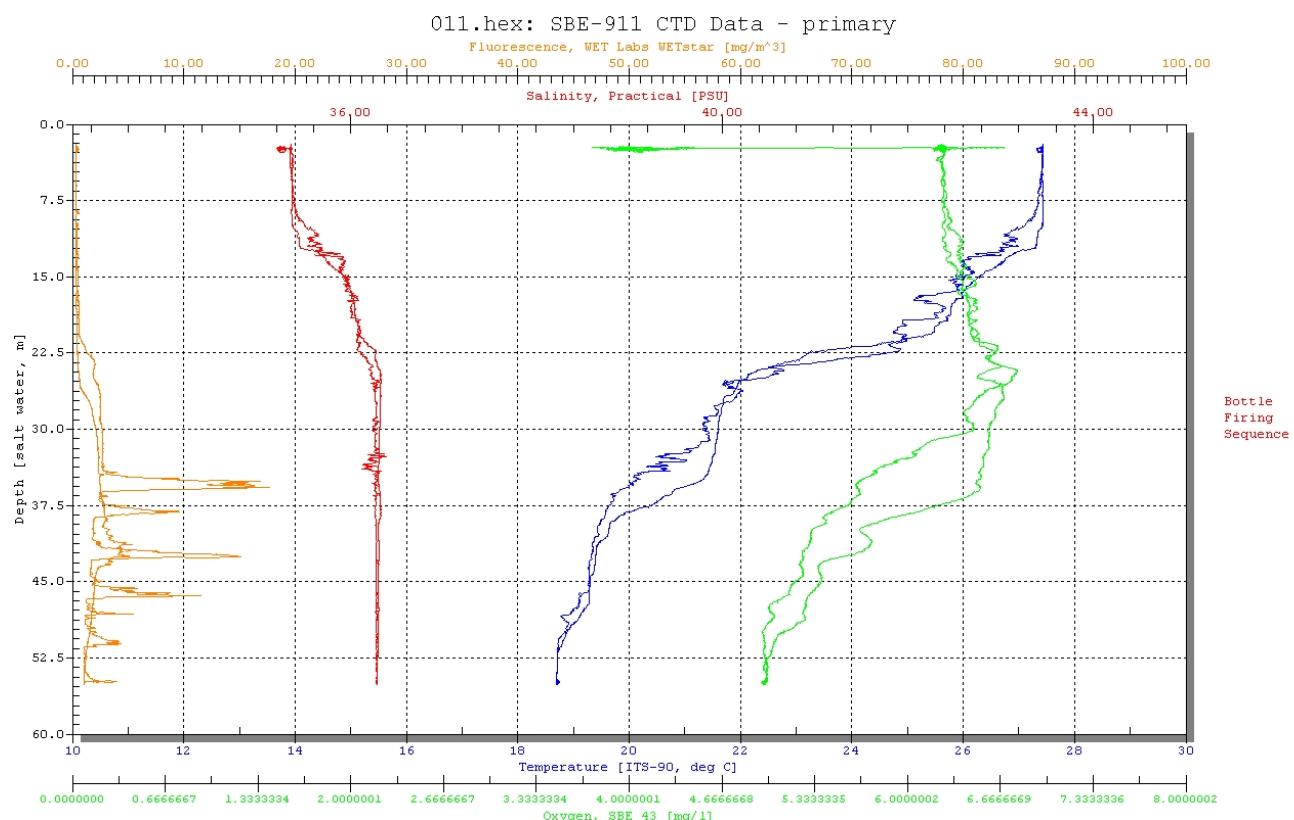
Dive Site: ROV 13-27; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

Dive Data:

Minimum Bottom Depth (m):	-45	Total Transect Length (km):	1.50
Maximum Bottom Depth (m):	-55	Surface Current (kn):	0.6
On Bottom (Time- GMT):	13:42	On Bottom (Lat/Long):	32.76°N; -78.42°W
Off Bottom (Time- GMT):	15:14	Off Bottom (Lat/Long):	32.77°N; -78.4°W
Physical (bottom); Temp (°C):	18.84	Salinity:	N/A
		Visibility (ft):	N/A
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 16.64



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-27; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

Dive Imagery:



Figure 1: -53.5 m 32.77 °N; -78.42 °W
Giant red starfish (*Tethyaster grandis*) on soft bottom habitat.



Figure 2: -49.3 m 32.77 °N; -78.41 °W
Lionfish (*Pterois volitans/miles*) and black coral on low relief hard bottom.

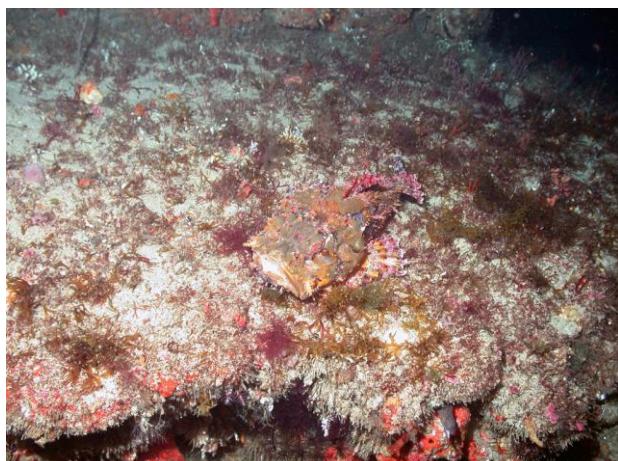


Figure 3: -49.3 m 32.77 °N; -78.41 °W
Scorpionfish (Scorpaenidae) blends in with the rock/algal substrate.

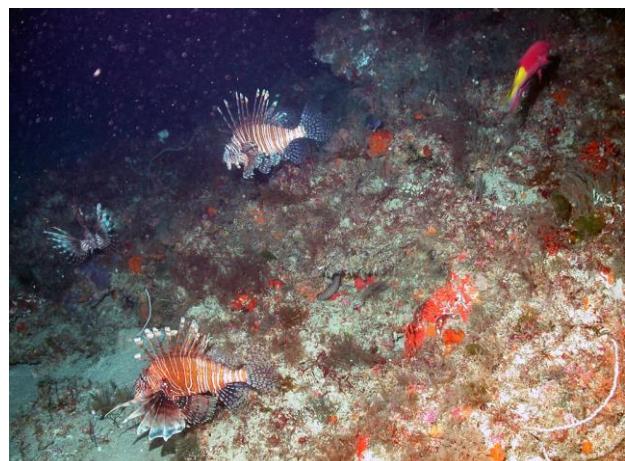


Figure 4: -51 m 32.77 °N; -78.41 °W
School of Lionfish (*Pterois volitans/miles*) and spotfin hogfish (*Bodianus pulchellus*) [upper right].

Dive Site: ROV 13-27; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-27, UNCW Superphantom ROV Dive 2262; Site #- 9-VII-13-4. Target Site - S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m. Ground-truth 2012 Pisces MB:)(scmpa_bathy and oe_block9_5m)

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted.

Site Description/Habitat/Biota:

Multibeam shows long E-W oriented ridge, very narrow, 10-20 wide, with flat bottom on each side. Transect heading E along the ridge and base. Landed in sediment 300 m south of ridge. Edge of MB ridge is sediment with small patches of 1 m diameter rock boulders, .5 m relief. Ridge top: variable, some areas are scattered smooth rock knolls, 5-10 m diam, 1-2 m tall, surrounded by sand. Other areas are high relief ledges, up to 3-4 m, with deep undercuts, 1-3 m deep and some with short tunnels, high rugosity; top 49 m, base 50-52 m, and sand at base; no rubble zone at base. The boulders are smooth, 10 m wide and about 3 m tall. To the north and south of the ridge is 100 % sediment. Small area with sheer rock wall 90o slope on the 3-4 m ledge; this appears as a 20o slope on MB. Dominant fauna are dense black stinging hydroids, Stichopathes, Agelas sponges. Dense fish, numerous gag and scamp grouper, and one speckled hind. 223 Lionfish-everywhere!!

Dominant Benthic Biota:

Alg - Phaeophyta: *Sargassum* sp.; Rhodophyta: *Halymenia* sp.; Art - Decapoda; Anomura, Scyllarides sp.; Bry - *Hippoporella* sp.; Cho - Ascidiacea; Didemnidae, *Eudistoma* sp.; Cni - Anthozoa: *Cerianthus* sp.; Antipathidae: unid, *Stichopathes* sp.; Gorgonacea: *Diodogorgia* sp., *Telesto* sp., Ellisellidae, *Nicella* sp., *Swiftia exserta*, *Titanideum frauenfeldii*; Hydroidolina: unid, black stinging, white bushy; Zoanthidea; Ech - Asteroidea: *Tethiaster grandis*; Crinoidea: unid; Por - Demospongiae: unid, *Geodia* sp., *Ircinia campana*, *Agelas clathrodes*, Spirastrellidae, unid tan cake

Fish

amberjack - *Seriola* sp., bandtail puffer - *Sphoeroides spengleri*, bank butterflyfish - *Prognathodes aya*, bank seabass - *Centropristes ocyurus*, bicolor damselfish - *Pomacentrus partitus*, blackbar soldierfish - *Myripristis jacobus*, blue angelfish - *Holacanthus bermudensis*, Calamus porgy - *Calamus* sp., cowfish - *Lactophrys* sp., creole-fish - *Paranthias furcifer*, cubbyu - *Equetus umbrosus*, doctorfish, french angelfish - *Pomacanthus paru*, gag grouper - *Mycteroperca microlepis*, graysby grouper - *Epinephelus cruentatus*, hogfish - *Lachnolaimus maximus*, lionfish - *Pterois volitans* (223), moray eel - Muraenidae, orangeback bass - *Serranus annularis*, porgy - Sparidae, puffer, purple reefish - *Chromis scotti*, razorfish - *Hemipteronotus* sp., red porgy - *Pagrus pagrus*, reef butterflyfish - *Chaetodon sedentarius*, rock beauty - *Holacanthus tricolor*, scamp grouper - *Mycteroperca phenax*, scorpionfish - *Scorpaenidae*, sharpnose puffer - *Canthigaster rostrata*, short bigeye - *Pristigenys alta*, speckled hind - *Epinephelus drummondhayi*, spotfin butterflyfish - *Chaetodon ocellatus*, spotfin hogfish - *Bodianus pulchellus*, squirrelfish - *Holocentrus* sp., sunshinefish - *Chromis insolata*, tattler - *Serranus phoebe*, tomtate - *Haemulon aurolineatum*, twospot cardinalfish - *Apogon pseudomaculatus*, vermillion snapper - *Rhomboplites aurorubens*, white grunt - *Haemulon plumieri*, wrasse - *Halichoeres* sp., yellowhead wrasse - *Halichoeres garnoti*, yellowmouth grouper - *Mycteroperca interstitialis*,

Dive Site: ROV 13-27; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

yellowtail reefish - *Chromis enchrysurus*

Dive Site: ROV 13-27; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

CPCe Percent Cover Analysis:

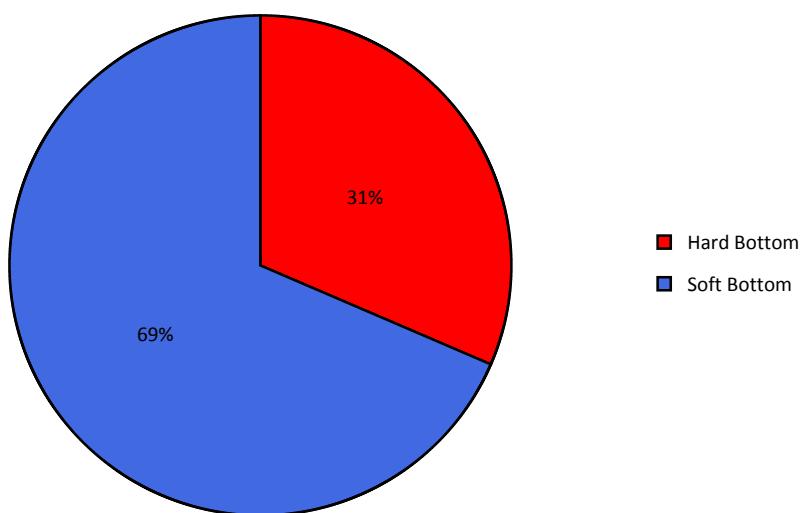


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-27. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

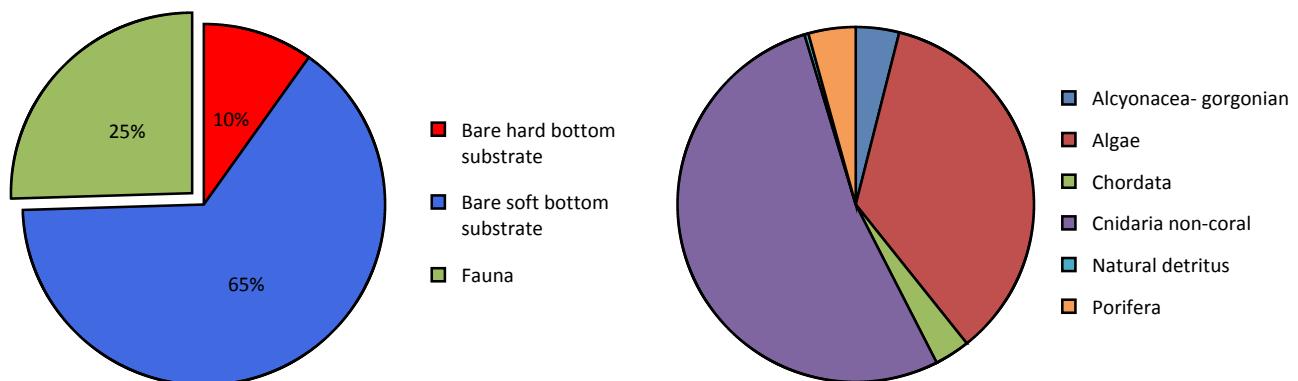


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-27.

Dive Site: ROV 13-27; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-27.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	280	25.48%
Algae	99	9.01%
Chlorophyta	3	0.27%
Corallinales/crustose coralline	29	2.64%
Phaeophyta	32	2.91%
Rhodophyta	35	3.18%
Porifera	12	1.09%
Chondrosia sp.	1	0.09%
Demospongiae	2	0.18%
Demospongiae- ze tan starlet	1	0.09%
Ircinia campana	3	0.27%
Ircinia sp.	1	0.09%
Spirastrellidae	4	0.36%
Alcyonacea- gorgonian	11	1.00%
Diodogorgia sp.	1	0.09%
Ellisella sp.	1	0.09%
Gorgonacea	7	0.64%
Telesto/Carijoa	2	0.18%
Cnidaria non-coral	148	13.47%
Hydroidolina	148	13.47%
Chordata	9	0.82%
Didemnidae	5	0.45%
Fish	4	0.36%
Natural detritus	1	0.09%
Natural detritus	1	0.09%
Soft bottom substrate	711	64.70%
Soft bottom substrate	711	64.70%
Bare soft bottom substrate	711	64.70%
Hard bottom substrate	108	9.83%
Hard bottom substrate	108	9.83%
Bare rock- pavement boulder ledge	96	8.74%
Bare rubble- rock	12	1.09%
Grand Total	1099	100.00%

Dive Site: ROV 13-27; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-27.

