**NOAA CIOERT Cruise Report**

# South Atlantic MPAs and Deepwater Coral HAPCs: Characterization of Benthic Habitat, Benthic Macrobiota, and Fish Communities

**NOAA Ship *Nancy Foster* Cruise 14-08**
**FGBNMS *Mohawk* ROV**
**June 18-27, 2014**

Funding: NOAA Coral Reef Conservation Program (CRCP)
South Atlantic Fishery Management Council (SAFMC)
NOAA CRCP-Fishery Management Council Coral Reef Conservation Cooperative Agreements

**Project ID#: NA11NMF4410061**

John Reed and Stephanie Farrington
Harbor Branch Oceanographic Institute, Florida Atlantic University
Fort Pierce, FL
Email: jreed12@fau.edu

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

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 10 day research cruise was conducted by NOAA National Marine Fisheries, June 18 to 27, 2014, on the NOAA Ship *Nancy Foster* with the new Flower Garden Banks National Marine Sanctuary (FGBNMS) *Mohawk* ROV. Collaborators included the Cooperative Institute for Ocean Exploration, Research, and Technology (CIOERT) at Harbor Branch Oceanographic Institute, Florida Atlantic University (HBOI-FAU), College of Charleston, and University of North Carolina at Wilmington (ROV operations).

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 cruise was the final cruise of a 3-year grant to document and characterize the benthic habitats, benthic biota, and fish populations within and adjacent to the MPA protected areas within the jurisdiction of the SAFMC.

This 2014 Cruise Report provides detailed quantitative characterization of the benthic habitat, benthic macrobiota, and fish populations for each of the 29 ROV dives performed. Appendix 1 provides a species list and percent cover of benthic macrobiota observed at each dive site. Appendix 2 provides a species list and densities of fish species observed at each dive site. Appendix 3 provides a SEADESC Level II Report for each dive site. The SEADESC Level II report includes:

- cruise and ROV dive metadata and objectives
- figures showing each ROV dive track overlaid on multibeam sonar maps
- ROV dive site data (start and end coordinates, time, and depth)
- plots of temperature profiles for each ROV dive
- images characterizing the habitat and biota
- summary of dive notes and habitat descriptions
- quantitative analyses of photo transects at each dive site using CPCe 4.1© Coral Point Count for percent cover of benthic macrobiota and substrate types
- quantitative analyses of video transects at each dive site for fish densities by species.

Twenty-nine ROV dives were conducted resulting in a total bottom time of 39.4 hours, covering ~25 km, at depths from 40 to 168 m. A total of 2,429 *in situ* digital images were taken which included quantitative transect images, general habitat, and species documentation images (as well as 234 still screen grabs made from the Hi-Def video). Forty-three shipboard CTD casts were made at the multibeam sites. A temperature/depth sensor recorded each ROV dive.

A total of 11 multibeam sonar surveys provided new maps covering a total area of 158.14 $km^2$ at depths ranging from 45 to 180 m. 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.

The data from this cruise will be combined with previous cruise data collected 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 establish baseline information to be referenced and compared to future research cruises to identify the

long-term health and status of these important ecosystems. These data will be made available to the SAFMC, NOAA Fisheries, NOAA DSCRTP, NOAA CRCP, NOAA Mesophotic Reef Ecosystem Program, and NOAA Marine Sanctuaries to assist management on these habitats and key species.

## ACKNOWLDEGEMENTS

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 *Nancy Foster* and FGBNMS ROV (Lance Horne and Jason White) are especially thanked for their support and efforts which made this cruise a success.

## DELIVERABLES AND DATA MANAGEMENT

This Cruise Report and SEADESC Level II Report are the deliverables 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 *Nancy Foster* 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 not unintentional release of sensitive data to the public.

**Table 1**. NOAA Ship *Nancy Foster* cruise (June 18-27, 2014) 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 DSCRTP, 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), College of Charleston (Friedrich Knuth), NOAA CIOERT at HBOI-FAU (John Reed, Stephanie Farrington), and UNCW (Lance Horn, Jason White).

## SCIENTIFIC PARTICIPANTS

| | | |
|---|---|---|
| Stacey Harter | Chief Scientist, Principal Investigator | NMFS-Panama City Lab |
| Andrew David | Co-Principal Investigator | NMFS-Panama City Lab |
| Stephanie Farrington | Biological Scientist, Data Manager | HBOI-FAU, CIOERT |
| Friedrich Knuth | Multibeam Sonar Specialist | College of Charleston |
| Steven Matthews | Scientist | NMFS-Panama City Lab |
| LT Heather Moe | Scientist | NMFS-Panama City Lab |
| Lance Horn | Chief ROV Pilot | UNCW |
| Jason White | ROV Pilot | UNCW |
| John Bilotta | Teacher-At-Sea | University of Minnesota |
| Kayla Johnson | Multibeam Sonar Specialist | Independent Contractor |

## PROJECT OVERVIEW

The South Atlantic Fishery Management Council (SAFMC) and Department of Commerce through the Magnuson-Stevens Fishery Management Act have 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 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, May 2010, July 2012, and July 2013. 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.

## 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) multibeam or sidescan sonar mapping and ground-truthing, habitat characterization, and monitoring of such areas, including deeper coral reefs, bands 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 objective of the three research cruises (2012, 2013, and 2014) were 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). The data from these cruises are part of a long-term sampling/monitoring program to document changes in these areas before and after fishing restrictions were implemented. Efficacy of this management tool will aid fishery managers in future use of area restrictions for the conservation 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.

## OUTREACH AND EDUCATION

The goal of the expedition's education and outreach is to promote ocean literacy, knowledge of deep coral ecosystems, and the challenges of exploring deep ocean frontiers for public and classroom audiences. Related outreach/education activities included: NOAA Teacher-at-Sea and web materials for http://teacheratsea.noaa.gov/2014/bilotta.html.

# METHODS

## ROV Operations

The new Flower Garden Banks National Marine Sanctuary (FGBNMS) *Mohawk* ROV (operated by UNCW, Lance Horne and Jason White) was used for the first time on these cruises. 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
- 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. The ROV was equipped with a high-definition digital video camera (using fiber optic cable) mounted on tilt bar, a fixed digital still camera, and a temperature/depth recorder. The ROV was not outfitted with a manipulator and no samples were collected.

### ROV Video Camera

Video was recorded continuously throughout each dive from surface to surface with a high-definition video camera (Insite Pacific Mini Zeus CMOS color zoom camera with 2,000,000 effective pixels). The camera was typically angled down ~30$^{o}$ to view both near and far to the horizon for fish aggregations and habitat, and had 10-cm parallel lasers for scale. High-definition video was recorded to external hard drives and used as the primary data source for viewing by the science team and quantitative analysis of the fish populations. A second standard definition copy was also recorded to a hard drive as well as to DVD for backup and easy viewing on any computer's DVD drive. The standard definition format had an On-Screen Display (OSD) video overlay which recorded time, date, ROV heading, and ROV depth, and was used as the "pilot" view. A microphone was used for continuous audio annotations by the PIs describing events, habitat, and biota which were recorded onto the video recordings and transcribed into a Microsoft Access 2010 database.

### ROV Digital Still Camera

Still images were taken for quantitative analysis of habitat and benthic macrobiota. The Kongsberg OE14-408 high-definition digital still camera, with resolution of 3648x2736 pixels, was pointed down 90° from horizontal and contained two lasers at 10-cm parallels for scale. Still images were captured approximately every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. 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 ArcGIS™ 10.0.

### ROV Navigation

The *Mohawk* ROV uses an integrated navigation system consisting of Hypack Max 2014 software on a 64-bit, 3.4 GHz, rack-mounted computer running Windows 7. Additionally, data from an

ORE Offshore 4410C Trackpoint II USBL Acoustic Tracking System, Northstar 951XD differential GPS, and Azimuth 1000 digital compass, along with the *Mohawk* ROV data feed to this computer. The Trackpoint II system communicates acoustically to an ORE Offshore 4377A transponder with depth telemetry on the ROV to provide slant range, bearing, and depth from the support vessel. This system allows the ROV to assign latitude and longitude while in operation. The integrated navigation system provides real time tracking and orientation of the ROV and the ship to the ROV pilot and the ship's bridge for navigation. 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 ship navigation. Hypack can also export ROV position data in real time as a NMEA data string. Ship and ROV positions in addition to the ROV depth, heading and altimeter data, are logged and processed after each dive day and provided to the scientist in an Excel spreadsheet file. All data documentation (digital images, HD video, dive annotations, and specimen collections) are geo-referenced to ROV position by matching the time and date to the ROV navigation files.