Scientific Name	Common Name	13-27
<i>Acanthurus</i> sp.	doctorfish	8.07
<i>Apogon pseudomaculatus</i>	twospot cardinalfish	0.4
<i>Bodianus pulchellus</i>	spotfin hogfish	44.79
<i>Calamus</i> sp.	porgy	9.28
<i>Canthigaster rostrata</i>	sharpnose puffer	12.51
<i>Centropristes oxyurus</i>	bank sea bass	0.81
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	4.44
<i>Chaetodon sedentarius</i>	reef butterflyfish	32.28
<i>Chromis encrysurus</i>	yellowtail reeffish	13.32
<i>Chromis insolatus</i>	sunshinefish	11.7
<i>Chromis scotti</i>	purple reefish	14.12
<i>Chromis</i> sp.	damselfish	25.42
<i>Epinephelus cruentatus</i>	graysby	0.81
<i>Epinephelus drummondhayi</i>	speckled hind	0.4
<i>Gymnothorax moringa</i>	spotted moray	0.4
<i>Haemulon aurolineatum</i>	tomtate	153.75
<i>Haemulon plumieri</i>	white grunt	1.21
<i>Halichoeres garnoti</i>	yellowhead wrasse	2.42
<i>Halichoeres</i> sp.	wrasse	35.51
<i>Hemipteronotus</i> sp.	razorfish	3.63
<i>Holacanthus bermudensis</i>	blue angelfish	14.53
<i>Holacanthus tricolor</i>	rock beauty	3.23
<i>Holocentrus</i> sp.	squirrelfish	10.49
<i>Lachnolaimus maximus</i>	hogfish	2.42
<i>Lactophrys</i> sp.	cowfish	0.4
<i>Liopropoma eukrines</i>	wrasse bass	0.4
<i>Mycteroperca microlepis</i>	gag grouper	1.61
<i>Mycteroperca phenax</i>	scamp	5.25
<i>Myripristis jacobus</i>	blackbar soldierfish	0.81
<i>Pagrus pagrus</i>	red porgy	4.84
<i>Paranthias furcifer</i>	creole-fish	21.39
<i>Pareques umbrosus</i>	cubbyu	0.4
<i>Pomacanthus paru</i>	french angelfish	1.21
<i>Pristigenys alta</i>	short bigeye	9.69
<i>Prognathodes aya</i>	bank butterflyfish	6.46
<i>Pterois volitans</i>	lionfish	101.69
<i>Rhomboplites aurorubens</i>	vermillion snapper	28.25
<i>Rypticus saponaceus</i>	greater soapfish	0.4

Dive Site: ROV 13-27; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

Scorpaenidae	scorpionfish	0.81
<i>Seriola</i> sp.	amberjack	2.42
<i>Serranus annularis</i>	orangeback bass	0.81
<i>Serranus notospilus</i>	saddle bass	0.81
<i>Serranus phoebe</i>	tattler	14.93
Sparidae	porgy	4.44
<i>Sparisoma atomarium</i>	greenblotch parrotfish	0.4
<i>Sphoeroides spengleri</i>	bandtail puffer	2.82
<i>Stegastes partitus</i>	bicolor damselfish	1.21

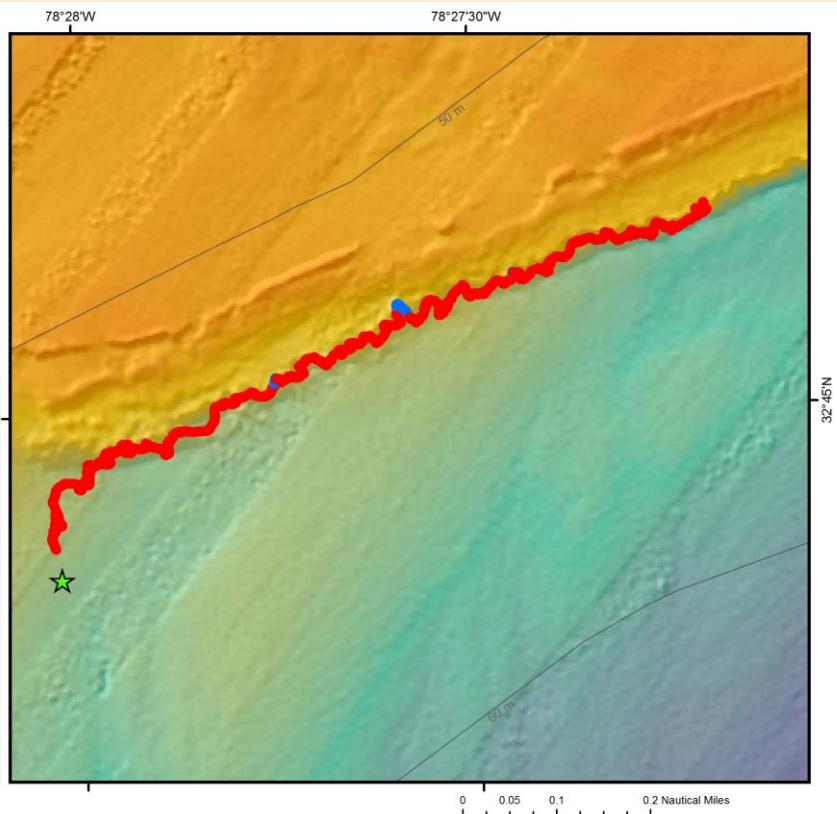
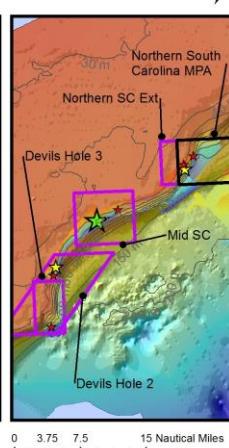
Dive Site: ROV 13-28; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
**South Carolina, Mid SC-
 Proposed MPA**
9-VII-13-5; ROV 13-28

★ ROV 13-28
 ★ ROV Dives
 ★ CTD
ROV Tracks
 ● Hard Bottom
 ● Soft Bottom
 • Other ROV Tracks

- MPA
- Deep Coral HAPC
- Proposed MPA 2013
- Bathymetry Lines (m)



Site Overview:

Project: 2013 NMFS S. Atlantic MPA Grant
Principal Investigator: Stacy Harter
PI Contact Info: 3500 Delwood Beach Rd., Panama City, FL 32444
Website: [HBOI CIOERT](#)
Scientific Observers: Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management: Access Database, Excel Spreadsheet
ROV Navigation Data: Trackpoint II
Ship Position System: DGPS
Report Analyst: John Reed, Stephanie Farrington
Date Compiled: 6/9/2014

Dive Overview:

Vessel: NOAA Ship *Pisces*
Sonar Data: OE_block9_5m
Purpose: Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV: UNCW Super Phantom
ROV Sensors: Temperature (°C), Depth (m)
Date of Dive: 7/9/2013
Specimens: 0
Digital Photos: 95
DVD: 2
Hard Drive: 1

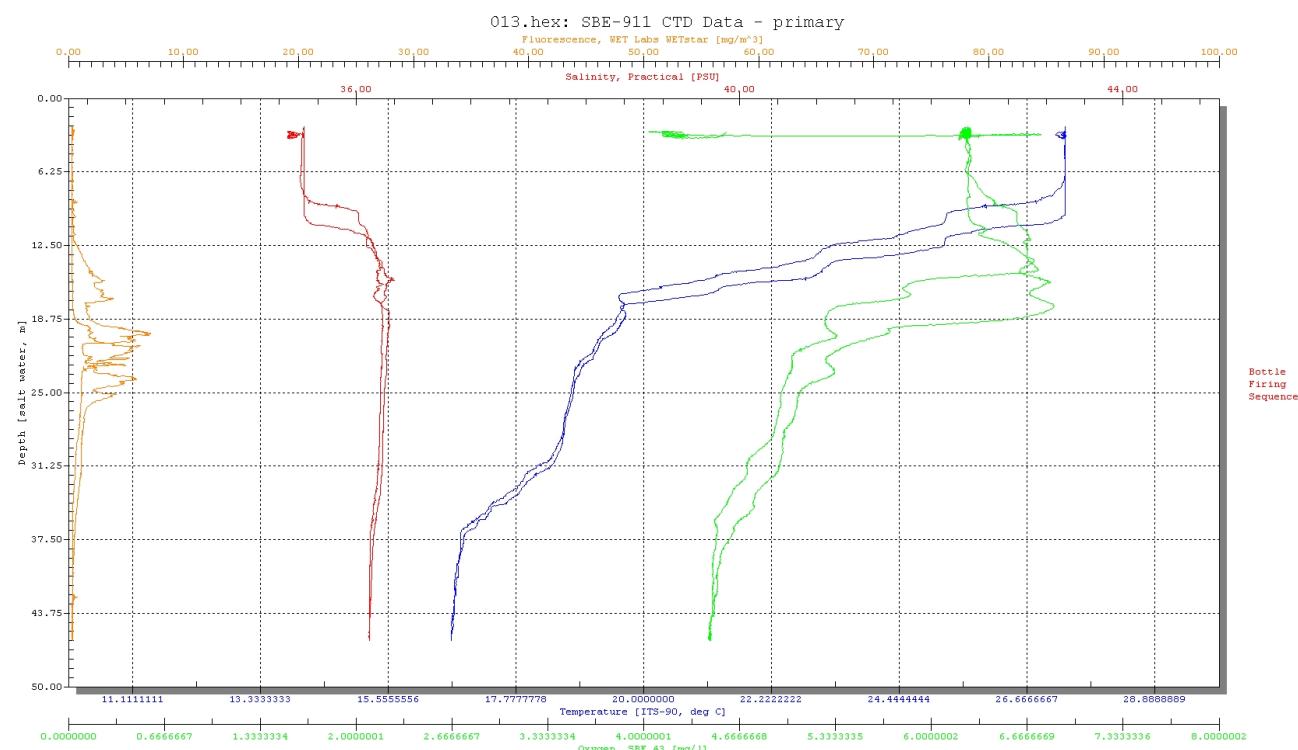
Dive Site: ROV 13-28; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

Dive Data:

Minimum Bottom Depth (m):	-44	Total Transect Length (km):	1.45
Maximum Bottom Depth (m):	-56	Surface Current (kn):	0.6
On Bottom (Time- GMT):	16:03	On Bottom (Lat/Long):	32.75°N; -78.47°W
Off Bottom (Time- GMT):	17:38	Off Bottom (Lat/Long):	32.75°N; -78.45°W
Physical (bottom); Temp (°C):	18.54	Salinity:	N/A
		Visibility (ft):	50
		Current (kn):	0.75

Physical Environment:

Distance from Dive Site(km): 13.21



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-28; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

Dive Imagery:

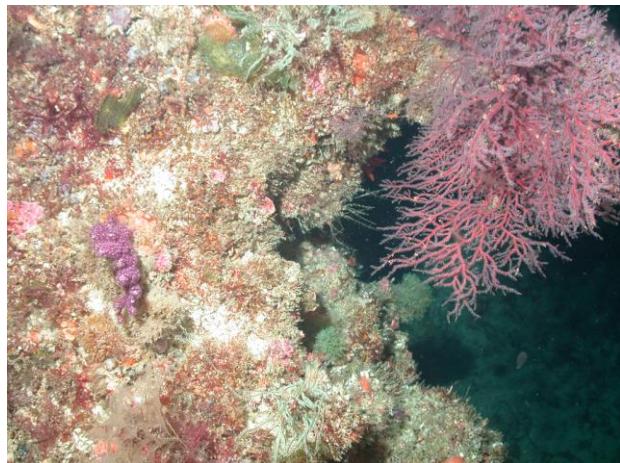


Figure 1: -48.5 m 32.75 °N; -78.46 °W

Dense cover of epifauna and algae on rock ledge: purple gorgonian (*Diogorgia* sp.), red gorgonian (*Nicella* sp.).



Figure 2: -51 m 32.75 °N; -78.47 °W

Thicket of *Telesto* sp. gorgonian.



Figure 3: -51 m 32.75 °N; -78.45 °W

Yellowmouth grouper (*Mycteroperca interstitialis*).



Figure 4: -49.3 m 32.75 °N; -78.46 °W

Scorpionfish (Scorpaenidae) blends in with the bottom.

Dive Site: ROV 13-28; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-28, UNCW Superphantom ROV Dive 2263; Site #- 9-VII-13-5. Target Site - S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m. Ground-truth 2012 Pisces MB: OE_block9_5m.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted.

Site Description/Habitat/Biota:

Ridge in MB is 23,000+ m long and 35 m wide, oriented E-W. The transect headed east along the top and south slope of the ridge. Landed 179 m south of ridge; pavement with sediment veneer, 55 m. South base of ridge slope: scattered boulders, < 2 m diameter, <.5 m relief, depth 55 m. Ridge top: 2 m ledge near vertical along ledge, with undercut rock slabs at top edge, high rugosity (55 m at base, 50 at top of ridge), overhangs 2-3 m; minimum depth on top 48.5 m. Base of south slope abruptly changes to flat sand, without wide rubble zone. Right on green spot on MB on slope: table top undercut rock slabs with flat tops and caves, steep rugged slopes, upper slope vertical escarpment 2-3 m, overall slope 7.5 m maximum, 48.5 top to 58 m base. This area shows as 30o slope on the MB. We estimate 30o also for total slope from top to bottom. North side of ridge is 100% sediment and there is an abrupt change to rock and sheer overhangs.

Dominant Benthic Biota:

Alg - Phaeophyta: *Sargassum* sp.; Chlorophyta: *Ulva* sp.; Ann - *Filograna* sp.; Art - Decapoda: *Scyllarides* sp.; Bry - *Schizoporella* sp.; Cho - Ascidiacea; Didemnidae; Cni - Antipathidae: unid. Sp. Black fan 50-75 cm with zoanthids, *Stichopathes* sp., *Tanacetipathes* sp.; Gorgonacea: unid. Sp., *Bebryce* sp., *Diodogorgia* sp., *Telesto* sp., Ellisellidae, *Swiftia exserta*; Hydroidolina: unid. Sp., fine white hair; Zoanthidea; Ech - Asteroidea: *Tethiaster grandis*; Crinoidea: *Crinometra brevipenna*; Por - Demospongiae: unid. Spp., *Geodia* sp., *Ircinia campana*, *Agelas clathrodes*, gray cake

Fish

amberjack - *Seriola* sp., bandtail puffer - *Sphoeroides spengleri*, bank butterflyfish - *Prognathodes aya*, bicolor damselfish - *Pomacentrus partitus*, blackbar soldierfish - *Myripristis jacobus*, blue angelfish - *Holacanthus bermudensis*, burrfish, *Calamus* porgy - *Calamus* sp., cornetfish - *Fistularia* sp., cowfish - *Lactophrys* sp., creole-fish - *Paranthias furcifer*, cubbyu - *Equetus umbrosus*, doctorfish, french angelfish - *Pomacanthus paru*, gag grouper - *Mycteroperca microlepis*, gray triggerfish - *Balistes capriscus*, graysby grouper - *Epinephelus cruentatus*, greenblotch parrotfish - *Sparisoma atomarium*, grouper, hake, hogfish - *Lachnolaimus maximus*, lionfish - *Pterois volitans* (98), moray eel - Muraenidae, *Mycteroperca* sp., ocean surgeonfish, orangeback bass - *Serranus annularis*, porgy - Sparidae, purple reefish - *Chromis scotti*, red porgy - *Pagrus pagrus*, reef butterflyfish - *Chaetodon sedentarius*, rock beauty - *Holacanthus tricolor*, sand tilefish - *Malacanthus plumieri*, scamp grouper - *Mycteroperca phenax*, scorpionfish - Scorpaenidae, shark, sharpnose puffer - *Canthigaster rostrata*, short bigeye - *Pristigenys alta*, soldierfish, spanish hogfish, spotfin butterflyfish - *Chaetodon ocellatus*, spotfin hogfish - *Bodianus pulchellus*, spotted goatfish - *Pseudupeneus maculatus*, squirrelfish - *Holocentrus* sp., sunshinefish - *Chromis insolata*, tattler - *Serranus phoebe*, tomtate - *Haemulon aurolineatum*, white grunt - *Haemulon plumieri*, wrasse - *Halichoeres* sp., yellowhead wrasse - *Halichoeres garnoti*, yellowmouth grouper - *Mycteroperca interstitialis*, yellowtail reefish - *Chromis*

Dive Site: ROV 13-28; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

enchraysurus

Dive Site: ROV 13-28; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

CPCe Percent Cover Analysis:

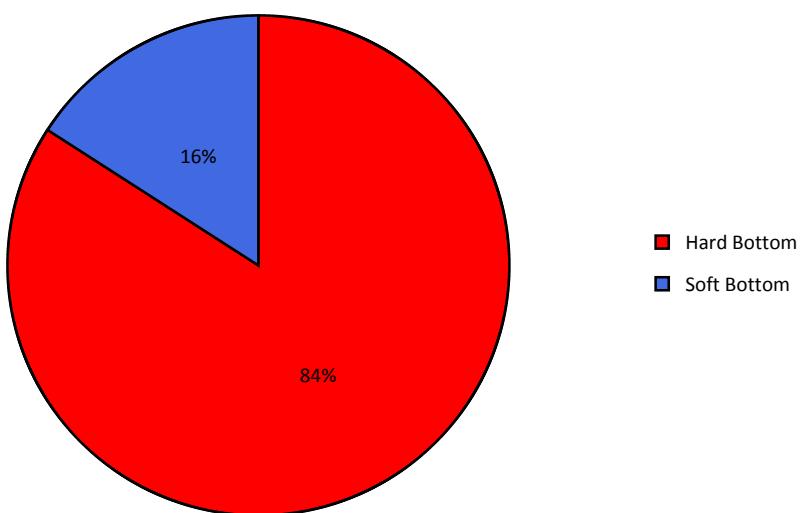


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-28. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

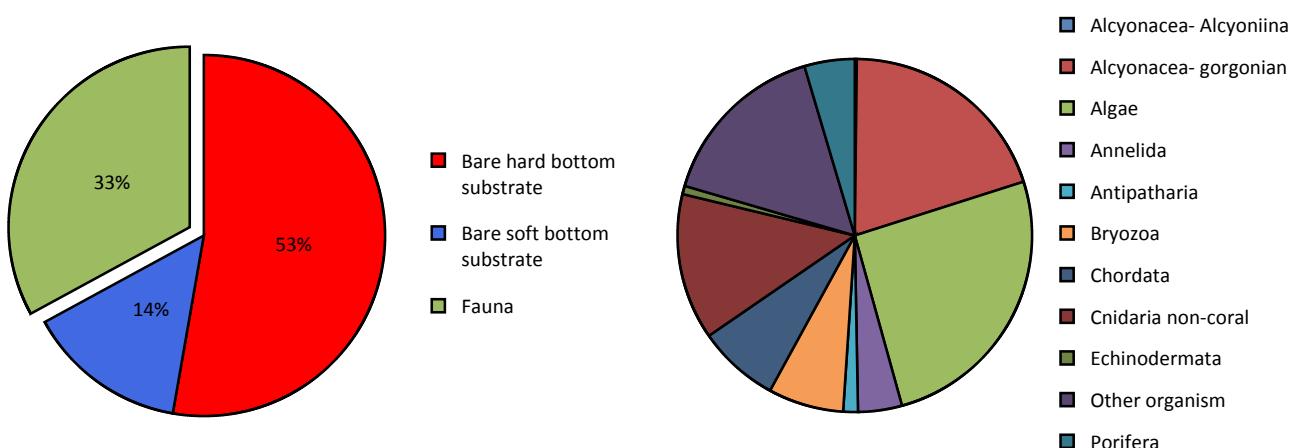


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-28.

Dive Site: ROV 13-28; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-28.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	523	32.96%
Algae	134	8.44%
Chlorophyta	17	1.07%
Corallinales/crustose coralline	5	0.32%
Cyanophyta	3	0.19%
Phaeophyta	36	2.27%
Rhodophyta	73	4.60%
Porifera	24	1.51%
Demospongiae	15	0.95%
Demospongiae- ze tan starlet	6	0.38%
Haliscarca sp.	2	0.13%
Spirastrellidae	1	0.06%
Alcyonacea- gorgonian	104	6.55%
Diodogorgia sp.	10	0.63%
Gorgonacea	2	0.13%
Muricea sp.	12	0.76%
Nicella sp.	5	0.32%
Telesto/Carijoa	75	4.73%
Alcyonacea- Alcyoniina	1	0.06%
Chironephthya caribaea	1	0.06%
Antipatharia	7	0.44%
Antipatharia	2	0.13%
Tanacetipathes hirta	5	0.32%
Cnidaria non-coral	70	4.41%
Fam- Zoanthidae	1	0.06%
Hydroidolina	69	4.35%
Annelida	21	1.32%
Filograna sp.	21	1.32%
Bryozoa	36	2.27%
Bryozoa	31	1.95%
Schizoporella sp.	5	0.32%
Echinodermata	4	0.25%
Crinoidea	4	0.25%
Chordata	39	2.46%
Asciidiacea	11	0.69%
Didemnidae	25	1.58%
Fish	3	0.19%

Dive Site: ROV 13-28; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

Other organism	83	5.23%
Other organism	83	5.23%
Soft bottom substrate	227	14.30%
Soft bottom substrate	227	14.30%
Bare soft bottom substrate	227	14.30%
Hard bottom substrate	837	52.74%
Hard bottom substrate	837	52.74%
Bare rock- pavement boulder ledge	832	52.43%
Bare rubble- rock	5	0.32%
Grand Total	1587	100.00%

Dive Site: ROV 13-28; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-28.

Scientific Name	Common Name	13-28
<i>Acanthurus</i> sp.	doctorfish	7.43
<i>Balistes capriscus</i>	grey triggerfish	0.41
<i>Bodianus pulchellus</i>	spotfin hogfish	42.13
<i>Bodianus rufus</i>	spanish hogfish	0.83
<i>Calamus</i> sp.	porgy	11.15
<i>Canthigaster rostrata</i>	sharpnose puffer	28.09
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	5.37
<i>Chaetodon sedentarius</i>	reef butterflyfish	38.41
<i>Chaetodon</i> sp.	butterflyfish	5.78
<i>Chromis cyaneus</i>	blue chromis	4.96
<i>Chromis encrysurus</i>	yellowtail reefish	2.89
<i>Chromis insolatus</i>	sunshinefish	13.63
<i>Chromis scotti</i>	purple reefish	37.59
<i>Chromis</i> sp.	damselish	14.87
<i>Diodon hystrix</i>	porcupinefish	0.41
<i>Diodon</i> sp.	puffer	0.41
<i>Epinephelus cruentatus</i>	graysby	3.3
<i>Fistularia tabacaria</i>	bluespotted cornetfish	0.41
<i>Haemulon aurolineatum</i>	tomate	656.75
<i>Haemulon plumieri</i>	white grunt	6.61
<i>Halichoeres garnoti</i>	yellowhead wrasse	3.3
<i>Halichoeres</i> sp.	wrasse	59.07
<i>Holacanthus bermudensis</i>	blue angelfish	26.44
<i>Holacanthus tricolor</i>	rock beauty	1.65
Holocentridae		0.41
<i>Holocentrus</i> sp.	squirrelfish	30.15
<i>Lachnolaimus maximus</i>	hogfish	4.96
<i>Lactophrys quadricornis</i>	scrawled cowfish	0.41
<i>Lactophrys</i> sp.	cowfish	0.41
<i>Lutjanus</i> sp.	snapper	1.24
<i>Malacanthus plumieri</i>	sand tilefish	0.41
Muraenidae	moray eel	0.41
<i>Mycteroperca interstitialis</i>	yellowmouth grouper	0.41
<i>Mycteroperca microlepis</i>	gag grouper	5.78
<i>Mycteroperca phenax</i>	scamp	29.74
<i>Myripristis jacobus</i>	blackbar soldierfish	2.89
<i>Pagrus pagrus</i>	red porgy	94.59
<i>Paranthias furcifer</i>	creole-fish	8.26

Dive Site: ROV 13-28; S. Carolina, Proposed Mid SC MPA, E-W Ridge, 50 m

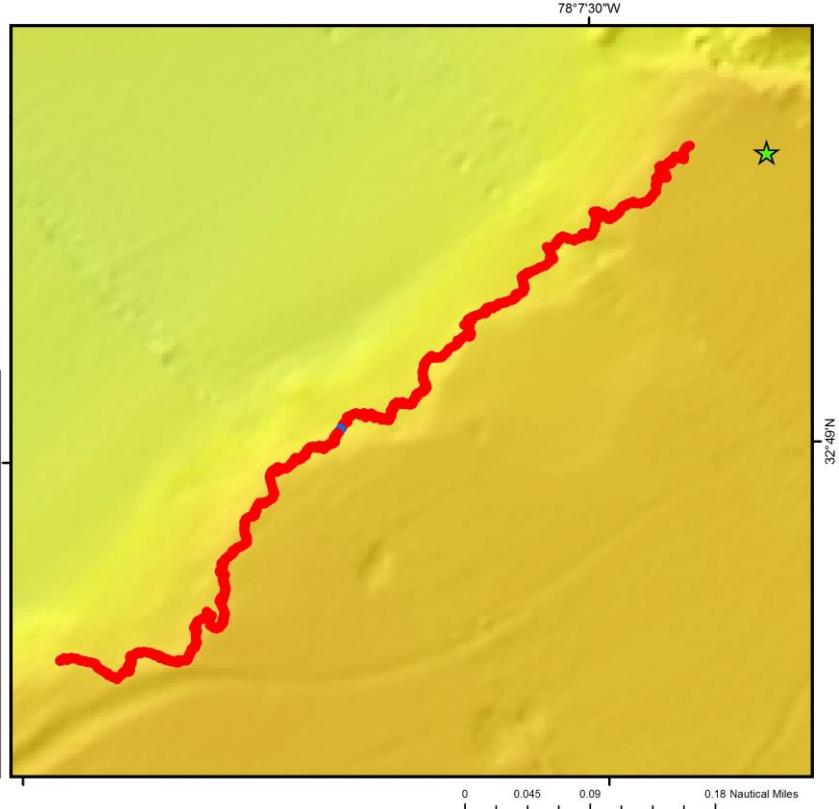
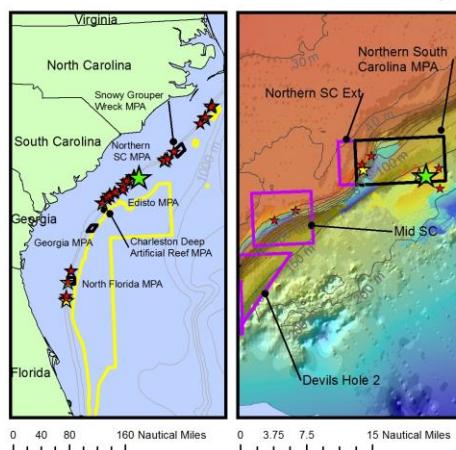
<i>Pareques umbrosus</i>	cubbyu	20.24
<i>Pomacanthus paru</i>	french angelfish	0.83
<i>Pomacanthus</i> sp.	angelfish	0.83
<i>Pristigenys alta</i>	short bigeye	4.54
<i>Prognathodes aya</i>	bank butterflyfish	6.61
<i>Pseudupeneus maculatus</i>	spotted goatfish	0.41
<i>Pterois volitans</i>	lionfish	49.57
<i>Rhomboplites aurorubens</i>	vermillion snapper	7.02
Scorpaenidae	scorpionfish	1.65
<i>Seriola dumerili</i>	greater amberjack	0.41
<i>Seriola rivoliana</i>	almaco jack	1.24
<i>Seriola</i> sp.	amberjack	6.2
<i>Serranus annularis</i>	orangeback bass	0.41
<i>Serranus phoebe</i>	tattler	1.24
<i>Sparisoma atomarium</i>	greenblotch parrotfish	0.41
<i>Sphoeroides spengleri</i>	bandtail puffer	0.83
<i>Stegastes partitus</i>	bicolor damselfish	5.37
<i>Urophycis earlii</i>	carolina hake	0.41

Dive Site: ROV 13-29; S. Carolina, Northern S. Carolina MPA, terrace with iceberg scour, 165 m

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
South Carolina, Northern South Carolina MPA
10-VII-13-2; ROV 13-29

- ★ ROV 13-29
 - ★ ROV Dives
 - ★ CTD
 - MPA
 - Deep Coral HAPC
 - Proposed MPA 2013
 - Bathymetry Lines (m)
- ROV Tracks**
- Hard Bottom
 - Soft Bottom
 - Other ROV Tracks



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	oe_block2
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/10/2013
Specimens:	0
Digital Photos:	117
DVD:	2
Hard Drive:	1

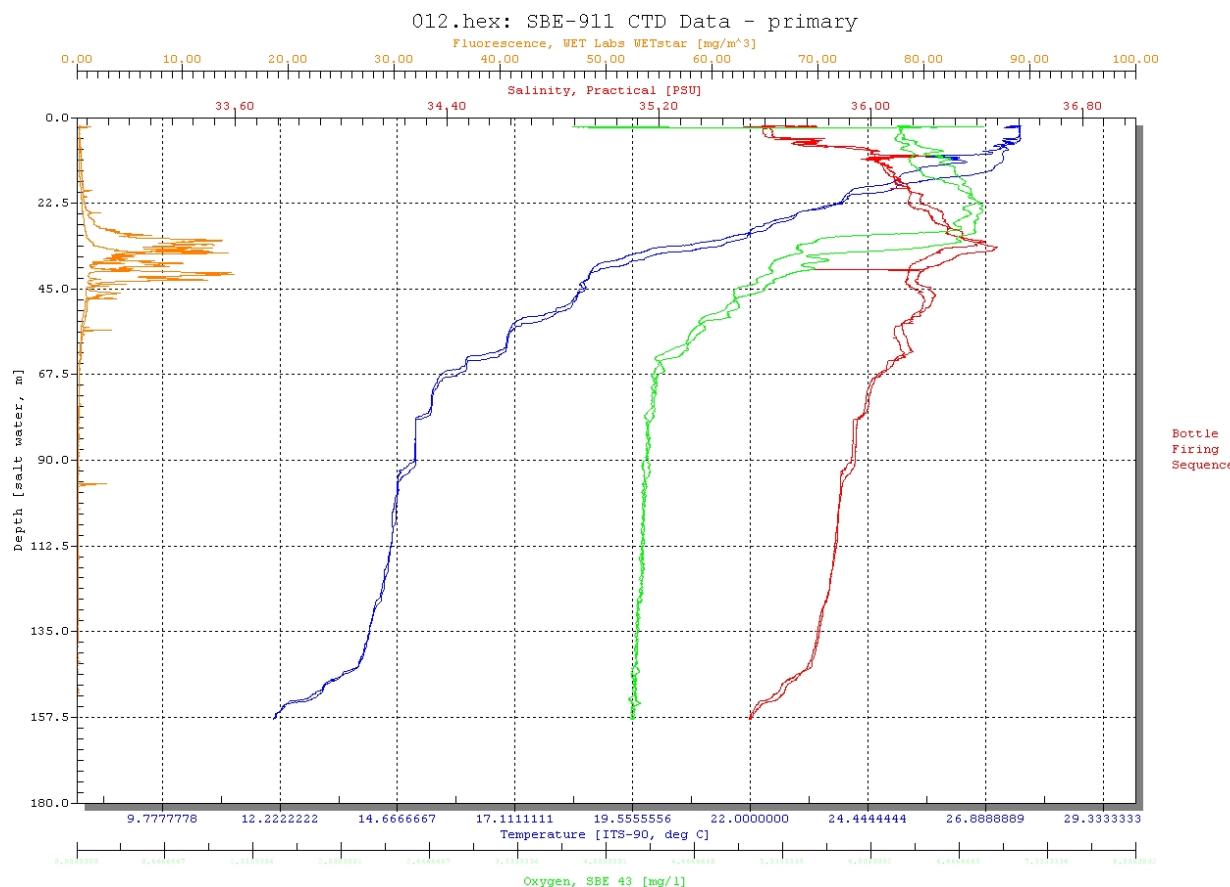
Dive Site: ROV 13-29; S. Carolina, Northern S. Carolina MPA, terrace with iceberg scour, 165 m

Dive Data:

Minimum Bottom Depth (m):	-159	Total Transect Length (km):	1.32
Maximum Bottom Depth (m):	-169	Surface Current (kn):	0.4
On Bottom (Time- GMT):	8:21	On Bottom (Lat/Long):	32.82°N; -78.12°W
Off Bottom (Time- GMT):	9:48	Off Bottom (Lat/Long):	32.81°N; -78.13°W
Physical (bottom); Temp (°C):	11.91	Salinity:	N/A
		Visibility (ft):	15
		Current (kn):	0.25

Physical Environment:

Distance from Dive Site(km): 1.39



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-29; S. Carolina, Northern S. Carolina MPA, terrace with iceberg scour, 165 m

Dive Imagery:



Figure 1: -167 m 32.82 °N; -78.13 °W

Deep iceberg scours provide habitat for this deepwater *Leiodermatium* sp. demosponge and *Ellisellidae* gorgonians.

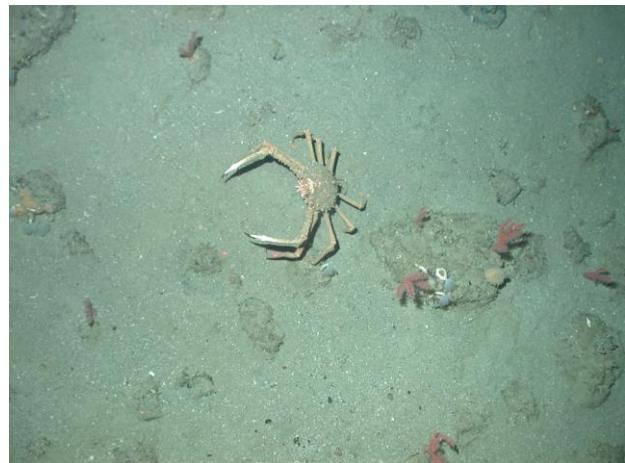


Figure 2: -164 m 32.82 °N; -78.13 °W

Spider crab (Majidae).



Figure 3: -162.4 m 32.82 °N; -78.13 °W

School of longspine snipefish (*Macrorhamphosus scolopax*) on top edge of iceberg scour.



Figure 4: -161.7 m 32.82 °N; -78.13 °W

Yellowedge grouper (*Hyporthodus flavolimbatus*) and snowy grouper (*Hyporthodus niveatus*).

Dive Site: ROV 13-29; S. Carolina, Northern S. Carolina MPA, terrace with iceberg scour, 165 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-29, UNCW Superphantom ROV Dive 2264; Site #- 10-VII-13-2. Target Site - S. Carolina, Northern S. Carolina MPA, terrace with iceberg scours, 165 m. Ground-truth 2012 Pisces MB: (reprocessed 2013 as oe_block2_5m, and corresponding files).

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted.

Site Description/Habitat/Biota:

MB shows iceberg scours cutting through a terrace, 165 m deep. Transect was along the west edge of the 165 m terrace and was not in the iceberg scour. Landed on top of 165 m terrace, near west edge; flat rock pavement with cobble and small boulders <0.25 cm, and sediment veneer. Headed S along edge of terrace west slope: upper slope, 0-5°. West Slope; where it shows on MB 9-10° slope: 1 m rock ledges and boulders, 0.5 m relief, scatter rock boulders - 167.5 m. West slope: MB shows 5-10o: pavement, sediment small rocks, depth 169 m. West slope: MB shows 10-12o slope: increase in rock size = 20-30 cm, increase in rugosity to high, top of ridge 164 m, row relief rugged < 0.5 m, visually estimate 10+°slope.

Dominant Benthic Biota:

Ann - Serpulidae; Art - Decapoda: Majidae, Anomura, *Cancer* sp.; Cni - Gorgonacea: 2 spp, white and pink unid; Ech - Holothuroidea: *Paracolochirus mysticus*; Por - Demospongiae: *Leiodermatium* sp., Lithistidae, *Hymedesmia* sp., *Spongisorites?* sp.