ROV Survey Protocol

The primary objectives of each dive were to document benthic habitat, benthic macrobiota, 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. Video transects were used for analysis of fish populations. Video transects kept the ROV as close to the bottom as possible (<1/2 m) with a speed over ground of ~¼ knot.
2. Bottom paralleled, quantitative digital still images were captured approximately every 2 minutes throughout the dive during which the ROV hovered at a depth of ~1.3 m to provide similar field of view area for each image (~1.5 $m^2$).
3. Still images captured from the photo transects were analyzed using CPCe© software to determine relative percent cover of benthic macrobiota and habitat types. 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.
4. 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.
5. 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.
6. All data documentation (digital images, video, and dive annotations) were geo-referenced to ROV position after the cruise by matching the date and time to the ROV navigation files in our CIOERT At-Sea Access Database.

**Fish Analyses**

Each dive was divided into transects based on benthic habitat characterization (see Protocol for Benthic Habitat Characterization below) so that each transect consisted of only a single habitat type. All fish were identified for each transect down to the lowest taxonomic level and counted. Transect volume ($m^3$) was calculated by multiplying the transect length (m) by the estimated

field of view of the transect width (m), and the field of view of the transect height (m). Transect length was determined by using the ROV's tracking system and transect width and height was estimated for each dive using the paired lasers on the video camera. This varied with the visibility of each dive. Transect volume was then used to calculate the density (# of individuals $m^{-3}$) of each fish species.

**Benthic Analyses**

Percent cover of substrate type and benthic macrobiota was determined by analyzing the quantitative transect images with Coral Point Count with Excel extensions (CPCe 4.1©, Kohler and Gill, 2006), 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 benthic macrobiota (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, sponges, algae). Coral is defined 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) (Lumsden et al, 2007).

**Protocol for Benthic Habitat Characterization**

This protocol defines the habitat categories that were used to define and characterize the benthic habitats for the shelf-edge reefs and MPAs off southeastern U.S. within the jurisdiction of the South Atlantic Fishery Management Council. The habitat categories were entered into the HBOI Microsoft Access at-Sea Database for each ROV dive site and used for Primer statistical analyses of the fish populations and benthic communities.

1. *[On/Off Reef]*: "On Reef" or "Off Reef"- Simple designation of when the dive is on 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 distribution of biota for each habitat zone at each dive site and to plot the dive track overlay on multibeam sonar maps in ArcGIS.

3. [MPA Status]: Dive site or transect is within a marine protected area (MPA) or is not within any MPA.

4. [Depth]: Depth range (m) of the dive.

5. [*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. Relief is defined 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 is generally in the range of 10-20 m, which is typically within the field of view of the ROV for observing fish schools.

6. [*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 are zones of fractured rock slabs, or zones of boulders or rock outcrops. Low Rugosity is the flat rock pavement typically found top of the ridges or at the base of the mounds and ridges. Low Rugosity also defines the rounded rock mounds and knolls found at some sites that are devoid of ledges and loose boulders. For the present, this will be a non-quantified relative term. Most of the multibeam sonar maps collected 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.

7. [Substrate]: Table 2 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). The categories which are useful for characterizing deep coral habitat were modified to make them useful for the 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. Benthic habitat category codes (modified SEADESC).

| 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 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 MPA, i.e., 'no protection'). For the benthic analysis, CPCe percent cover data of the macrobiota were 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, densities (# individuals $m^{-3}$) of all species for each transect were analyzed. Density data were then averaged by location inside and outside each MPA and fourth-root transformed to reduce the effect of common species.

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 Similarities Profile (SIMPROF). Similarity Percentages (SIMPER) was utilized to determine which species contributed to the dissimilarities among group pairs.

**Multibeam Sonar Mapping**

NOAA acoustic surveys using multibeam sonar (Reson 7125 SV2) 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. Data was processed using CARIS and converted to GeoTIFF images.

# RESULTS

## Study Areas

The cruise took place on the continental shelf-edge of the South Atlantic Bight between Jacksonville, Florida and Cape Fear, North Carolina. Ten shelf-edge MPA sites and 19 adjacent non-protected sites were surveyed (Figs. 1-6; Table 4). Two dives (ROV 14-25, 14-26) were made to document two barges that were recently sunk in April 2014. These will make up the Artificial Reef MPA site off South Carolina. Although barren now, it will be monitored to follow the growth of biota and fish communities on these barges over time.

## Cruise Summary

A total of 29 ROV dives were conducted, resulting in a total bottom time of 39.4 hours, covering ~25 km, at depths from 40 to 168 m (Table 3, Figs. 1-6). A total of 2,429 *in situ* digital images were taken which included quantitative transect images, general habitat, and species documentation images (as well as 234 still screen grabs made from the Hi-Def video). Forty-three shipboard CTD casts were made. A temperature/depth sensor recorded each ROV dive (Appendix 3). A total of 11 multibeam sonar surveys provided new maps covering a total area of 158.14 $km^2$ at depths ranging from 45 to 180 m. These sites had never been surveyed previously with multibeam sonar. Complete species list with percent cover of benthic marcrobiota 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).