Fish

anthiid - Anthiinae; apricot bass - *Plectranthias garrupellus*; bank butterflyfish - *Prognathodes aya*; bigeye soldierfish - *Ostichthys trachypoma*; blackbar drum - *Pareques iwamotoi*; blueline tilefish - *Caulolatilus microps*; boarfish - *Antigonia* sp.; bulleye - *Cookeolus boops*; Darwin's slimehead - *Gephyroberyx darwinii*; Ech - Holothuroidea; *Paracolochirus mysticus*; french butterflyfish - *Prognathodes guyanensis*; goosefish; *Laemonema* sp.; longspine snipefish - *Macroramphosus scolopax*; porgy - Sparidae; red barbier - *Hemanthias vivenus*; red hogfish - *Decodon puellaris*; red porgy - *Pagrus pagrus*; roughtongue bass - *Pronotogrammus martinicensis*; saddle bass - *Serranus notospilus*; sand diver - *Synodus intermedius*; scorpionfish - *Scorpaenidae*; short bigeye - *Pristigenys alta*; snowy grouper - *Epinephelus niveatus*; yellowedge grouper - *Hyporthodus flavolimbatus*; yellowfin bass - *Anthias nicholsi*

Dive Site: ROV 13-29; S. Carolina, Northern S. Carolina MPA, terrace with iceberg scour, 165 m

CPCe Percent Cover Analysis:

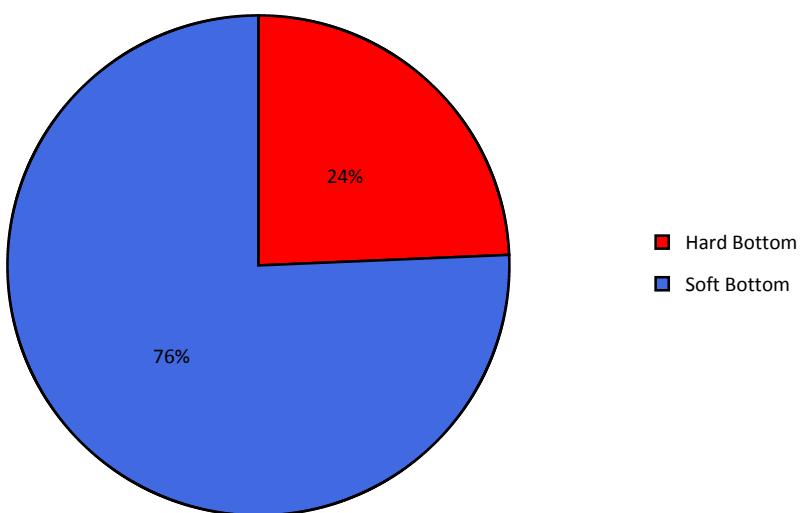


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-29. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

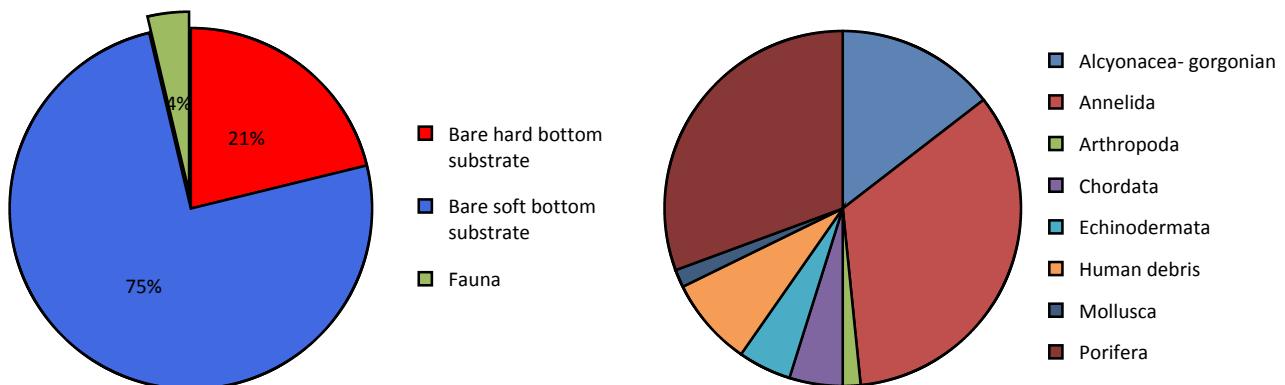


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-29.

Dive Site: ROV 13-29; S. Carolina, Northern S. Carolina MPA, terrace with iceberg scour, 165 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-29.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	57	3.40%
Porifera	19	1.13%
Demospongiae	13	0.78%
Leiodermatium sp.	5	0.30%
Zyzya sp.	1	0.06%
Alcyonacea- gorgonian	9	0.54%
Muricea sp.	7	0.42%
Nicella sp.	2	0.12%
Annelida	21	1.25%
Sabellidae	21	1.25%
Mollusca	1	0.06%
Gastropoda	1	0.06%
Arthropoda	1	0.06%
Majidae	1	0.06%
Echinodermata	3	0.18%
Paracolochirus mysticus	3	0.18%
Chordata	3	0.18%
Fish	3	0.18%
Soft bottom substrate	1260	75.13%
Soft bottom substrate	1260	75.13%
Bare soft bottom substrate	1260	75.13%
Hard bottom substrate	355	21.17%
Hard bottom substrate	355	21.17%
Bare rock- pavement boulder ledge	271	16.16%
Bare rubble- rock	84	5.01%
Human debris	5	0.30%
Human debris	5	0.30%
Fishing gear/line/long line	3	0.18%
Human debris- other	2	0.12%
Grand Total	1677	100.00%

Dive Site: ROV 13-29; S. Carolina, Northern S. Carolina MPA, terrace with iceberg scour, 165 m**Density of Fish:**

Table 1. Density (number individuals/km) of fish for all transects at 13-29.

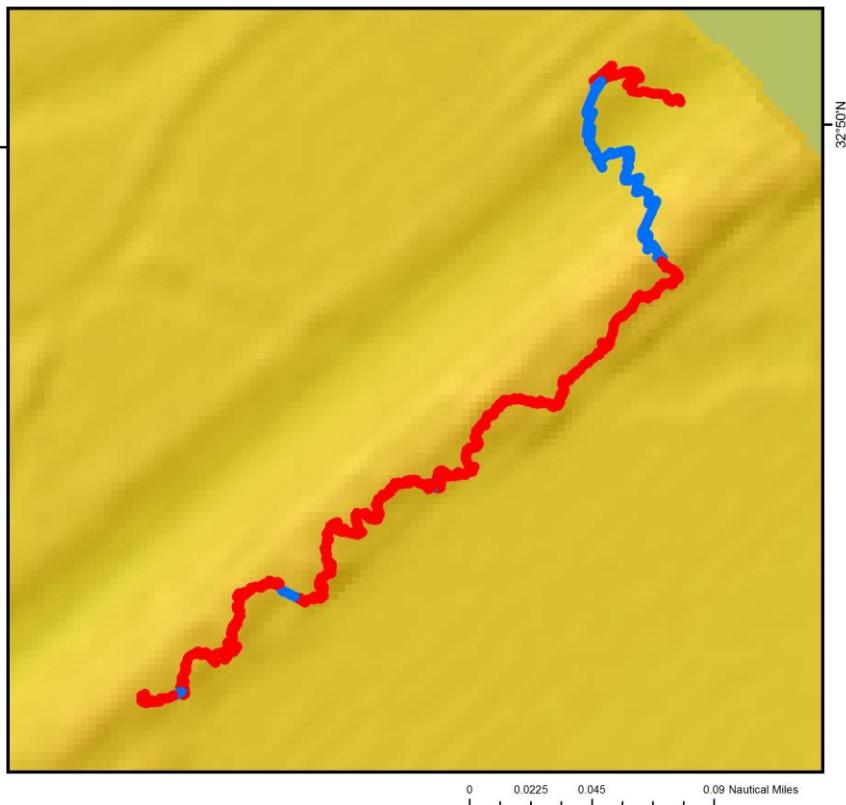
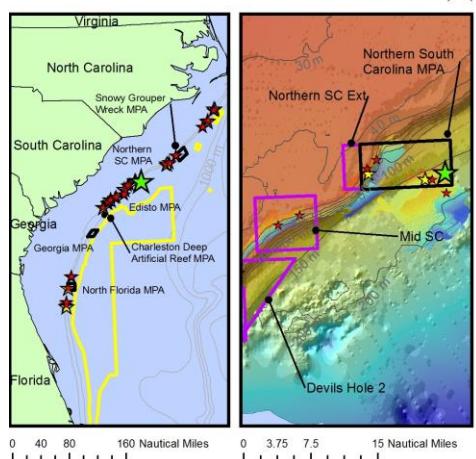
Scientific Name	Common Name	13-29
<i>Anthias nicholsi</i>	yellowfin bass	25.54
<i>Anthiinae</i>	anthiid	87.1
<i>Antigonia capros</i>	deepbody boarfish	143.42
<i>Caulolatilus microps</i>	blueline tilefish	3.27
<i>Cookeolus boops</i>	bulleye	1.96
<i>Decodon puellaris</i>	red hogfish	9.82
<i>Gephyroberyx darwinii</i>	Darwin's slimehead	3.93
<i>Hemanthias vittatus</i>	red barbier	4.58
Holocentridae		1.96
<i>Hyporthodus flavolimbatus</i>	yellowedge grouper	0.65
<i>Hyporthodus niveatus</i>	snowy grouper	16.37
<i>Laemonema sp.</i>	mora cod	5.89
<i>Lophius americanus</i>	goosefish	0.65
<i>Macrorhamphosus scolopax</i>	longspine snipefish	4.58
<i>Muraena retifera</i>	reticulate moray	1.31
<i>Ostichthys trachypoma</i>	bigeye soldierfish	3.27
<i>Pagrus pagrus</i>	red porgy	7.2
<i>Pareques iwamotoi</i>	blackbar drum	11.13
<i>Plectranthias garrupellus</i>	apricot bass	20.3
<i>Pristigenys alta</i>	short bigeye	18.99
<i>Prognathodes aya</i>	bank butterflyfish	2.62
<i>Prognathodes guyanensis</i>	french butterflyfish	1.96
Scorpaenidae	scorpionfish	34.05
<i>Serranus notospilus</i>	saddle bass	15.72
<i>Synodus intermedius</i>	sand diver	0.65

Dive Site: ROV 13-30; S. Carolina, Northern S. Carolina MPA, iceberg scour, 160 m

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
South Carolina, Northern South Carolina MPA
10-VII-13-3; ROV 13-30

- ★ ROV 13-30
 - ★ ROV Dives
 - ★ CTD
 - ROV Tracks**
 - Hard Bottom
 - Soft Bottom
 - Other ROV Tracks
- MPA
 Deep Coral HAPC
 Proposed MPA 2013
— Bathymetry Lines (m)



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	oe_block2
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/10/2013
Specimens:	0
Digital Photos:	64
DVD:	1
Hard Drive:	1

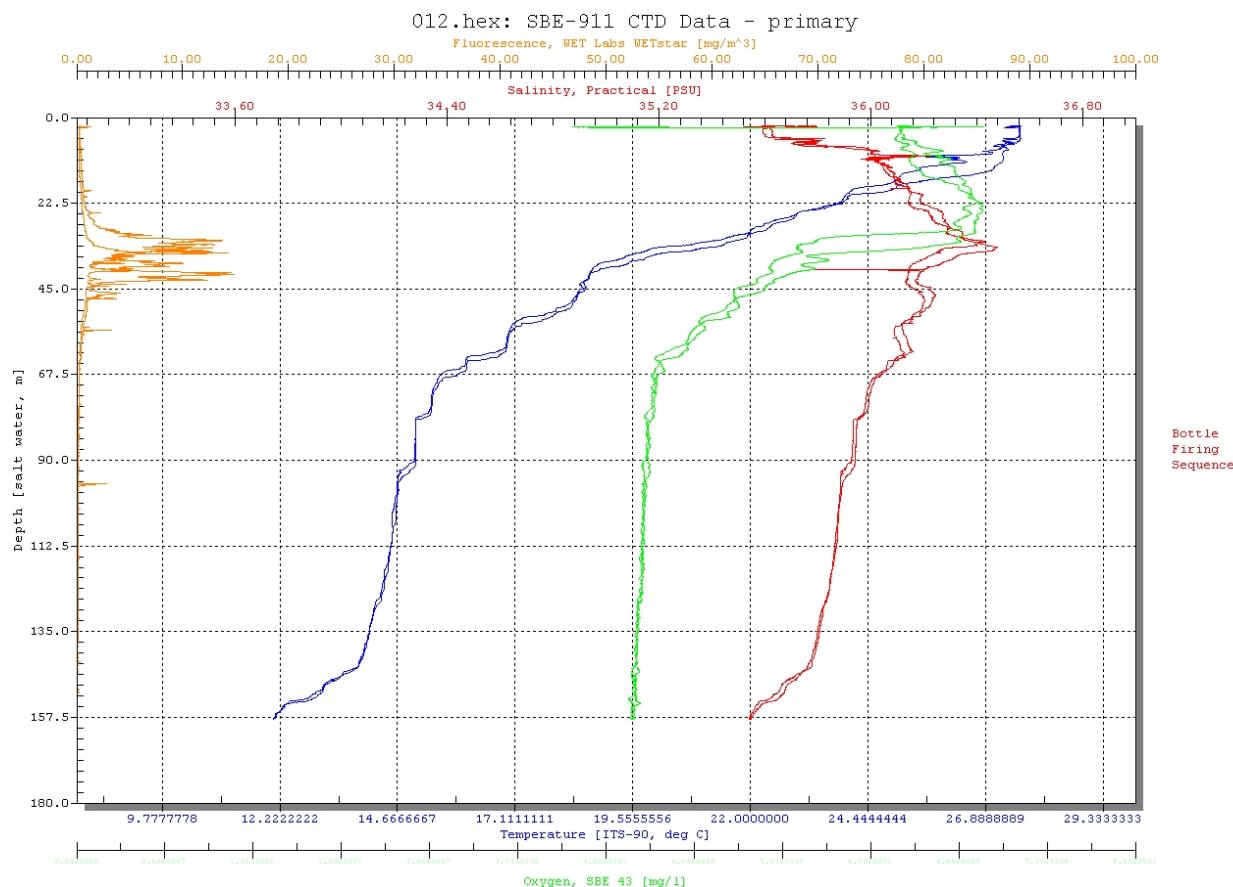
Dive Site: ROV 13-30; S. Carolina, Northern S. Carolina MPA, iceberg scour, 160 m

Dive Data:

Minimum Bottom Depth (m):	-156	Total Transect Length (km):	0.46
Maximum Bottom Depth (m):	-164	Surface Current (kn):	1.2
On Bottom (Time- GMT):	10:36	On Bottom (Lat/Long):	32.83°N; -78.1°W
Off Bottom (Time- GMT):	11:38	Off Bottom (Lat/Long):	32.83°N; -78.1°W
Physical (bottom); Temp (°C):	12.08	Salinity:	N/A
		Visibility (ft):	15
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 16.55



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-30; S. Carolina, Northern S. Carolina MPA, iceberg scour, 160 m

Dive Imagery:



Figure 1: -158.6 m 32.83 °N; -78.10 °W
Holothurian (*Holothuria lentigenosa enodis*).



Figure 2: -159.7 m 32.83 °N; -78.10 °W
Slitshell (*Perotrochus amabilis*) and hermit crab on small rock boulders on top edge of iceberg scour.



Figure 3: -159.9 m 32.83 °N; -78.10 °W
Snowy grouper (*Hyporthodus niveatus*) [spotted] and school of porgies on top edge of iceberg scour.



Figure 4: -160.7 m 32.83 °N; -78.10 °W
Red *Nicella* sp. gorgonians and *Leiodermatium* sp. sponge [right] on rock boulders at top of iceberg scour.

Dive Site: ROV 13-30; S. Carolina, Northern S. Carolina MPA, iceberg scour, 160 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-30, UNCW Superphantom ROV Dive 2265; Site #- 10-VII-13-3. Target Site - S. Carolina, Northern S. Carolina MPA, iceberg scour, 160 m. Ground-truth 2012 Pisces MB: (reprocessed 2013 as oe_block2_5m, and corresponding files).

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted.

Site Description/Habitat/Biota:

Multibeam shows large iceberg scour 3000+ m long, 80 m wide (rim to rim), width of south rime- 60 m; depth of scour valley- 164 m, top of rim- 159 m, terrace hard bottom to south of scour- 162 m. Transect to west along south rim of scour. Landed inside scour valley: 163 m, 5-10 cm rocks on pavement, 0 slope, low rugosity. Base of scour: 164 m deep, soft bottom, fine sediment, no bioturbation, no sand waves. iceberg south rim: top of rim, 158 m, rock ledges, low relief rock boulders, 0.5-2 m diameter, 0.5 m relief, 5-10o slope on inside of rim; 12o slope on MB. Dominate species: 10 cm white and orange gorgonacea, *Leiodermatium*, *Spongisorites*? Dense schools of fish especially in high relief areas on rim edge- red porgies, snipefish, boar fish, few snowy grouper.

Dominant Benthic Biota:

Alg - Phaeophyta; *Sargassum* sp.; Ann - Serpulidae; Art - Decapoda; Majidae; Cni - Gorgonacea: *Hypnogorgia* sp.; Ech - Holothuroidea: *Paracolochirus mysticus*, *Holothuria Lentiginosa enodis*; Mol - Gastropoda: slit shell; Por - Demospongiae: *Leiodermatium* sp, Lithistidae, Pachastrellidae, Spirastrellidae, *Spongisorites*? Sp.

Fish

anthiid - Anthiinae; apricot bass - *Plectranthias garrupellus*; bank butterflyfish - *Prognathodes aya*; bigeye soldierfish - *Ostichthys trachypoma*; blackbar drum - *Pareques iwamotoi*; Darwin's slimehead - *Gephyroberyx darwini*; *Laemonema* sp.; longspine snipefish - *Macroramphosus scolopax*; red barbier - *Hemanthias vivianus*; red hogfish - *Decodon puellaris*; red porgy - *Pagrus pagrus*; saddle bass - *Serranus notospilus*; scamp grouper - *Mycteroperca phenax*; scorpionfish - Scorpidae; short bigeye - *Pristigenys alta*; short bigeye - *Pristigenys alta*; snowy grouper - *Epinephelus niveatus*; wrasse bass - *Liopropoma eukrines*; yellowfin bass - *Anthias nicholsi*

Dive Site: ROV 13-30; S. Carolina, Northern S. Carolina MPA, iceberg scour, 160 m

CPCe Percent Cover Analysis:

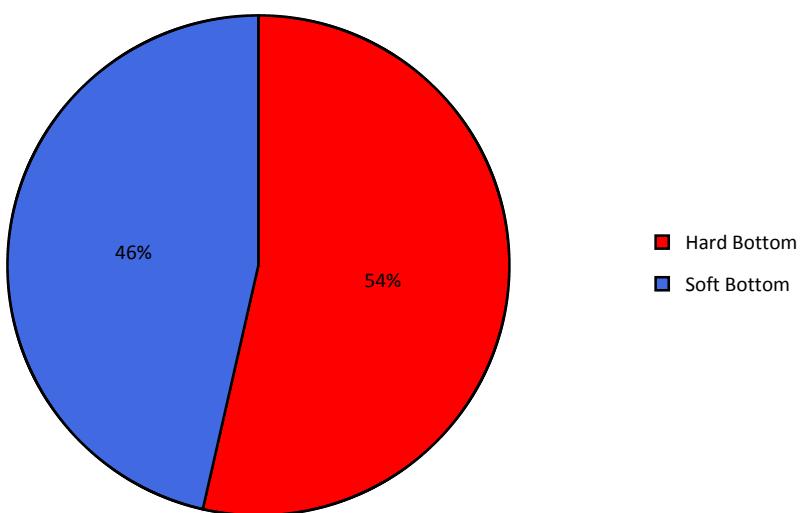


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-30. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

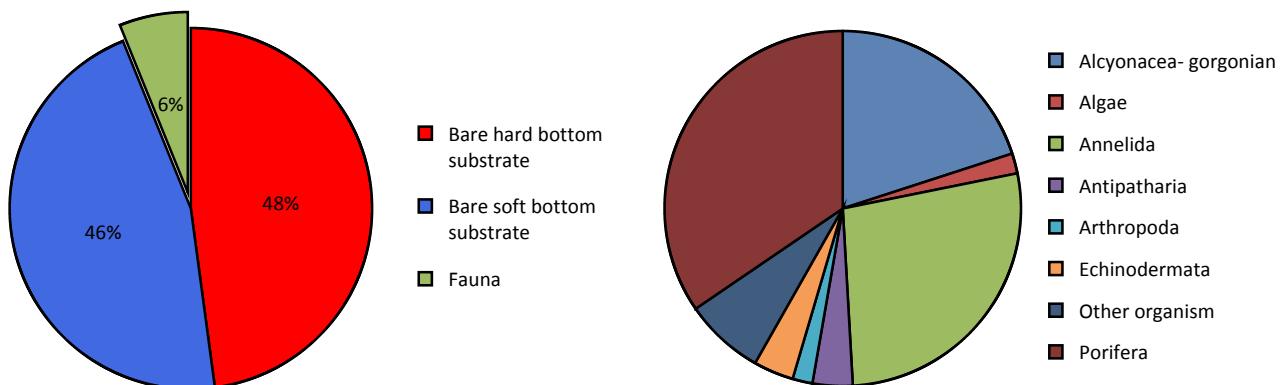


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-30.

Dive Site: ROV 13-30; S. Carolina, Northern S. Carolina MPA, iceberg scour, 160 m**Percent Cover of Benthic Macro-Biota and Substrate:**

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-30.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	55	6.11%
Algae	1	0.11%
Phaeophyta	1	0.11%
Porifera	19	2.11%
Demospongiae	6	0.67%
Demospongiae- MPA03	5	0.56%
Leiodermatium sp.	8	0.89%
Alcyonacea- gorgonian	11	1.22%
Ellisellidae	7	0.78%
Gorgonacea	4	0.44%
Antipatharia	2	0.22%
Tanacetipathes hirta	2	0.22%
Annelida	15	1.67%
Annelida	5	0.56%
Sabellidae	1	0.11%
Serpulidae	9	1.00%
Arthropoda	1	0.11%
Majidae	1	0.11%
Echinodermata	2	0.22%
Paracolochirus mysticus	2	0.22%
Other organism	4	0.44%
Other organism	4	0.44%
Soft bottom substrate	414	46.00%
Soft bottom substrate	414	46.00%
Bare soft bottom substrate	414	46.00%
Hard bottom substrate	431	47.89%
Hard bottom substrate	431	47.89%
Bare rock- pavement boulder ledge	430	47.78%
Bare rubble- rock	1	0.11%
Grand Total	900	100.00%

Dive Site: ROV 13-30; S. Carolina, Northern S. Carolina MPA, iceberg scour, 160 m

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-30.

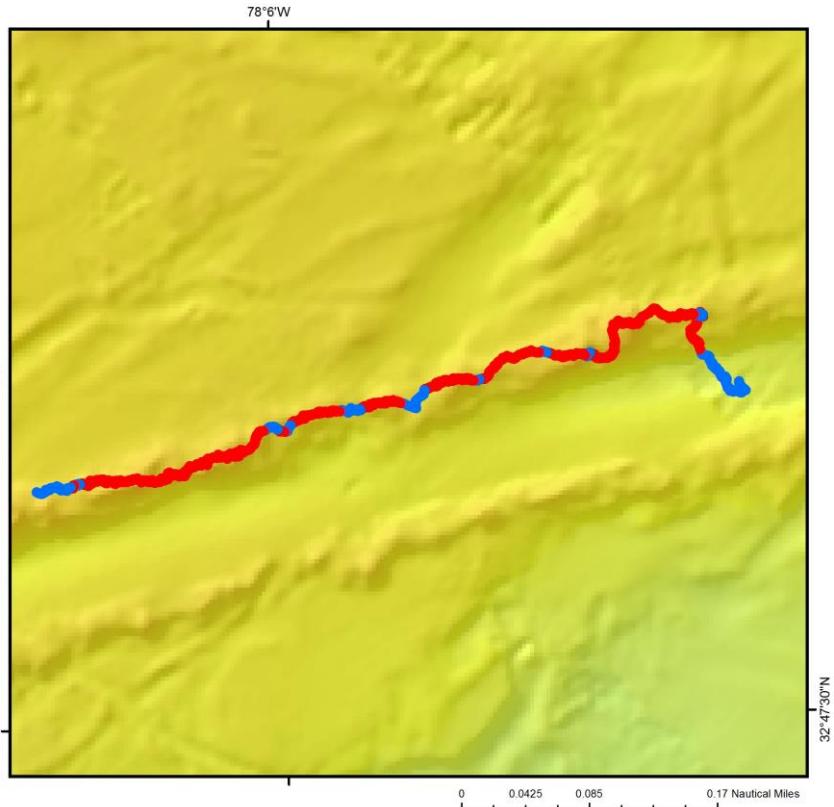
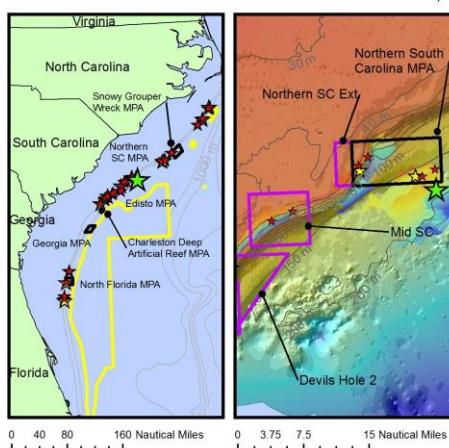
Scientific Name	Common Name	13-30
<i>Anthiinae</i>	anthiid	241.79
<i>Antigonia capros</i>	deepbody boarfish	145.27
<i>Decodon puellaris</i>	red hogfish	17.91
<i>Gephyroberyx darwinii</i>	Darwin's slimehead	6.97
<i>Hemanthias vittatus</i>	red barbier	8.96
<i>Hyporthodus niveatus</i>	snowy grouper	9.95
<i>Laemonema sp.</i>	mora cod	18.91
<i>Liopropoma eukrines</i>	wrasse bass	1.99
<i>Macrorhamphosus scolopax</i>	longspine snipefish	10.95
<i>Mycteroperca phenax</i>	scamp	1
<i>Ostichthys trachypoma</i>	bigeye soldierfish	4.98
<i>Pagrus pagrus</i>	red porgy	274.63
<i>Pareques iwamotoi</i>	blackbar drum	13.93
<i>Plectranthias garrupellus</i>	apricot bass	20.9
Priacanthidae	bigeye	1
<i>Pristigenys alta</i>	short bigeye	6.97
<i>Prognathodes aya</i>	bank butterflyfish	1
<i>Pronotogrammus martinicensis</i>	roughtongue bass	1
Scorpaenidae	scorpionfish	26.87
<i>Serranus notospilus</i>	saddle bass	17.91

Dive Site: ROV 13-31; S. Carolina, Outside Northern S. Carolina MPA, iceberg scour, 160 m

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
South Carolina, No Protection-
Outside Northern S. Carolina MPA
10-VII-13-4; ROV 13-31

- ★ ROV 13-31
 - ★ ROV Dives
 - ★ CTD
 - MPA
 - Deep Coral HAPC
 - Proposed MPA 2013
 - Bathymetry Lines (m)
- ROV Tracks**
- Hard Bottom
 - Soft Bottom
 - Other ROV Tracks



Site Overview:

Project:	2013 NMFS S. Atlantic MPA Grant
Principal Investigator:	Stacy Harter
PI Contact Info:	3500 Delwood Beach Rd., Panama City, FL 32444
Website:	HBOI CIOERT
Scientific Observers:	Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management:	Access Database, Excel Spreadsheet
ROV Navigation Data:	Trackpoint II
Ship Position System:	DGPS
Report Analyst:	John Reed, Stephanie Farrington
Date Compiled:	6/9/2014

Dive Overview:

Vessel:	NOAA Ship <i>Pisces</i>
Sonar Data:	oe_block2
Purpose:	Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV:	UNCW Super Phantom
ROV Sensors:	Temperature (°C), Depth (m)
Date of Dive:	7/10/2013
Specimens:	0
Digital Photos:	99
DVD:	2
Hard Drive:	1

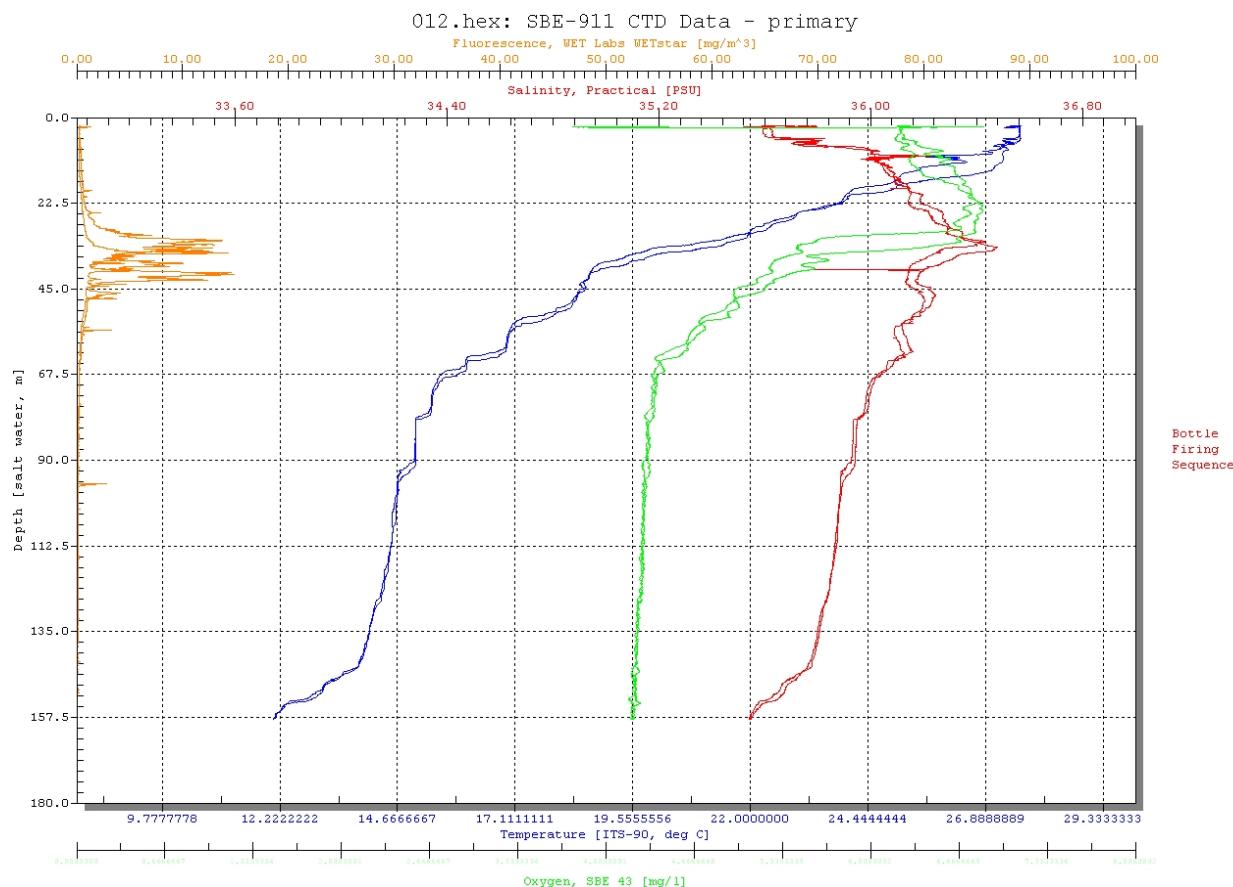
Dive Site: ROV 13-31; S. Carolina, Outside Northern S. Carolina MPA, iceberg scour, 160 m

Dive Data:

Minimum Bottom Depth (m):	-157	Total Transect Length (km):	0.87
Maximum Bottom Depth (m):	-171	Surface Current (kn):	.5
On Bottom (Time- GMT):	12:52	On Bottom (Lat/Long):	32.8°N; -78.09°W
Off Bottom (Time- GMT):	14:20	Off Bottom (Lat/Long):	32.79°N; -78.1°W
Physical (bottom); Temp (°C):	11.40	Salinity: N/A	Visibility (ft): 15
			Current (kn): 0.75

Physical Environment:

Distance from Dive Site(km): 5.18



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m3). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-31; S. Carolina, Outside Northern S. Carolina MPA, iceberg scour, 160 m

Dive Imagery:



Figure 1: -161.5 m 32.79 °N; -78.10 °W
Moray eel (Muraenidae) with fluttet *Leiodermatium* sp. sponges on rock outcrop at top of iceberg scour.



Figure 2: -162.4 m 32.79 °N; -78.10 °W
Unidentified finger sponges (Demospongiae) and frilly *Leiodermatium* sp. sponge [right] on rock outcrop.

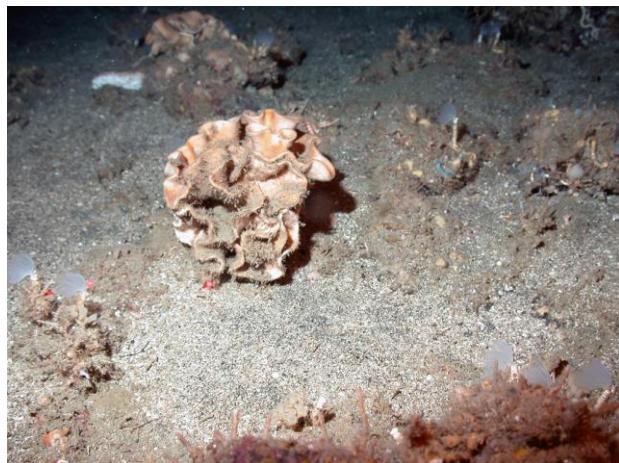


Figure 3: -163.8 m 32.79 °N; -78.10 °W
Frilly *Leiodermatium* sp. demosponge at top edge of iceberg scour.



Figure 4: -162.4 m 32.80 °N; -78.10 °W
Spider crab (Majidae).

Dive Site: ROV 13-31; S. Carolina, Outside Northern S. Carolina MPA, iceberg scour, 160 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-31, UNCW Superphantom ROV Dive 2266; Site 10-VII-13-4. Target Site - S. Carolina, Outside Northern S. Carolina MPA, iceberg scour, 160 m. Ground-truth 2012 Pisces MB: (reprocessed 2013 as oe_block2_5m, and corresponding files).

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted.

Site Description/Habitat/Biota:

Multibeam shows a 11,400 m x 230 m iceberg scour. North rim- 78 m wide, 159 m depth on top; south rim- 55 m wide, 165 m on top; north of scour on top of terrace- 165 m deep; scour valley: 167 m deep. Transect heading west along north rim of scour. Landed at base of iceberg scour in the valley: soft bottom, 171 m. South slope of north side of scour: rock cobble, small boulders, 0.5 m ledges, 70° slope on MB. Top of north ridge: smooth sediment in areas and rubble and cobble, low relief, 0.5 m relief boulders. Slope of north rim: 5-10° or 20-30° slope in other parts. Intersection with N-S scour mark: rocky ledge, moderate relief, 1-2 m diameter boulders, <0.5 m relief, steep 30-40° slope on upper slope, 162 at top. Soft bottom, fine gray sediment at base of scour mark. 45-60° slope with large jumbled flat slabs.