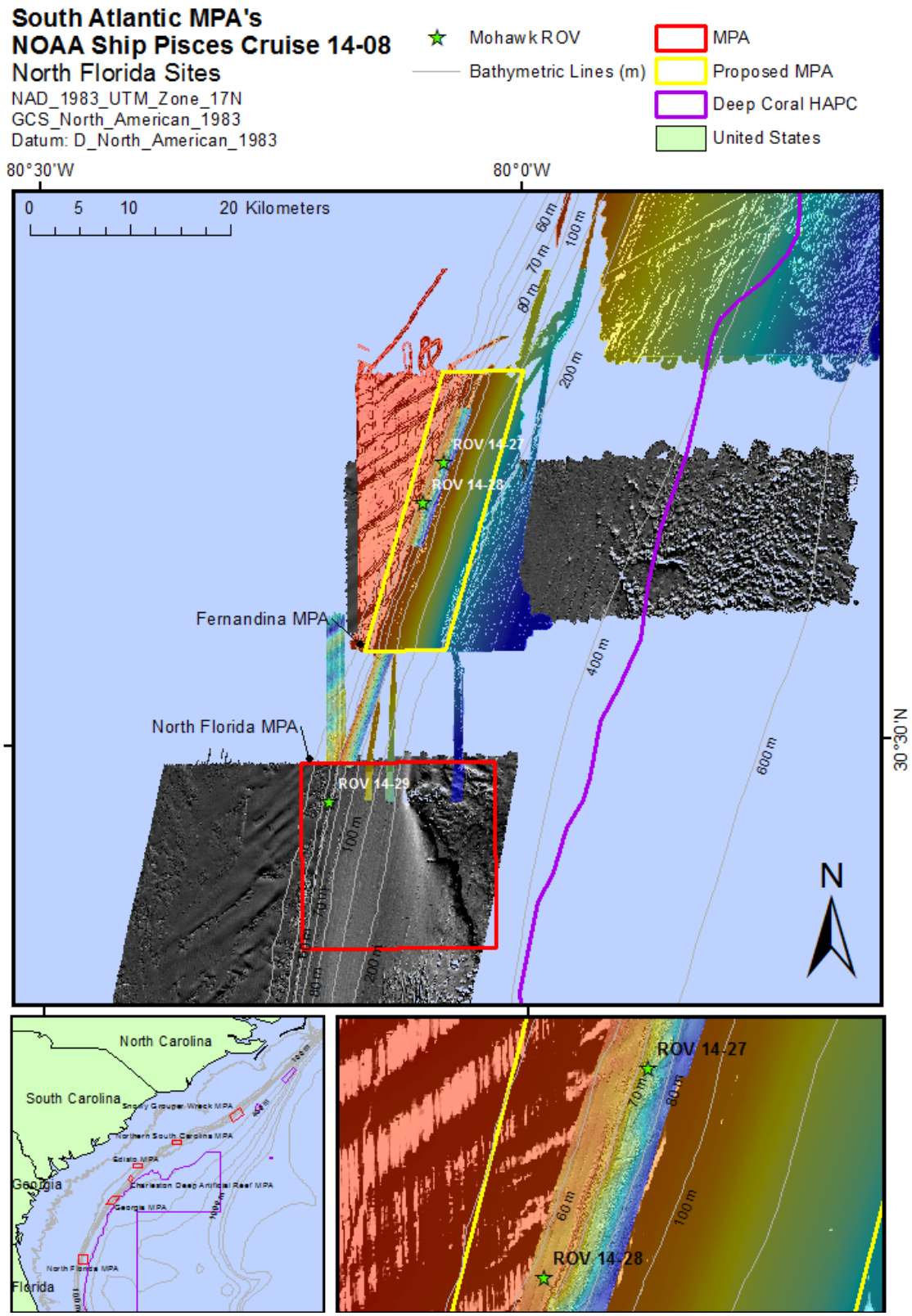


Figure 1. Locations of shelf-edge MPA sites and ROV dive sites off North Florida during NOAA Ship *Nancy Foster* cruise, June 18 to 27, 2014.

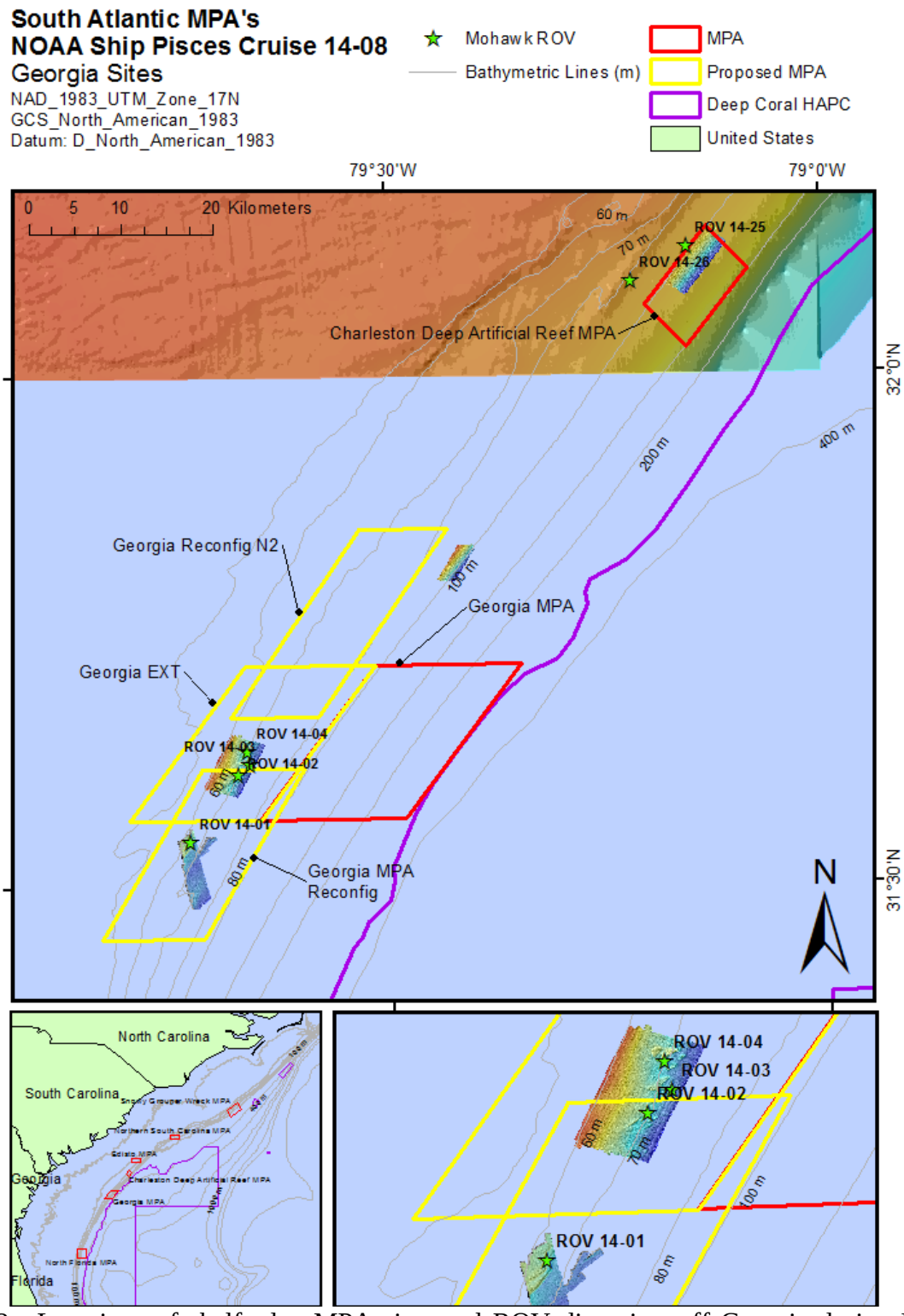


Figure 2. Locations of shelf-edge MPA sites and ROV dive sites off Georgia during NOAA Ship *Nancy Foster* cruise, June 18 to 27, 2014.

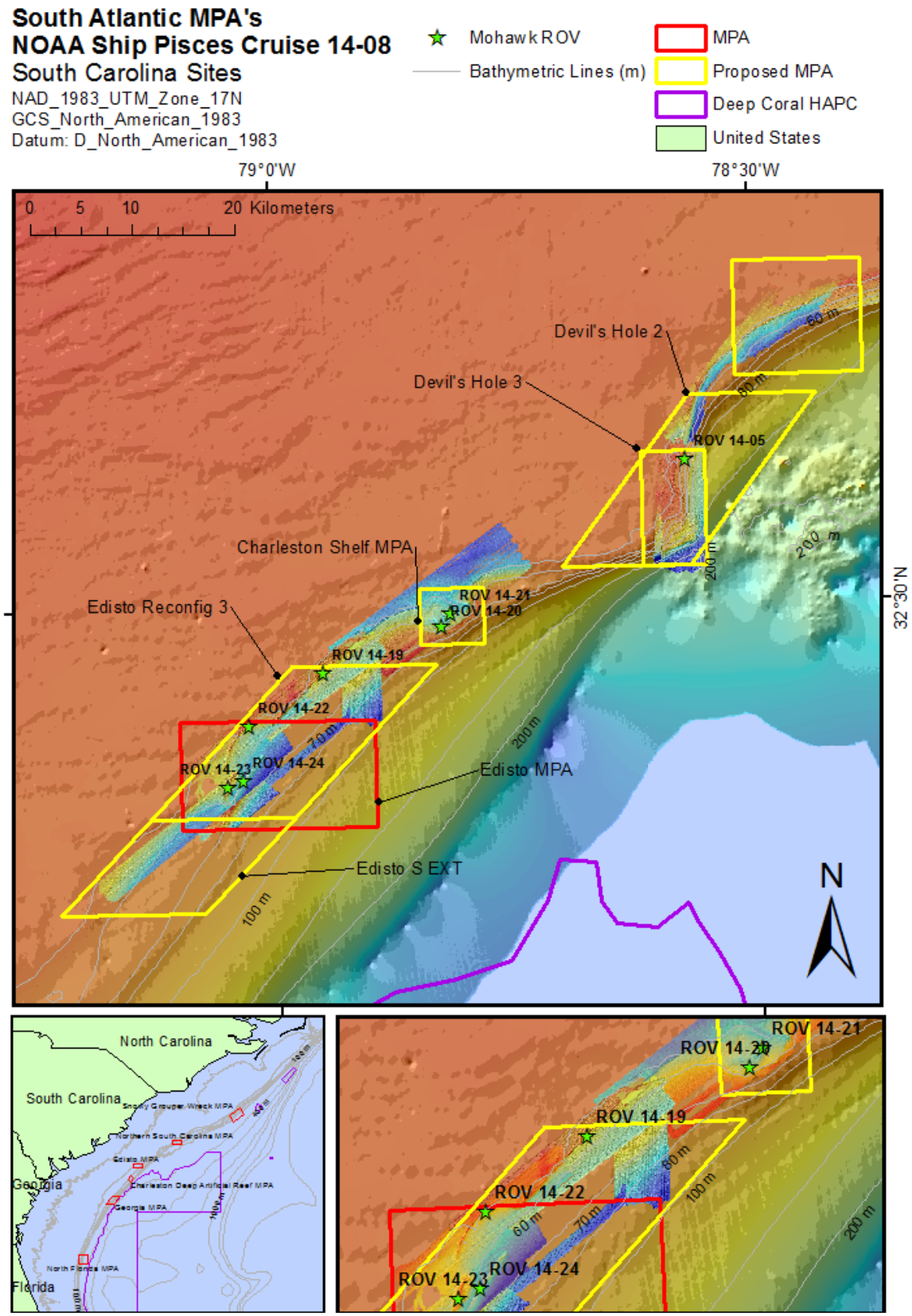


Figure 3. Locations of shelf-edge MPA sites and ROV dive sites off South Carolina during NOAA Ship *Nancy Foster* cruise, June 18 to 27, 2014.