Dominant Benthic Biota:

Ann - Sabellidae, Serpulidae; Art - Decapoda; Majidae; Cni - Gorgonacea; *Hypnogorgia* sp.; Ech - Holothuroidea: *Holothuria Lentiginosa enodis*, *Paracolochirus mysticus*, *Stylocidaris* sp.; Por - Demospongiae; *Leiodermatium* sp, Pachastrellidae, *Geodia* sp., *Hymedesmia* sp., Lithistidae, *Spongisorites?* Sp.

Fish

anthiid - Anthiinae; apricot bass - *Plectranthias garrupellus*; bigeye soldierfish - *Ostichthys trachypoma*; blackbar drum - *Pareques iwamotoi*; blueline tilefish - *Caulolatilus microps*; boarfish - *Antigonia* sp.; bulleye - *Cookeolus boops*; Darwin's slimehead - *Gephyroberyx darwini*; *Laemonema* sp.; longspine snipefish - *Macroramphosus scolopax*; moray eel - Muraenidae; red barbier - *Hemanthias vivanus*; red hogfish - *Decodon puellaris*; red porgy - *Pagrus pagrus*; saddle bass - *Serranus notospilus*; scorpionfish - Scorpaenidae; short bigeye - *Pristigenys alta*; snowy grouper - *Epinephelus niveatus*; yellowfin bass - *Anthias nicholsi*;

Dive Site: ROV 13-31; S. Carolina, Outside Northern S. Carolina MPA, iceberg scour, 160 m

CPCe Percent Cover Analysis:

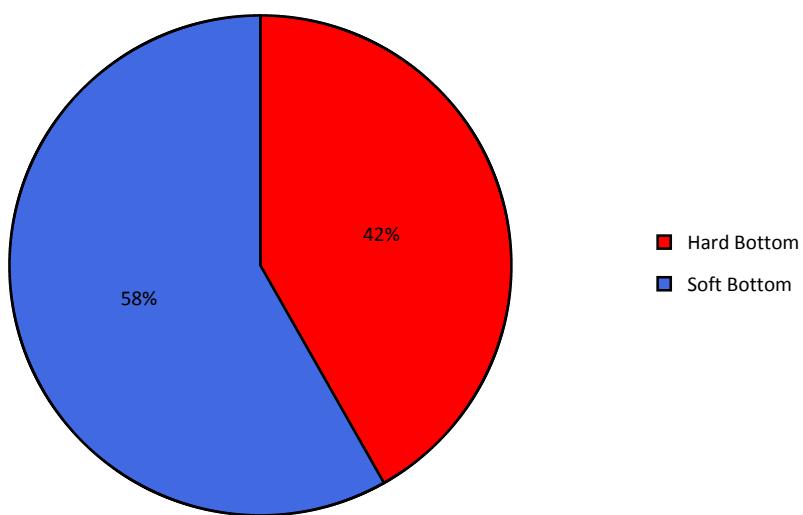


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-31. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

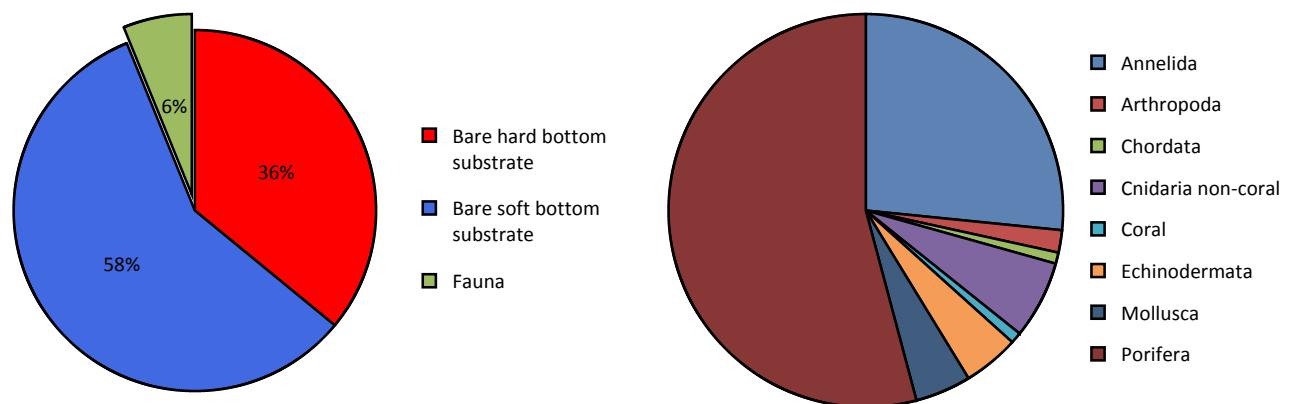


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-31.

Dive Site: ROV 13-31; S. Carolina, Outside Northern S. Carolina MPA, iceberg scour, 160 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-31.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	109	6.13%
Porifera	59	3.32%
Astrophorida	2	0.11%
Demospongiae	18	1.01%
Leiodermatium sp.	36	2.03%
Porifera	2	0.11%
Zyzya sp.	1	0.06%
Coral	1	0.06%
Scleractinia solitary	1	0.06%
Cnidaria non-coral	7	0.39%
Hydroidolina	7	0.39%
Annelida	29	1.63%
Sabellidae	29	1.63%
Mollusca	5	0.28%
Bivalvia	2	0.11%
Gastropoda	2	0.11%
Perotrochus amabilis	1	0.06%
Arthropoda	2	0.11%
Paguridae	2	0.11%
Echinodermata	5	0.28%
Holothuria lentigenosa enodus	2	0.11%
Paracolochirus mysticus	3	0.17%
Chordata	1	0.06%
Fish	1	0.06%
Soft bottom substrate	1029	57.91%
Soft bottom substrate	1029	57.91%
Bare soft bottom substrate	1029	57.91%
Hard bottom substrate	639	35.96%
Hard bottom substrate	639	35.96%
Bare rock- pavement boulder ledge	594	33.43%
Bare rubble- rock	45	2.53%
Grand Total	1777	100.00%

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-31.

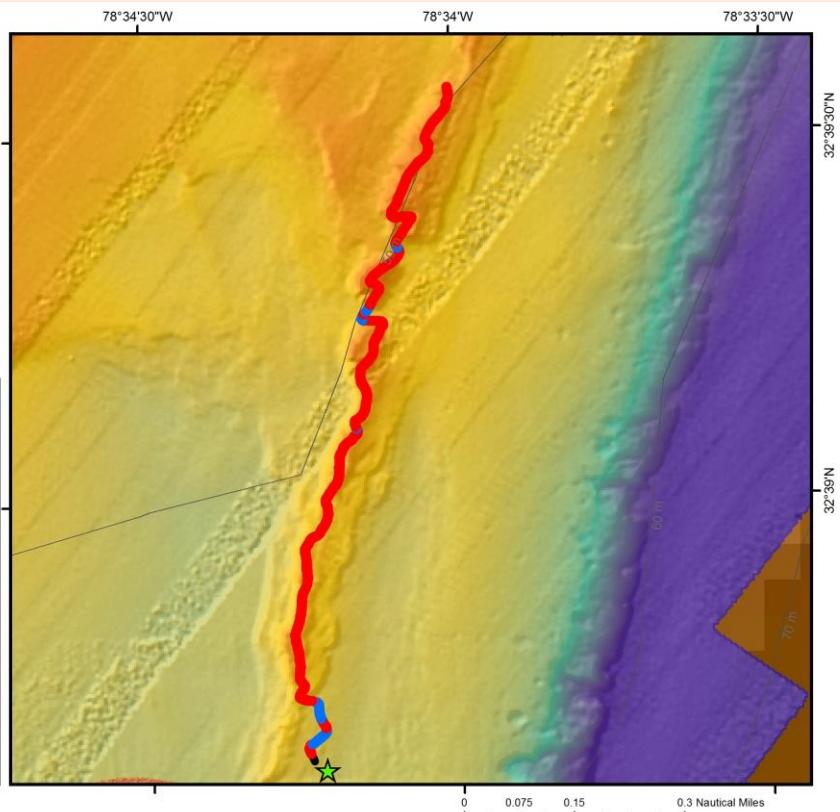
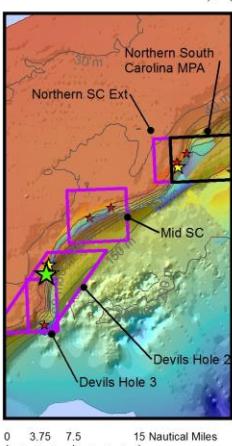
Scientific Name	Common Name	13-31
<i>Anthias nicholsi</i>	yellowfin bass	403.71
<i>Anthiinae</i>	anthiid	1605.08
<i>Antigonia capros</i>	deepbody boarfish	261.97
<i>Caulolatilus microps</i>	blueline tilefish	3.91
<i>Cookeolus boops</i>	bulleye	0.98
<i>Decodon puellaris</i>	red hogfish	7.82
<i>Gephyroberyx darwinii</i>	Darwin's slimehead	8.8
<i>Gymnothorax</i> sp.	moray eel	0.98
<i>Halichoeres</i> sp.	wrasse	0.98
<i>Hemanthias vivanus</i>	red barbier	7.82
<i>Hyporthodus niveatus</i>	snowy grouper	45.94
<i>Laemonema</i> sp.	mora cod	21.51
<i>Macrorhamphosus scolopax</i>	longspine snipefish	1.96
<i>Ostichthys trachypoma</i>	bigeye soldierfish	2.93
<i>Pagrus pagrus</i>	red porgy	25.42
<i>Pareques iwamotoi</i>	blackbar drum	3.91
<i>Plectranthias garrupellus</i>	apricot bass	13.69
<i>Pristigenys alta</i>	short bigeye	0.98
<i>Scorpaenidae</i>	scorpionfish	17.6
<i>Serranus notospilus</i>	saddle bass	3.91

Dive Site: ROV 13-32; S. Carolina, Proposed Devils Hole 2 MPA, N-S Ridge, 50 m

General Location and Dive Track:

NOAA Ship Pisces Cruise 13-03
South Carolina, Devils Hole 2-
Proposed MPA
11-VII-13-2; ROV 13-32

ROV Tracks
 ● Hard Bottom
 ● Soft Bottom
 • Other ROV Tracks



Site Overview:

Project: 2013 NMFS S. Atlantic MPA Grant
Principal Investigator: Stacy Harter
PI Contact Info: 3500 Delwood Beach Rd., Panama City, FL 32444
Website: [HBOI CIOERT](#)
Scientific Observers: Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington
Data Management: Access Database, Excel Spreadsheet
ROV Navigation Data: Trackpoint II
Ship Position System: DGPS
Report Analyst: John Reed, Stephanie Farrington
Date Compiled: 6/9/2014

Dive Overview:

Vessel: NOAA Ship *Pisces*
Sonar Data: EastDEvilsHoleMPA
Purpose: Conduct ROV surveys and multibeam sonar of shelf-edge MPAs
ROV: UNCW Super Phantom
ROV Sensors: Temperature (°C), Depth (m)
Date of Dive: 7/11/2013
Specimens: 0
Digital Photos: 177
DVD: 2
Hard Drive: 1

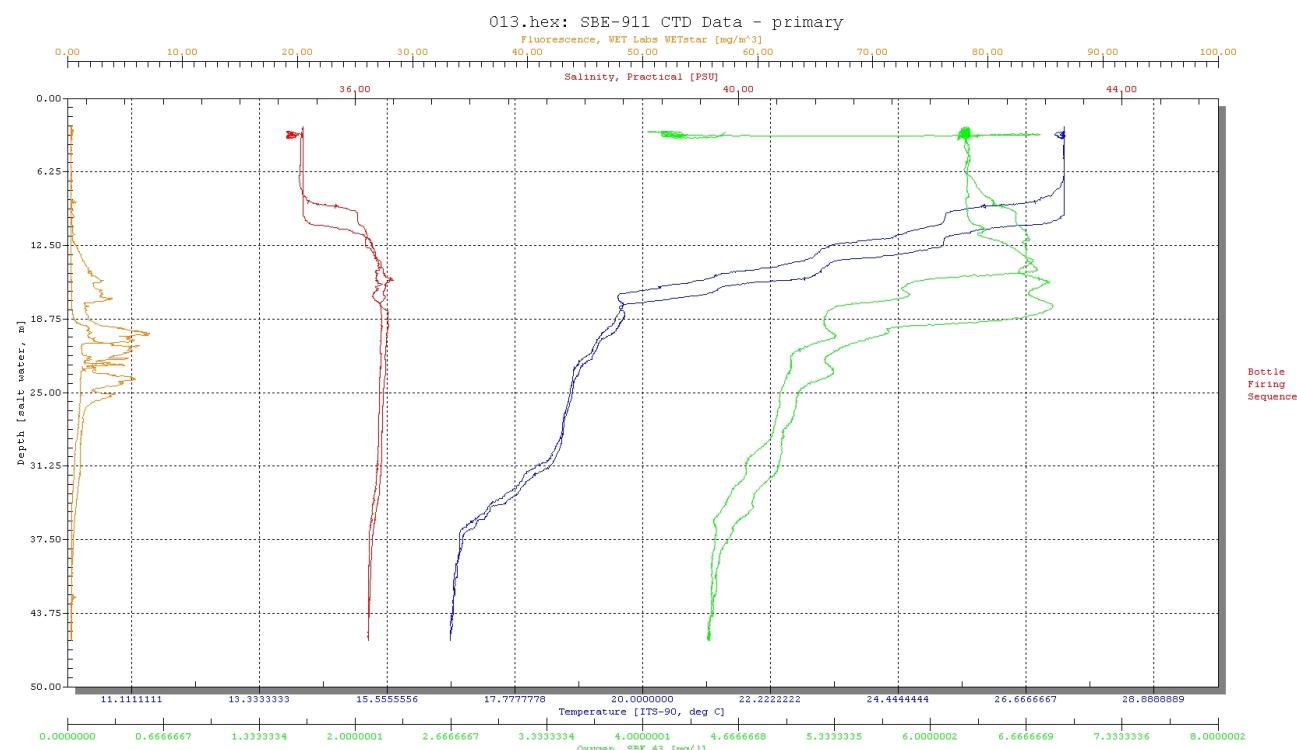
Dive Site: ROV 13-32; S. Carolina, Proposed Devils Hole 2 MPA, N-S Ridge, 50 m

Dive Data:

Minimum Bottom Depth (m):	-39	Total Transect Length (km):	1.73
Maximum Bottom Depth (m):	-52	Surface Current (kn):	
On Bottom (Time- GMT):	8:03	On Bottom (Lat/Long):	32.64°N; -78.57°W
Off Bottom (Time- GMT):	10:06	Off Bottom (Lat/Long):	32.66°N; -78.57°W
Physical (bottom); Temp (°C):	16.47	Salinity:	N/A
		Visibility (ft):	45
		Current (kn):	N/A

Physical Environment:

Distance from Dive Site(km): 1.97



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Imagery:



Figure 1: -48.9 m 32.65 °N; -78.57 °W
Carolina hake (*Urophycis earlii*).



Figure 2: -48.7 m 32.65 °N; -78.57 °W
Trumpet fish (*Aulostomus maculatus*) hiding in a gorgonian (*Diodogorgia* sp.).



Figure 3: -45.1 m 32.66 °N; -78.57 °W
Slipper lobster (*Scyllarides nodifer*).



Figure 4: -44.9 m 32.66 °N; -78.57 °W
Greater soapfish (*Rypticus saponaceus*) [middle] and snowy grouper (*Hyporthodus niveatus*) under densely encrusted ledge.

Dive Site: ROV 13-32; S. Carolina, Proposed Devils Hole 2 MPA, N-S Ridge, 50 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-32, UNCW Superphantom ROV Dive 2267; Site #11-VII-13-2. Target Site - S. Carolina, Proposed Devils Hole 2 MPA, N-S Ridge, 50 m. Ground-truth 2012 Pisces Multibeam Oeblock9_5m.

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Video is 2 seconds ahead of ship time.

Site Description/Habitat/Biota:

Multibeam shows N-S oriented ridge, 4200 m x 175 m, 45 m ridge-top, 50 m ridge base. Transect was mostly along west slope and top of ridge; few transects along east slope. On bottom: 100 m east of ridge- rock ledges; 0.5 m relief, few undercut ledges.. Headed west towards the ridge.50 m east of ridge: flat sediment with small areas of smooth rock knolls. West slope of ridge: rock ledges, 100 slope, <1 m ledges, mostly high rugosity on edge of slope. In the 14-16o slope on MB on the west slope: large rock boulders with overhangs, eroded rocks, high rugosity, 1-3 m rock ledges on the upper slope with vertical relief, overall slope from top to bottom about 15o visual estimate, over 15 m width. Dominated by Hydroidolina; white bushy, Dictyota algae, Agelas sponges. West base of ridge is sediment, 50.5 m max depth. Top of ridge 49 m at beginning of dive to 45 m at end of dive; ridge top mostly flat pavement, few low ledges <0.25 m, and 100% cover hard bottom and 100% cover of benthic biota- algae and hydroids. Base of west ridge: low relief smooth rock knolls and sediment. West slope, isolated mound at N end of first ridge: large undercut ledges, 2-3 m relief, highly eroded rock, high rugosity, 5-7o slope on MB; top of mound is flat pavement dominated by white bushy and fine hair hydroids and brown algae, 45 m. NE side of ridge mound: pavement, 5-7o slope on MB. Two sediment gaps in the MB, each about 60 m wide; depth 50 m, mostly sediment with low relief rock knolls. Second isolated mound on ridge: south slope 5-10o, large undercut ledges, 2-3 m relief, high rugosity; top of mound- 45 m. Matches MB very well. North slope of mound #2: low relief < 1 m ledges, slope 5-10o, low rugosity; base of slope-low rock knolls and sediment. South side of mound# 3: rock ledge ranging from smooth slope to steep ledge, 1-2 m relief, smoother rocks and low relief rocks. Top of mound # 3:pavement, low relief low slope, low rugosity, with a flat sediment patch on the top with some low relief boulders/knolls, 46 m.