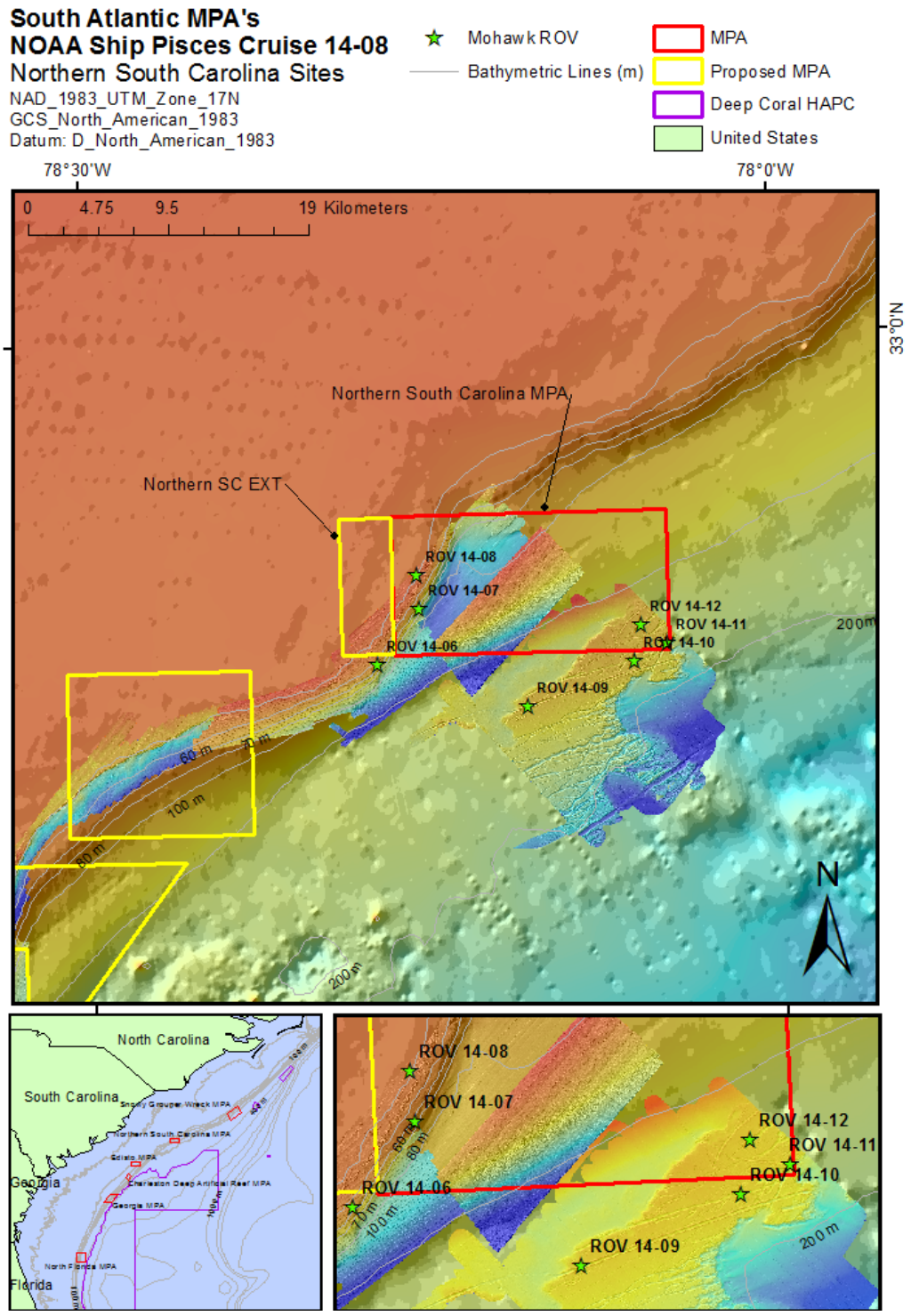


Figure 4. Locations of shelf-edge MPA sites and ROV dive sites off northern South Carolina during NOAA Ship *Nancy Foster* cruise, June 18 to 27, 2014.

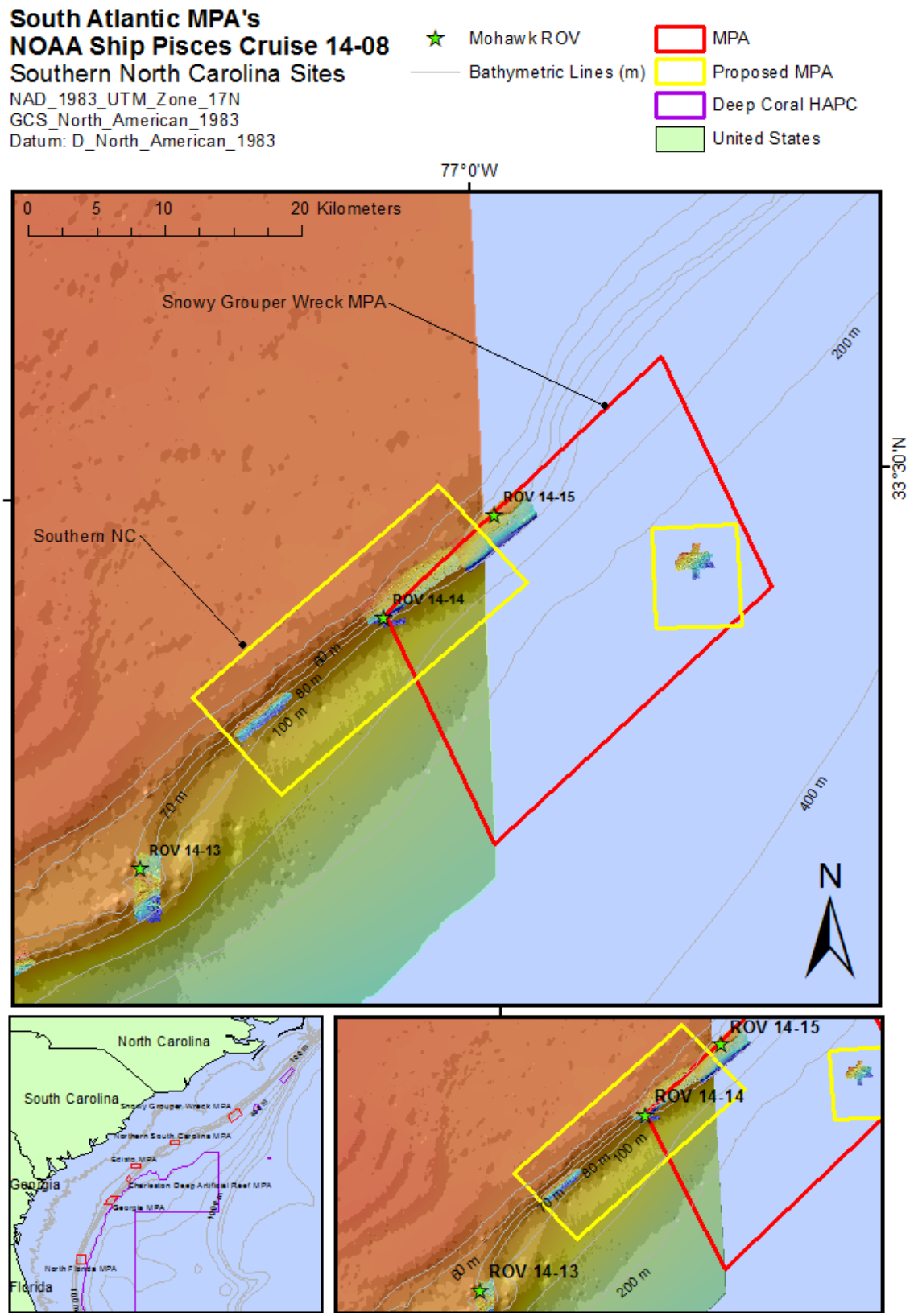


Figure 5. Locations of shelf-edge MPA sites and ROV dive sites off southern North Carolina during NOAA Ship *Nancy Foster* cruise, June 18 to 27, 2014.

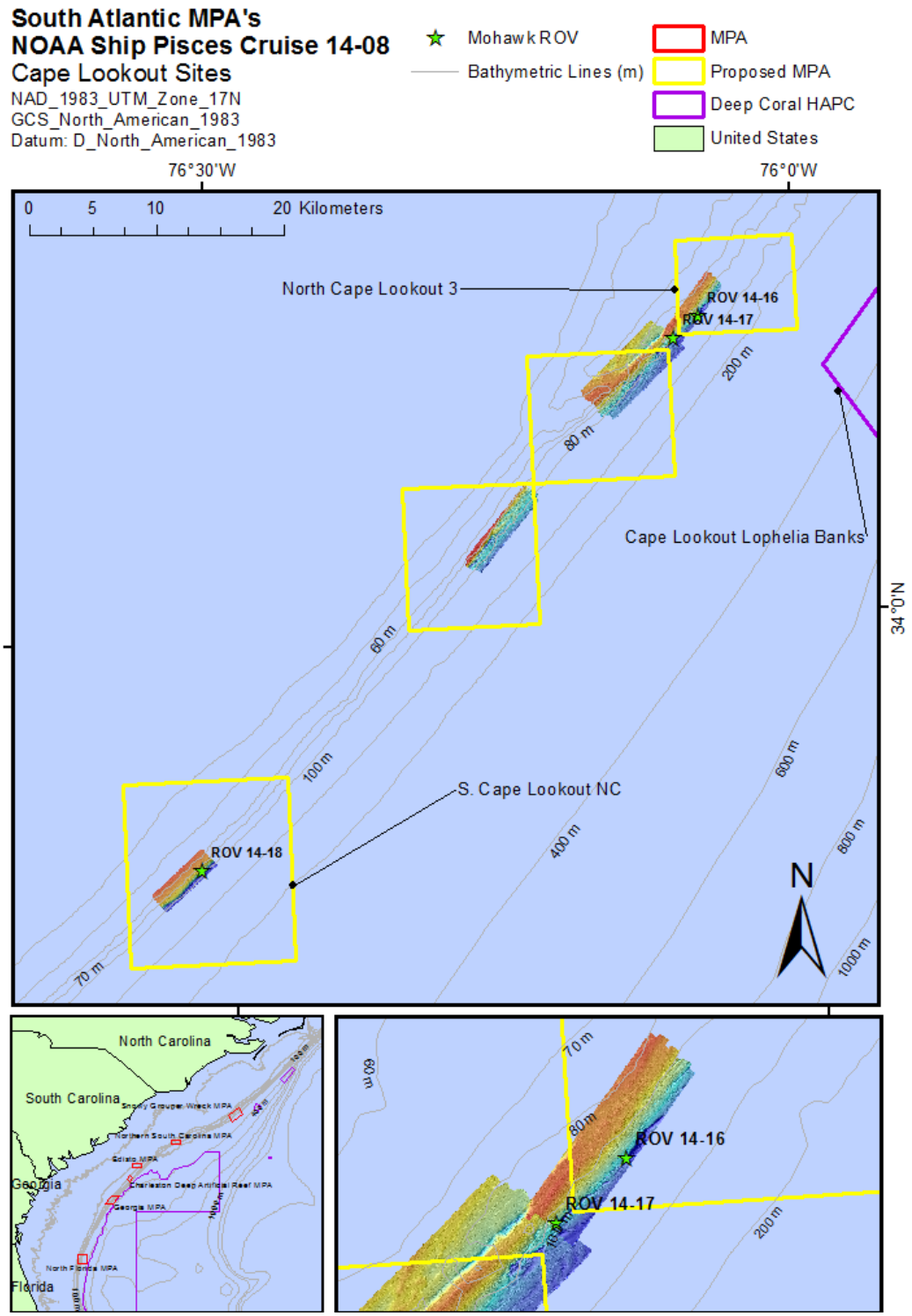


Figure 6. Locations of shelf-edge MPA sites and ROV dive sites off Cape Lookout North Carolina during NOAA Ship *Nancy Foster* cruise, June 18 to 27, 2014.

Table 3. ROV dive sites and CTD casts during NOAA Ship *Nancy Foster* cruise, June 18 to 27, 2014. (Site Number= Day-Month-Year-Site).