Dominant Benthic Biota:

Alg - Phaeophyta; unid. Spp., *Dictyota* sp., *Sargassum* sp., Rhodophyta: unid. Spp., flat bladed branching; Chlorophyta: *Ulva* sp.; Art - Decapoda: *Scyllarides* sp., *Panulirus argus*; Cho - Ascidiacea: *Eudistoma* sp.; Cni - Antipathidae: white fan, *Stichopathes* sp.; Gorgonacea: *Diodogorgia* sp., *Nicella* sp., Ellisellidae, *Swiftia exserta*, *Telesto* sp.; Cni - Hydroidolina: black bushy, fine white hair, white bushy; Mol - Bivalvia: thorny oyster- *Spondylus* sp.; Por - Demospongiae: *Ircinia campana*, *Agelas clathrodes*, unid tan cake, Aplysina, Axinellida.

Fish

amberjack - *Seriola* sp.; bandtail puffer - *Sphoeroides spengleri*; bank butterflyfish - *Prognathodes aya*; bicolor damselfish - *Pomacentrus partitus*; blackbar soldierfish - *Myripristis jacobus*; blue angelfish - *Holacanthus bermudensis*; Calamus porgy - *Calamus* sp.; cornetfish - *Fistularia* sp.; cowfish - *Lactophrys* sp.;

Dive Site: ROV 13-32; S. Carolina, Proposed Devils Hole 2 MPA, N-S Ridge, 50 m

creole-fish - *Paranthias furcifer*; cubbyu - *Equetus umbrosus*; doctorfish - *Acanthurus* sp.; french angelfish - *Pomacanthus paru*; gag grouper - *Mycteroperca microlepis*; gray snapper - *Lutjanus griseus*; gray triggerfish - *Balistes capriscus*; graysby grouper - *Epinephelus cruentatus*; greenblotch parrotfish - *Sparisoma atomarium*; grunt - *Haemulon* sp.; hake; hogfish - *Lachnolaimus maximus*; lionfish - *Pterois volitans* (91); longsnout butterflyfish - *Chaetodon aculeatus*; ocean surgeonfish - *Acanthurus bahianus*; orangeback bass - *Serranus annularis*; *Pomacanthus* sp.; puffer; purple reefish - *Chromis scotti*; reef butterflyfish - *Chaetodon sedentarius*; rock beauty - *Holacanthus tricolor*; rock hind - *Epinephelus adscensionis*; scamp grouper - *Mycteroperca phenax*; scorpionfish - *Scorpaenidae*; sharpnose puffer - *Canthigaster rostrata*; soapfish - *Rypticus* sp.; spanish hogfish - *Bodianus rufus*; spotfin butterflyfish - *Chaetodon ocellatus*; spotfin hogfish - *Bodianus pulchellus*; spotted goatfish - *Pseudupeneus maculatus*; squirrelfish - *Holocentrus* sp.; sunshinefish - *Chromis insolata*; tattler - *Serranus phoebe*; tomtate - *Haemulon aurolineatum*; trumpetfish - *Aulostomus maculatus*; vermillion snapper - *Rhomboplites aurorubens*; white grunt - *Haemulon plumieri*; wrasse - *Halichoeres* sp.; wrasse bass - *Liopropoma eukrines*; yellowhead wrasse - *Halichoeres garnoti*; yellowtail reefish - *Chromis encrysurus*;

Dive Site: ROV 13-32; S. Carolina, Proposed Devils Hole 2 MPA, N-S Ridge, 50 m

CPCe Percent Cover Analysis:

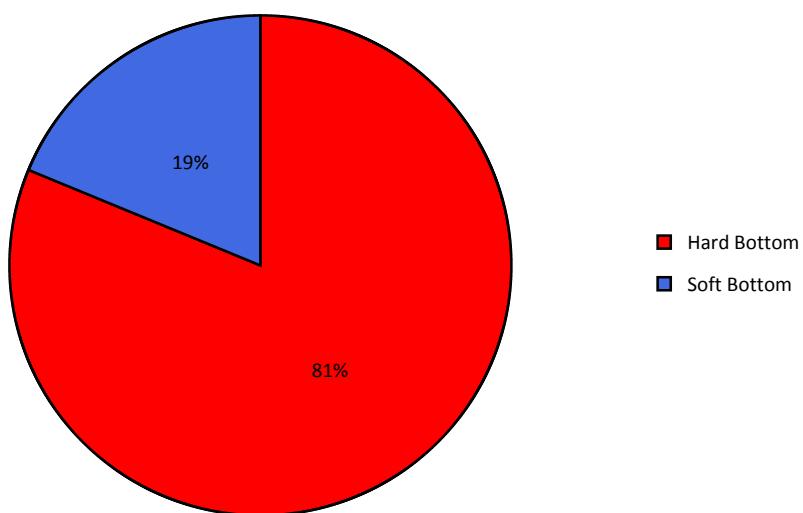


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-32. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

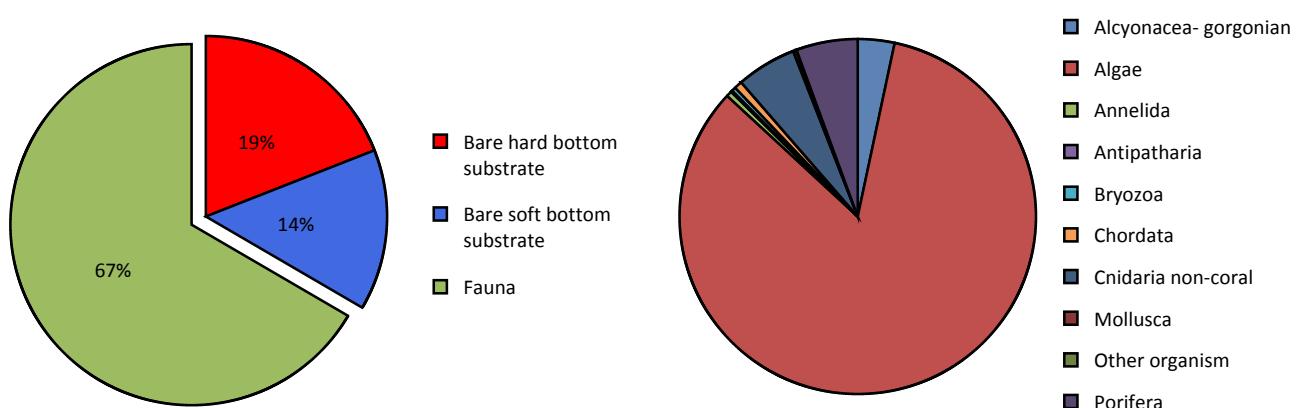


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-32.

Dive Site: ROV 13-32; S. Carolina, Proposed Devils Hole 2 MPA, N-S Ridge, 50 m**Percent Cover of Benthic Macro-Biota and Substrate:**

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-32.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	1558	66.58%
Algae	1302	55.64%
Chlorophyta	4	0.17%
Corallinales/crustose coralline	107	4.57%
Cyanophyta	5	0.21%
Phaeophyta	991	42.35%
Rhodophyta	195	8.33%
Porifera	87	3.72%
Agelas sp.	11	0.47%
Aiolochroia crassa	4	0.17%
Aplysina sp.	7	0.30%
Astrophorida	1	0.04%
Chondrilla sp.	1	0.04%
Chondrosia sp.	8	0.34%
Demospongiae	27	1.15%
Demospongiae- ze tan starlet	3	0.13%
Ircinia campana	3	0.13%
Ircinia sp.	3	0.13%
Spirastrellidae	19	0.81%
Alcyonacea- gorgonian	52	2.22%
Diogorgia sp.	27	1.15%
Ellisella sp.	5	0.21%
Ellisellidae	2	0.09%
Gorgonacea	1	0.04%
Leptogorgia	1	0.04%
Muricea sp.	15	0.64%
Nicella sp.	1	0.04%
Antipatharia	2	0.09%
Stichopathes lutkeni	2	0.09%
Cnidaria non-coral	85	3.63%
Hydroidolina	85	3.63%
Annelida	8	0.34%
Filograna sp.	7	0.30%
Sabellidae	1	0.04%
Mollusca	4	0.17%
Bivalvia	4	0.17%
Bryozoa	6	0.26%

Dive Site: ROV 13-32; S. Carolina, Proposed Devils Hole 2 MPA, N-S Ridge, 50 m

Bryozoa	5	0.21%
Schizoporella sp.	1	0.04%
Chordata	11	0.47%
Asciidiacea	3	0.13%
Didemnidae	4	0.17%
Fish	4	0.17%
Other organism	1	0.04%
Other organism	1	0.04%
Soft bottom substrate	337	14.40%
Soft bottom substrate	337	14.40%
Bare soft bottom substrate	337	14.40%
Hard bottom substrate	445	19.02%
Hard bottom substrate	445	19.02%
Bare rock- pavement boulder ledge	413	17.65%
Bare rubble- rock	32	1.37%
Grand Total	2340	100.00%

Dive Site: ROV 13-32; S. Carolina, Proposed Devils Hole 2 MPA, N-S Ridge, 50 m

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-32.

Scientific Name	Common Name	13-32
<i>Acanthurus</i> sp.	doctorfish	10.67
<i>Aulostomus maculatus</i>	trumpetfish	0.48
<i>Balistes capriscus</i>	grey triggerfish	2.42
<i>Bodianus pulchellus</i>	spotfin hogfish	39.28
<i>Bodianus rufus</i>	spanish hogfish	0.48
<i>Calamus</i> sp.	porgy	21.82
<i>Canthigaster rostrata</i>	sharpnose puffer	73.23
<i>Chaetodon aculeatus</i>	longsnout butterflyfish	0.97
<i>Chaetodon ocellatus</i>	spotfin butterflyfish	22.31
<i>Chaetodon sedentarius</i>	reef butterflyfish	66.44
<i>Chaetodon</i> sp.	butterflyfish	2.91
<i>Chromis encrysurus</i>	yellowtail reefish	11.15
<i>Chromis insolatus</i>	sunshinefish	17.94
<i>Chromis scotti</i>	purple reefish	51.41
<i>Chromis</i> sp.	damselish	28.13
<i>Diodon hystrix</i>	porcupinefish	0.48
<i>Diodon</i> sp.	puffer	0.97
<i>Epinephelus adscensionis</i>	rock hind	0.48
<i>Epinephelus cruentatus</i>	graysby	2.42
<i>Fistularia</i> sp.	cornetfish	7.27
<i>Haemulon aurolineatum</i>	tomtate	5256.55
<i>Haemulon plumieri</i>	white grunt	1.94
<i>Haemulon striatum</i>	striped grunt	196.41
<i>Halichoeres bathyphilus</i>	greenband wrasse	3.88
<i>Halichoeres garnoti</i>	yellowhead wrasse	1.45
<i>Halichoeres</i> sp.	wrasse	31.52
<i>Holacanthus bermudensis</i>	blue angelfish	28.61
<i>Holacanthus tricolor</i>	rock beauty	5.82
<i>Holocentrus</i> sp.	squirrelfish	34.92
<i>Lachnolaimus maximus</i>	hogfish	2.42
<i>Lactophrys</i> sp.	cowfish	1.45
<i>Liopropoma eukrines</i>	wrasse bass	1.94
<i>Lutjanus griseus</i>	grey snapper	2.42
<i>Mycteroperca microlepis</i>	gag grouper	0.97
<i>Mycteroperca phenax</i>	scamp	29.58
<i>Myripristis jacobus</i>	blackbar soldierfish	1.94
<i>Paranthias furcifer</i>	creole-fish	3.88
<i>Pareques umbrosus</i>	cubbyu	17.94

Dive Site: ROV 13-32; S. Carolina, Proposed Devils Hole 2 MPA, N-S Ridge, 50 m

<i>Pomacanthus paru</i>	french angelfish	2.91
<i>Prognathodes aya</i>	bank butterflyfish	8.24
<i>Pseudupeneus maculatus</i>	spotted goatfish	0.48
<i>Pterois volitans</i>	lionfish	48.01
<i>Rhomboplites aurorubens</i>	vermillion snapper	291.46
<i>Rypticus saponaceus</i>	greater soapfish	2.91
Scorpaenidae	scorpionfish	1.94
<i>Seriola dumerili</i>	greater amberjack	12.61
<i>Seriola</i> sp.	amberjack	15.03
<i>Serranus annularis</i>	orangeback bass	0.48
<i>Serranus phoebe</i>	tattler	9.21
Sparidae	porgy	0.97
<i>Sparisoma atomarium</i>	greenblotch parrotfish	4.36
<i>Sphoeroides spengleri</i>	bandtail puffer	0.97
<i>Stegastes partitus</i>	bicolor damselfish	5.82
<i>Urophycis earlii</i>	carolina hake	0.48

Dive Site: ROV 13-33; S. Carolina, Proposed Devil's Hole 2 and 3 MPAs, E-W ridge, south slope, 130 m

General Location and Dive Track:

**NOAA Ship Pisces Cruise 13-03
South Carolina, Devil's Hole 2 and 3-
Proposed MPAs
11-VII-13-3; ROV 13-33**

★ ROV 13-33

★ ROV Dives

★ CTD

■ MPA

■ Deep Coral HAPC

■ Proposed MPA 2013

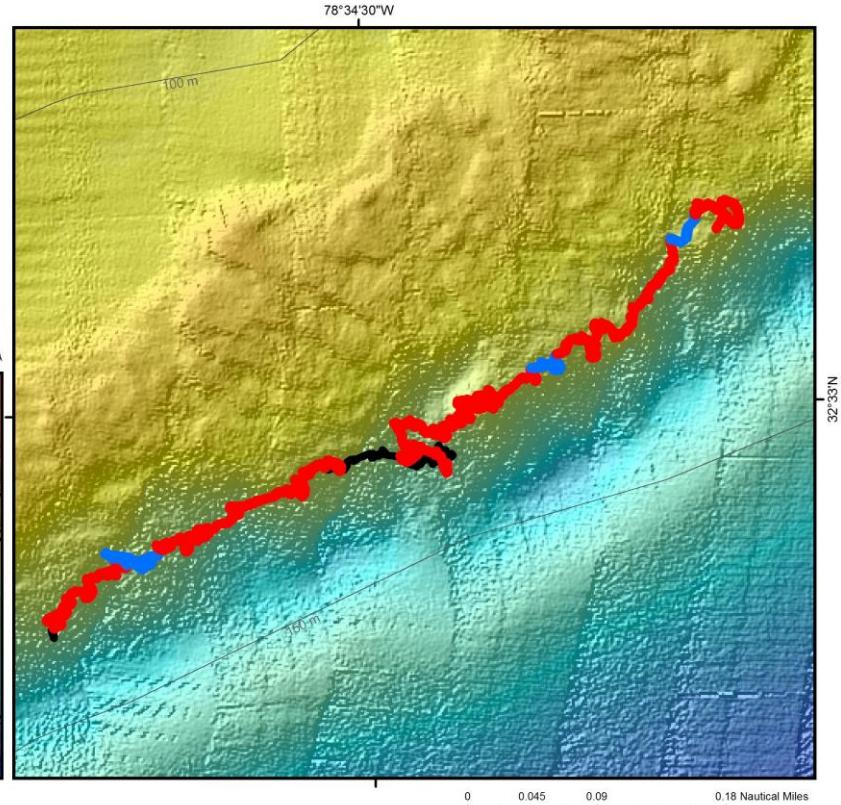
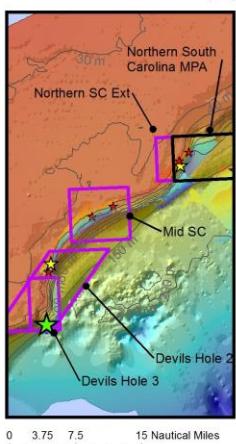
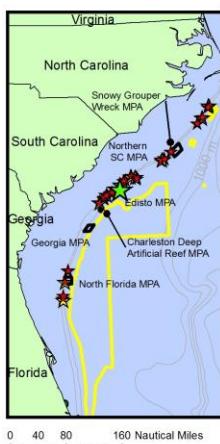
— Bathymetry Lines (m)

ROV Tracks

● Hard Bottom

● Soft Bottom

● Other ROV Tracks



Site Overview:

Project: 2013 NMFS S. Atlantic MPA Grant

Principal Investigator: Stacy Harter

PI Contact Info: 3500 Delwood Beach Rd., Panama City, FL 32444

Website: [HBOI CIOERT](#)

Scientific Observers: Andrew W. David, Glenn Taylor, John Reed, Lance Horne, Stacy Harter, Stephanie Farrington

Data Management: Access Database, Excel Spreadsheet

ROV Navigation Data: Trackpoint II

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/9/2014

Dive Overview:

Vessel: NOAA Ship *Pisces*

Sonar Data: EastDEvilsHoleMPA

Purpose: Conduct ROV surveys and multibeam sonar of shelf-edge MPAs

ROV: UNCW Super Phantom

ROV Sensors: Temperature (°C), Depth (m)