| Site Number | Method | Latitude | Longitude | Latitude | Longitude | Depth Range (m) | Distance (km) |
|---|---|---|---|---|---|---|---|
| | | On Bottom | | Off Bottom | | | |
| 18-VI-14-1 | CTD 14-01 | 31.62 | -79.70 | | | 62.28 | |
| 18-VI-14-2 | CTD 14-02 | 31.64 | -79.68 | | | 63.12 | |
| 19-VI-14-1 | ROV 14-01 | 31.55 | -79.73 | 31.54 | -79.73 | 74 to 57.7 | 1.17 |
| 19-VI-14-2 | ROV 14-02 | 31.60 | -79.67 | 31.60 | -79.68 | 72.3 to 47.4 | 0.92 |
| 19-VI-14-3 | ROV 14-03 | 31.62 | -79.66 | 31.62 | -79.67 | 79 to 56.2 | 1.08 |
| 19-VI-14-4 | ROV 14-04 | 31.63 | -79.67 | 31.64 | -79.66 | 72.3 to 59.6 | 0.77 |
| 19-VI-14-5 | CTD 14-03 | 31.60 | -79.69 | | | 59.23 | |
| 19-VI-14-6 | CTD 14-04 | 31.61 | -79.68 | | | 65.03 | |
| 19-VI-14-7 | CTD 14-05 | 31.63 | -79.66 | | | 66.36 | |
| 19-VI-14-8 | CTD 14-06 | 31.82 | -79.42 | | | 99.24 | |
| 20-VI-14-1 | ROV 14-05 | 32.63 | -78.57 | 32.64 | -78.57 | 69 to 52.4 | 1.15 |
| 20-VI-14-2 | ROV 14-06 | 32.80 | -78.29 | 32.81 | -78.28 | 72.2 to 53.5 | 1.40 |
| 20-VI-14-3 | ROV 14-07 | 32.84 | -78.26 | 32.84 | -78.26 | 74 to 65.6 | 0.69 |
| 20-VI-14-4 | ROV 14-08 | 32.86 | -78.26 | 32.86 | -78.25 | 51.6 to 44.2 | 0.79 |
| 20-VI-14-5 | CTD 14-07 | 32.55 | -78.60 | | | 91.96 | |
| 20-VI-14-6 | CTD 14-08 | 32.60 | -78.60 | | | 46.85 | |
| 20-VI-14-7 | CTD 14-09 | 32.82 | -78.24 | | | 108.35 | |
| 21-VI-14-1 | ROV 14-09 | 32.77 | -78.18 | 32.78 | -78.18 | 164.2 to 155.1 | 0.60 |
| 21-VI-14-2 | ROV 14-10 | 32.80 | -78.11 | 32.80 | -78.11 | 168.3 to 162.6 | 0.62 |
| 21-VI-14-3 | ROV 14-11 | 32.81 | -78.08 | 32.81 | -78.10 | 167.6 to 155.7 | 1.45 |
| 21-VI-14-4 | ROV 14-12 | 32.82 | -78.10 | 32.81 | -78.11 | 166.3 to 149.2 | 1.30 |
| 21-VI-14-5 | CTD 14-10 | 32.85 | -78.19 | | | 107.02 | |
| 21-VI-14-6 | CTD 14-11 | 32.81 | -78.22 | | | 133.94 | |
| 21-VI-14-7 | CTD 14-12 | 32.86 | -78.15 | | | 114.22 | |
| 21-VI-14-8 | CTD 14-13 | 32.83 | -78.18 | | | 136.09 | |
| 22-VI-14-1 | ROV 14-13 | 33.25 | -77.28 | 33.25 | -77.27 | 85 | 0.50 |
| 22-VI-14-2 | ROV 14-14 | 33.41 | -77.08 | 33.42 | -77.08 | 96.2 to 75.7 | 0.47 |
| 22-VI-14-3 | ROV 14-15 | 33.48 | -76.99 | 33.48 | -76.98 | 65.8 to 48.4 | 0.70 |
| 22-VI-14-4 | CTD 14-14 | 33.45 | -77.01 | | | 114.69 | |
| 22-VI-14-5 | CTD 14-15 | 33.48 | -76.97 | | | 80.4 | |
| 22-VI-14-6 | CTD 14-16 | 33.47 | -76.99 | | | 68.7 | |
| 22-VI-14-7 | CTD 14-17 | 33.47 | -77.00 | | | 60.73 | |
| 23-VI-14-1 | ROV 14-16 | 34.21 | -76.08 | 34.22 | -76.08 | 113 to 91.7 | 0.62 |
| 23-VI-14-2 | ROV 14-17 | 34.20 | -76.11 | 34.20 | -76.10 | 108 to 95.3 | 0.89 |
| 23-VI-14-3 | ROV 14-18 | 33.84 | -76.53 | 33.84 | -76.52 | 79.1 to 70.5 | 0.48 |
| 23-VI-14-4 | CTD 14-18 | 33.82 | -76.54 | | | 107.23 | |
| 23-VI-14-5 | CTD 14-19 | 33.84 | -76.53 | | | 68.58 | |
| 23-VI-14-6 | CTD 14-20 | 34.20 | -76.09 | | | 118.87 | |
| 23-VI-14-7 | CTD 14-21 | 34.23 | -76.07 | | | 72.97 | |
| 23-VI-14-8 | CTD 14-22 | 34.22 | -76.09 | | | 70.75 | |
| 23-VI-14-9 | CTD 14-23 | 33.83 | -76.56 | | | 57.78 | |
| 24-VI-14-1 | ROV 14-19 | 32.44 | -78.95 | 32.43 | -78.96 | 55.3 to 47 | 1.43 |
| 24-VI-14-2 | ROV 14-20 | 32.48 | -78.83 | 32.48 | -78.83 | 5153 | 0.05 |
| 24-VI-14-3 | ROV 14-21 | 32.49 | -78.82 | 32.48 | -78.83 | 55.9 to 47.7 | 1.37 |
| 24-VI-14-4 | ROV 14-22 | 32.40 | -79.03 | 32.39 | -79.04 | 54 to 47.8 | 0.81 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 24-VI-14-5 | CTD 14-25 | 33.43 | -77.20 | | | 34.8 | |
| 24-VI-14-6 | CTD 14-26 | 33.26 | -77.51 | | | 43.81 | |
| 24-VI-14-7 | CTD 14-27 | 33.01 | -77.90 | | | 104.44 | |
| 24-VI-14-8 | CTD 14-28 | 32.77 | -78.30 | | | 123.78 | |
| 24-VI-14-9 | CTD 14-29 | 32.56 | -78.69 | | | 41.7 | |
| 25-VI-14-1 | ROV 14-23 | 32.34 | -79.05 | 32.35 | -79.05 | 51.3 to 40.4 | 0.72 |
| 25-VI-14-2 | ROV 14-24 | 32.35 | -79.03 | 32.35 | -79.03 | 62.3 to 54.6 | 0.46 |
| 25-VI-14-3 | ROV 14-25 | 32.12 | -79.15 | 32.12 | -79.15 | 101.4 to 82.9 | 0.16 |
| 25-VI-14-4 | ROV 14-26 | 32.09 | -79.22 | 32.09 | -79.20 | 86.6 to 65.4 | 1.45 |
| 25-VI-14-5 | CTD 14-30 | 32.13 | -79.15 | | | 121.23 | |
| 25-VI-14-6 | CTD 14-31 | 32.09 | -79.23 | | | 75.97 | |
| 25-VI-14-7 | CTD 14-32 | 32.16 | -79.14 | | | 84.94 | |
| 25-VI-14-8 | CTD 14-33 | 32.33 | -79.03 | | | 71.14 | |
| 25-VI-14-9 | CTD 14-34 | 32.32 | -79.04 | | | 70.01 | |
| 26-VI-14-1 | ROV 14-27 | 30.75 | -80.08 | 30.74 | -80.08 | 64.6 to 56.1 | 0.82 |
| 26-VI-14-2 | ROV 14-28 | 30.71 | -80.10 | 30.71 | -80.10 | 57 to 40.9 | 1.06 |
| 26-VI-14-3 | ROV 14-29 | 30.45 | -80.20 | 30.44 | -80.21 | 59.9 to 53.3 | 1.15 |
| 26-VI-14-4 | CTD 14-37 | 31.50 | -79.61 | | | 121.23 | |
| 26-VI-14-5 | CTD 14-38 | 31.22 | -79.79 | | | 142.02 | |
| 26-VI-14-6 | CTD 14-39 | 30.79 | -80.08 | | | 46.69 | |
| 26-VI-14-7 | CTD 14-40 | 30.76 | -80.08 | | | 52.94 | |
| 26-VI-14-8 | CTD 14-41 | 30.77 | -80.07 | | | 61.73 | |
| 26-VI-14-9 | CTD 14-42 | 30.69 | -80.12 | | | 48.9 | |
| 27-VI-14-1 | CTD 14-44 | 30.70 | -80.10 | | | 56.56 | |
| 27-VI-14-2 | CTD 14-45 | 30.67 | -80.13 | | | 50.6 | |
| 27-VI-14-3 | CTD 14-46 | 30.58 | -80.46 | | | 30.22 | |
| 27-VI-14-4 | CTD 14-47 | 30.49 | -80.83 | | | 26.31 | |
| 28-VI-14-1 | CTD 14-24 | 33.63 | -76.88 | | | 58.69 | |
| 28-VI-14-2 | CTD 14-35 | 32.34 | -79.01 | | | 79.37 | |
| 28-VI-14-3 | CTD 14-36 | 32.05 | -79.24 | | | 90.94 | |
| 28-VI-14-4 | CTD 14-43 | 30.74 | -80.09 | | | 53.45 | |

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

| Site | Dive # | Inside MPA | Outside MPA | Depth Range (m) |
|---|---|---|---|---|
| **FLORIDA (Total Dives)** | **(3)** | | | **40-60** |
| Fernandina | 27,28 | | Y | 40-64 |
| North Florida MPA | 29 | Y | | 53-60 |
| **GEORGIA (Total Dives)** | **(4)** | | | **47-79** |
| GA Ext | 2, 3,4 | | Y | 56-79 |
| GA Reconfig | 1,2 | | Y | 47-74 |
| **SOUTH CAROLINA (Total Dives)** | **(16)** | | | **40-168** |
| Charleston Shelf | 20,21 | | Y | 47-55 |
| Outside Charleston Deep Artificial Reef MPA (barges) | 25,26 | Y | | 64-101 |
| Devil's Hole 2&3 | 5 | | Y | 52-69 |

| | | | | |
|---|---|---|---|---|
| Edisto MPA | 22,23,24 | Y | | 40-62 |
| Edisto Reconfig 3 | 19 | | Y | 47-55 |
| Northern S. Carolina Ext | 6 | | Y | 53-72 |
| Northern S. Carolina MPA | 7,8 | Y | | 44-74 |
| Northern S. Carolina MPA (iceberg scar) | 11,12 | Y | | 149-167 |
| Outside Northern S. Carolina MPA (iceberg scar) | 9, 10 | | Y | 155-168 |
| **NORTH CAROLINA (Total Dives)** | **(6)** | | | **70-113** |
| Outside Snowy Wreck MPA | 13 | | Y | 85 |
| North Cape Lookout 3 | 16,17 | | Y | 91-113 |
| Snowy Wreck MPA | 14,15 | Y | | 48-96 |
| S Cape Lookout | 18 | | Y | 70-79 |

**Multibeam Sonar**

A total of 11 multibeam sonar surveys provided new maps covering a total area of 158.14 $km^2$ at depths ranging from 45 to 180 m (Table 5). GeoTIFF maps were used to overlay targeted sites for the ROV dives which were especially helpful in ground-truthing the main geological features of the site.

Table 5. Multibeam sonar surveys conducted during *Nancy Foster* cruise, June 18-27, 2014 (F. Knuth, College of Charleston).

| Name | Area ($mi^2$) | Area ($km^2$) | Min Depth (m) | Max Depth (m) | Features / Description |
|---|---|---|---|---|---|
| Barge1 - Deep Artificial Reef | 0.06 | 0.16 | 93 | 101 | sunken barge, some containers fell off |
| Barge2 - Deep Artificial Reef | 0.04 | 0.11 | 62 | 87 | sunken barge, mostly intact |
| Fernandina | 9.41 | 24.37 | 48 | 75 | hardbottom ridge traversing site from north to south |
| South Cape Lookout | 3.55 | 9.20 | 64 | 115 | some rugosity ranging from south west to north east |
| Devil's Hole | 2.67 | 6.92 | 45 | 185 | stripe adding on to previous mapping of site. Some rugosity in the center of the site |
| Edisto MPA | 4.70 | 12.18 | 60 | 81 | no real topographic complexity visible |
| Snowy Wreck MPA | 6.60 | 17.08 | 56 | 122 | plateau in north eastern section. sand waves in north western section. |
| North Cape Lookout | 3.70 | 9.58 | 75 | 145 | many ridges and topographic complexity spread throughout site. |
| Northern South Carolina MPA | 18.28 | 47.34 | 100 | 179 | no striking topographic features |
| Georgia Wreck | 2.78 | 7.20 | 89 | 108 | no wreck. No striking topographic features |

| | | | | | |
|---|---|---|---|---|---|
| West of Georgia MPA | 9.26 | 23.99 | 60 | 77 | various irregular plateaus spread throughout sites. approximately 10 meters in height. |
| **Total Area** | **61.06** | **158.14** | | | |

## CTD Operations

A total of 47 shipboard CTD casts were conducted at the multibeam sites; each ROV dive (except Dive 13) recorded temperature/depth profiles (ROV temperature plots are presented for each dive in Appendix 3).

## SEADESC II Report: Characterization of Habitat, Benthic Macrobiota, and Fish Populations

A 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, figure showing each ROV dive track overlaid on multibeam sonar maps, plot of ROV temperature profile, dive track data (start and end latitude, longitude, depth), objectives, 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 macrobiota and substrate types, and 2) densities of fish populations (# individuals/$m^3$).

## Benthic Macrobiota and Habitat

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 Countof 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 actually may include different orders or classes.

A total of 95 taxa of benthic biota were identified from the quantitative photo transects and were used for CPCe percent cover analyses. These included 29 taxa of Cnidaria which included the following corals: 3- Scleractinia hard corals (*Oculina varicosa,* Scleractinia unidentified colonial, and Scleractinia unidentified solitary); 11- Alcyonacea gorgonians [Octocorallia] (*Bebryce* sp., *Diodogorgia* sp., *Ellisella* spp., Ellisellidae, *Leptogorgia* sp., *Muricea sp., Nicella* sp., *Telesto* sp., *Titanideum frauenfeldii,* and *Swiftia exserta,*); and 5- Antipathidae (*Antipatharia atlantica*, *Antipathes* sp. A, *Tanacetipathes barbadensis, Stichopathes lutkeni*, and unidentified sp.). Alcyonian soft corals included *Anthomastus* sp. and *Chironephthya caribaea*. Non-coral

Cnidaria included Actiniaria, Corallimorpharia, Zoanthidea, *Virgularia presbytes* (sea pen), and Hydroidolina (hydroids).

Porifera were most species rich with 32 taxa; the dominant sponges included numerous Demospongiae taxa, including: *Agelas* sp., *Aiolochroia crassa*, *Aplysina* sp., Astrophorida, *Auletta* sp., *Callyspongia vaginalis*, *Chondrilla* sp., *Cinachyra*/*Cinachyrella* sp., *Clathria* sp., *Cliona* sp., Dictyoceratida, *Erylus* sp., *Geodia* sp., *Holopsamma* sp., *Ircinia campana*, *Ircinia* sp., *Ircinia strobilina*, *Leiodermatium* sp., *Neofibularia* sp., *Niphates* sp., Poecilosclerida, *Scopalina* sp., Spirastrellidae, *Spongosorites* sp., *Xestospongia muta*, *Zyzzya* sp., and numerous unidentified species of Demospongiae. Only one species of Hexactinellida (glass sponge) was identified, *Farrea* 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); but these were not identified to species level.

**Table 6.** Fish densities from ROV video transects, and percent cover of benthic macrobiota and substrate from CPCe Point Count analysis of photographic transects listed by state and MPA status (i.e., inside MPA or no protection) during 2014 NOAA Ship *Nancy Foster* cruise. Coral= Scleractinia hard coral, Octo= Octocorallia (gorgonacea), Porifera (sponges).

| Site | Dive # | % HB | Fish- # spp.; Density (#/m$^3$) | % Cover Benthic Biota | % Cover Coral | % Cover Octo. | % Cover Antipat. | % Cover Porifera | % Cover Algae |
|---|---|---|---|---|---|---|---|---|---|
| **Florida** | **(3)** | **23.63%** | **74;0.07** | **13.65%** | **0.00%** | **0.24%** | **0.61%** | **3.09%** | **1.87%** |
| Fernandina | 27, 28 | 17.49% | 44;0.05 | 14.77% | 0.00% | 0.12% | 0.04% | 2.68% | 2.40% |
| North Florida MPA | 29 | 31.50% | 44;0.10 | 12.20% | 0.00% | 0.40% | 1.34% | 3.62% | 1.19% |
| **Georgia** | **(4)** | **18.78%** | **47;0.05** | **3.16%** | **0.00%** | **0.53%** | **0.51%** | **0.82%** | **0.02%** |
| Georgia EXT | 2-4 | 16.92% | 38;0.05 | 2.62% | 0.00% | 0.67% | 0.31% | 0.62% | 0.00% |
| Georgia Reconfig | 1,2 | 23.37% | 44;0.06 | 4.49% | 0.00% | 0.19% | 1.01% | 1.33% | 0.06% |
| **South Carolina** | **(16)** | **33.82%** | **110;0.12** | **24.46%** | **0.07%** | **1.70%** | **0.67%** | **3.31%** | **10.41%** |
| Charleston Shelf | 20,21 | 24.53% | 52;0.11 | 40.53% | 0.05% | 4.88% | 0.33% | 1.68% | 19.97% |
| Charleston Deep Reef MPA | 25,26 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| Devils Hole 2&3 | 5 | 30.55% | 37;0.09 | 16.07% | 0.00% | 1.52% | 0.87% | 1.82% | 1.73% |
| Edisto MPA | 22-24 | 40.29% | 71;0.26 | 38.09% | 0.05% | 1.81% | 1.38% | 5.10% | 19.76% |
| Edisto Reconfig 3 | 19 | 47.52% | 56;0.56 | 46.21% | 0.35% | 2.40% | 1.62% | 6.76% | 20.25% |
| Northern S. Carolina EXT | 6 | 17.28% | 41;0.06 | 16.66% | 0.00% | 2.50% | 0.31% | 1.46% | 4.89% |
| Northern S. Carolina MPA | 7,8,11,12 | 23.23% | 54;0.04 | 10.49% | 0.02% | 0.55% | 0.02% | 1.96% | 4.35% |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Outside Northern S. Carolina MPA | 9,10 | 45.30% | 23;0.03 | 6.83% | 0.03% | 0.64% | 0.00% | 2.51% | 0.00% |
| **North Carolina** | **(6)** | **45.34%** | **67;0.06** | **17.94%** | **0.00%** | **1.23%** | **0.46%** | **5.52%** | **5.24%** |
| Outside Snowy Wreck MPA | 13 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| North Cape Lookout 3 | 16,17 | 56.68% | 27;0.04 | 15.56% | 0.00% | 0.84% | 0.06% | 8.83% | 0.12% |
| Snowy Wreck MPA | 14,15 | 27.24% | 55;0.10 | 21.52% | 0.00% | 1.05% | 1.10% | 1.10% | 13.70% |
| South Cape Lookout NC | 18 | 40.44% | 23;0.03 | 19.41% | 0.00% | 2.93% | 0.61% | 2.43% | 6.88% |
| **Grand Total** | | **32.40%** | **119;0.09** | **19.20%** | **0.04%** | **1.29%** | **0.61%** | **3.29%** | **7.14%** |