Date of Dive: 7/11/2013

Specimens: 0

Digital Photos: 100

DVD: 2

Hard Drive: 1

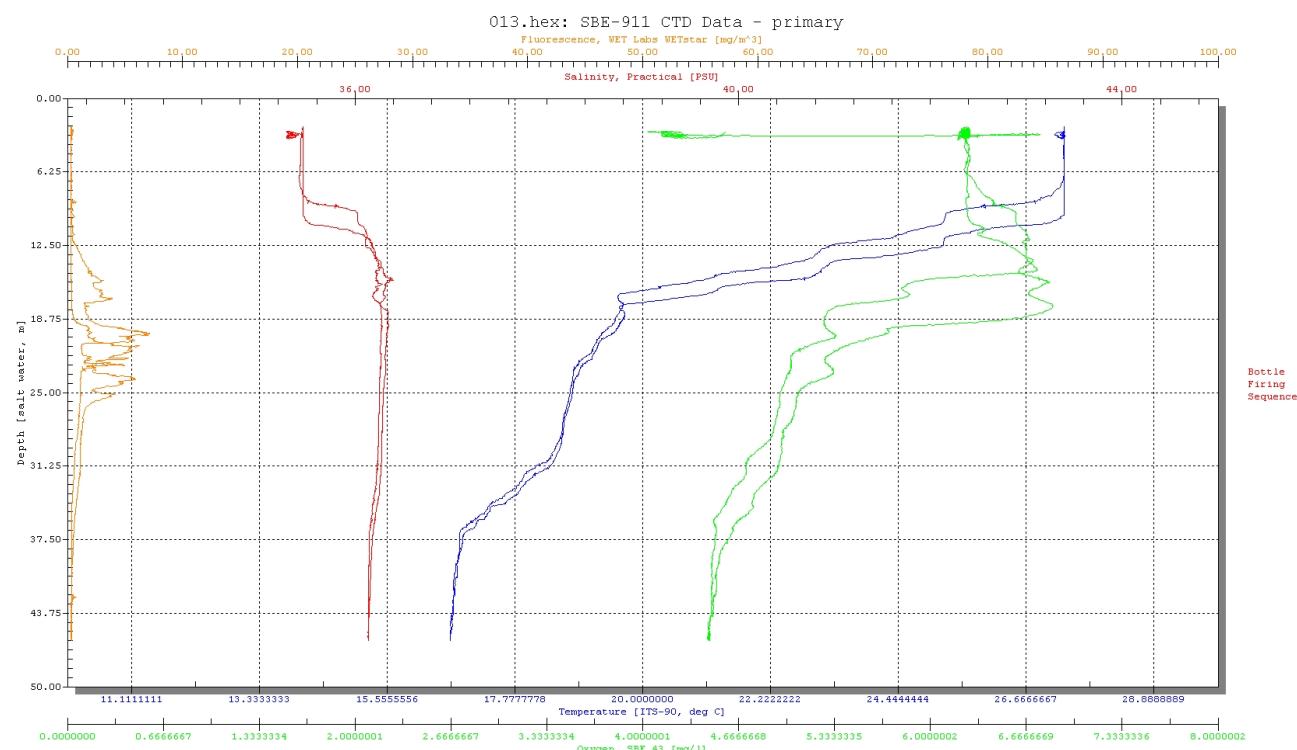
Dive Site: ROV 13-33; S. Carolina, Proposed Devil's Hole 2 and 3 MPAs, E-W ridge, south slope, 130 m

Dive Data:

Minimum Bottom Depth (m):	-91	Total Transect Length (km):	1.03
Maximum Bottom Depth (m):	-133	Surface Current (kn):	0.7
On Bottom (Time- GMT):	12:07	On Bottom (Lat/Long):	32.55°N; -78.58°W
Off Bottom (Time- GMT):	14:05	Off Bottom (Lat/Long):	32.55°N; -78.57°W
Physical (bottom); Temp (°C):	10.75	Salinity:	N/A
		Visibility (ft):	15
		Current (kn):	0.75

Physical Environment:

Distance from Dive Site(km): 12.91



Shipboard CTD Plot. CTD plot of cast made nearest to the ROV dive site. All CTD data were collected with shipboard CTD which recorded depth (m), temperature (°C), salinity (PSU), oxygen concentration (mg/l), and Fluorescence (mg/m³). These data were used both to support multibeam surveys (sound velocity) and to characterize hydrographic conditions at the dive sites.

Dive Site: ROV 13-33; S. Carolina, Proposed Devil's Hole 2 and 3 MPAs, E-W ridge, south slope, 130 m

Dive Imagery:



Figure 1: -112.6 m 32.55 °N; -78.57 °W
Great white shark (*Carcharodon carcharias*) near bottom at 160 m. (~6 ft long).



Figure 2: -124.7 m 32.55 °N; -78.58 °W
Pair of snowy grouper (*Hyporthodus niveatus*) on rocky bottom.

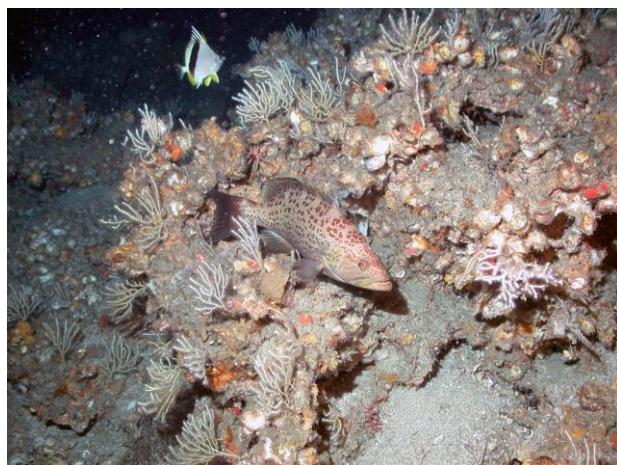


Figure 3: -108.6 m 32.55 °N; -78.57 °W
Scamp (*Mycteroperca phenax*) and bank butterfly fish (*Prognathodes aya*) on rock ledge with dense epifauna.



Figure 4: -120.7 m 32.55 °N; -78.58 °W
Clusters of deepwater oysters (*Pycnodonte enodis*), spotted 'sea weenies' holothurians (*Paracolochirus mysticus*), Plexauridae gorgonians on rock outcrop.

Dive Site: ROV 13-33; S. Carolina, Proposed Devil's Hole 2 and 3 MPAs, E-W ridge, south slope, 130 m

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

ROV Dive 13-33, UNCW Superphantom ROV Dive 2268; Site #- 11-VII-13-3. Target Site - S. Carolina, Proposed Devil's Hole 2 and 3 MPAs, E-W drop-off, 162 m. Ground-truth 2013 Pisces multibeam: (edevilsbathy.grid file and layers).

ROV Setup/Dive Events:

Video time ESDT. Dive Notes depth recorded as total depth (ROV altitude + ROV depth in meters). COG is ROV heading. Events, habitat and fauna are recorded directly into Access database. Fish data recorded by David and Harter in separate Access Database to be added to Faunal Access database at end of cruise. Quantitative photos taken 90° down every ~ 2 min; lasers 10 cm; transect photos noted. Video is set to ship time. Ship is having difficulty station keeping, spent most of dive 10 m off bottom.

Site Description/Habitat/Biota:

Multibeam shows flat top E-W ridge 2277 m long x 408 m wide; south slope = 190 m wide, 105 m depth at top of slope, 165 m at base of slope. Transect headed east, parallel to slope. Landed half way up the south slope: boulders 0.25 - 0.5 m diameter, rugged conglomerate boulders on sediment, 10-20° slope, 30% cover of rock. The boulders are covered with oysters or Pycnodonte bivalves. 113 m deep - near 1st "deep slope ridge" on MB - which does not show in video - artifact from MB; bottom does change to small cobble and rubble, flat a few scattered 1 m boulders rare but present, 10 % hard bottom. 124 m rounding a "indent in south slope": 50% cover, 0.5 m relief, 10° slope. 123 m deep: back on bottom from control loss: 1-2 m diameter boulders with oyster/Pycnodonte cover, <1 m relief, rough eroded boulders, high rugosity, undercut ledges. Top edge of S slope is rock ledge, 10-20° slope, moderate relief, and high rugosity, very rough and eroded rocks. Top of terrace: minimum depth near edge- 103 m; smaller boulders, 1 m diam, low relief, flat slope, some rocks with outcrops and dominated by the white gorgonian. Dominate macro-fauna of dive: 10 cm gorgonacea (3+ spp.), Pycnodonte, Parachlorochirus holothurians. Snowy grouper common in areas.

Top edge of south slope:

Dominant Benthic Biota:

Art - Decapoda: Majidae; Chelicerata: Pycnogonida; Cni - Gorgonacea; Ech - Holothuroidea: *Paracolochirus mysticus*, *Holothuria lentiginosa enodis*; Crinoidea: Comactinia; Asteroidea; Echinoidea: *Eucidaris tribuloides*, *Stylocidaris* sp.; Ophiuroidea; Gorgonocephalidae, *Ophioderma devaneyi*; Mol - Bivalvia: Pycnodonte? Or Ostreidae; Gastropoda; *Cypraea* sp.; Por - Demospongiae: Lithistidae, *Leiodermatium* sp., Spirastrellidae

Fish

amberjack - *Seriola* sp.; anthiid - Anthiinae; apricot bass - *Plectranthias garrupellus*; bank butterflyfish - *Prognathodes aya*; bigeye - *Priacanthus arenatus*; bigeye soldierfish - *Ostichthys trachypoma*; blackbar drum - *Pareques iwamotoi*; blue angelfish - *Holacanthus bermudensis*; bulleye - *Cookeolus boops*; cubbyu - *Equetus umbrosus*; flounder - Bothidae; grouper; Jack-knife fish - *Equetus lanceolatus*; porgy - Sparidae; red hogfish - *Decodon puellaris*; red porgy - *Pagrus pagrus*; reef butterflyfish - *Chaetodon sedentarius*; roughtongue bass - *Pronotogrammus martinicensis*; scamp grouper - *Mycteroperca phenax*; scorpionfish - Scorpidae; sharpnose puffer - *Canthigaster rostrata*; short bigeye - *Pristigenys alta*; snowy grouper - *Epinephelus niveatus*; soldierfish - Holocentridae; tattler - *Serranus phoebe*; wrasse - *Halichoeres* sp.; wrasse bass - *Liopropoma eukrines*;

Dive Site: ROV 13-33; S. Carolina, Proposed Devil's Hole 2 and 3 MPAs, E-W ridge, south slope, 130 m

CPCe Percent Cover Analysis:

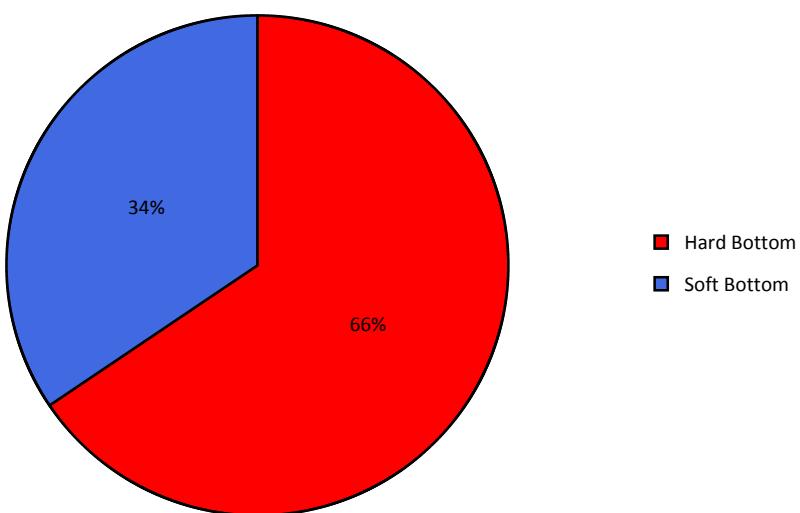


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 13-33. CPCe® points on organisms were scored as the underlying substrate (hard or soft).

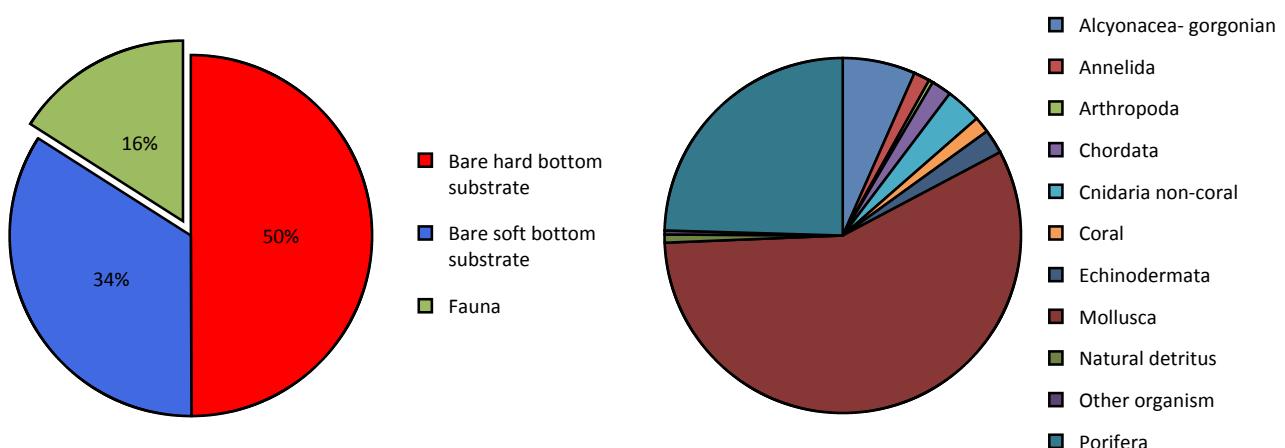


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 13-33.

Dive Site: ROV 13-33; S. Carolina, Proposed Devil's Hole 2 and 3 MPAs, E-W ridge, south slope, 130 m

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Percent cover of benthic macro-biota and substrate types from CPCe Point Count analysis of photographic transects at dive site ROV 13-33.

Benthic Macro-biota and substrate type	Point Count	% Cover
Fauna	273	15.95%
Porifera	67	3.91%
Demospongiae	52	3.04%
Lithistida	2	0.12%
Spirastrellidae	12	0.70%
Theonella	1	0.06%
Coral	4	0.23%
Scleractinia solitary	4	0.23%
Alcyonacea- gorgonian	18	1.05%
Ellisellidae	9	0.53%
Gorgonacea	7	0.41%
Plexauridiae	2	0.12%
Cnidaria non-coral	9	0.53%
Hydroidolina	9	0.53%
Annelida	4	0.23%
Filograna sp.	1	0.06%
Sabellidae	2	0.12%
Serpulidae	1	0.06%
Mollusca	156	9.11%
Bivalvia	156	9.11%
Arthropoda	1	0.06%
Majidae	1	0.06%
Echinodermata	6	0.35%
Crinoidea	1	0.06%
Echinoidea	2	0.12%
Paracolochirus mysticus	3	0.18%
Chordata	5	0.29%
Didemnidae	1	0.06%
Fish	4	0.23%
Other organism	1	0.06%
Other organism	1	0.06%
Natural detritus	2	0.12%
Natural detritus	2	0.12%
Soft bottom substrate	584	34.11%
Soft bottom substrate	584	34.11%
Bare soft bottom substrate	584	34.11%
Hard bottom substrate	855	49.94%

Dive Site: ROV 13-33; S. Carolina, Proposed Devil's Hole 2 and 3 MPAs, E-W ridge, south slope, 130 m

Hard bottom substrate	855	49.94%
Bare rock- pavement boulder ledge	612	35.75%
Bare rubble- rock	243	14.19%
Grand Total	1712	100.00%

Dive Site: ROV 13-33; S. Carolina, Proposed Devil's Hole 2 and 3 MPAs, E-W ridge, south slope, 130 m

Density of Fish:

Table 1. Density (number individuals/km) of fish for all transects at ROV 13-33.

Scientific Name	Common Name	13-33
<i>Anthiinae</i>	anthiid	1239.47
<i>Bothidae</i>	flounder	0.53
<i>Canthigaster rostrata</i>	sharpnose puffer	1.05
<i>Chaetodon sedentarius</i>	reef butterflyfish	1.05
<i>Cookeolus boops</i>	bulleye	0.53
<i>Decodon puellaris</i>	red hogfish	3.16
<i>Equetus lanceolatus</i>	jack-knife fish	0.53
<i>Halichoeres</i> sp.	wrasse	21.58
<i>Holacanthus bermudensis</i>	blue angelfish	0.53
<i>Holocentridae</i>		8.95
<i>Hyporthodus niveatus</i>	snowy grouper	12.63
<i>Liopropoma eukrines</i>	wrasse bass	3.68
<i>Mycteroperca phenax</i>	scamp	6.32
<i>Ogcocephalus</i> sp.	batfish	0.53
<i>Pagrus pagrus</i>	red porgy	3.16
<i>Pareques iwamotoi</i>	blackbar drum	20.53
<i>Pareques</i> sp.	drum	3.16
<i>Pareques umbrosus</i>	cubbyu	53.16
<i>Plectranthias garrupellus</i>	apricot bass	1.58
<i>Priacanthus arenatus</i>	bigeye	8.95
<i>Pristigenys alta</i>	short bigeye	77.89
<i>Prognathodes aya</i>	bank butterflyfish	16.84
<i>Pronotogrammus martinicensis</i>	roughtongue bass	160
<i>Scorpaenidae</i>	scorpionfish	5.26
<i>Seriola dumerili</i>	greater amberjack	0.53
<i>Seriola</i> sp.	amberjack	1.05
<i>Serranidae</i>	grouper	0.53
<i>Serranus phoebe</i>	tattler	1.05