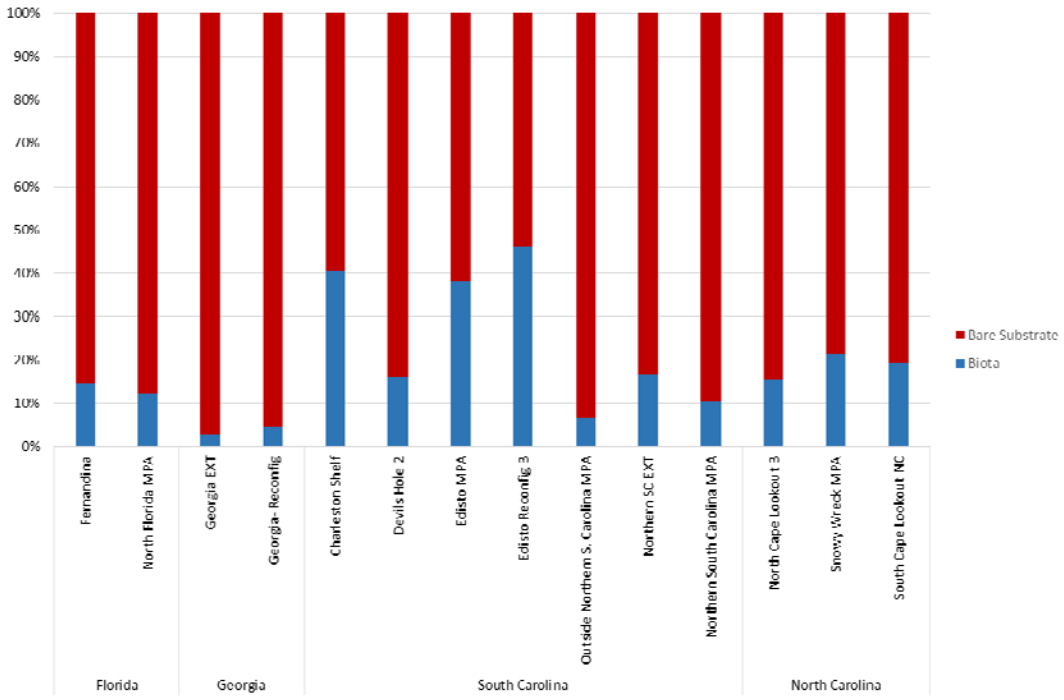


Figure 7. Percent cover of benthic macrobiota (blue) vs bare substrate (red) by MPA status and region from the 2014 NOAA Ship *Pisces* cruise.

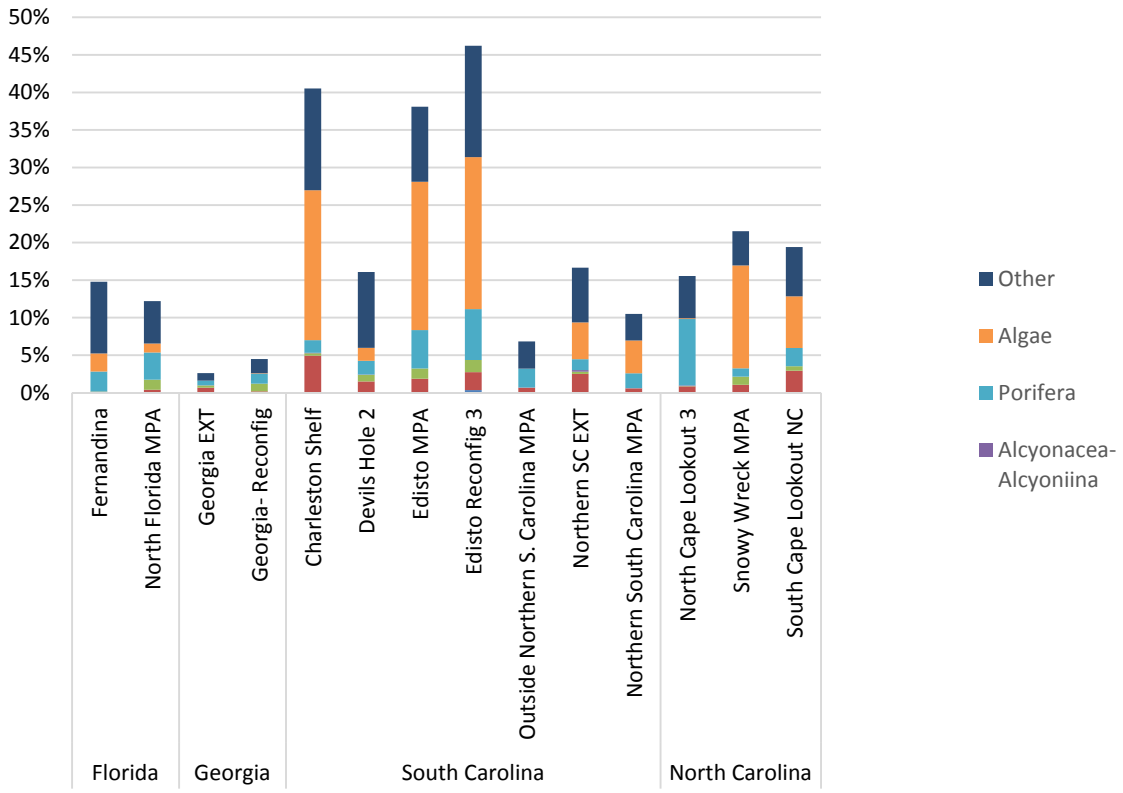


Figure 8. Percent cover of major benthic macrobiota taxa by MPA status and region from the 2014 NOAA Ship *Pisces* cruise.

CPCe Point Count analysis calculated the percent cover of bare substrate type and benthic macrobiota (Table 6, Fig. 7, Appendix 1). The range of biota cover ranged from 2.62% (Georgia EXT) to 46.21% at Edisto Reconfig 3, and averaged 19.2% for all sites. In general, the Georgia sites had the lowest cover of biota and the South Carolina sites the highest. The five MPA sites that were surveyed in 2014 ranged in cover of biota from 10.49% (Northern S. Carolina MPA) to 38.09% at Edisto MPA. The Charleston Deep Reef MPA site (Dives 25, 26) was the recently sunken barges which had no significant macrofauna and were not included in the point count analyses. Overall algae were the dominant cover averaging 7.14% for all sites (Phaeophyta- 3.11%; Rhodophyta- 2.09%; Chlorophyta- 1.4%) with a maximum cover of 20.25% at Edisto Reconfig 3 (Fig. 8). South Carolina sites had the greatest algal cover (10.41%) and Georgia the lowest (0.02%). Porifera averaged 3.29% cover for all sites, and had maximum cover at 8.83% at North Cape Lookout 3. Of the MPA sites, sponges were most dominant at Edisto MPA (5.10%). The mean cover of sponges was greatest at the N. Carolina sites (5.52%) and also lowest at Georgia (0.82%). Off hand, there is little obvious reason for the paucity of biota at the two Georgia sites (Dives 1-4; 3.16% average biota cover) other than they are not MPAs. They had the lowest cover of macrobiota of all sites. However the description of the sites (Appendix 3) does not indicate anything out of the ordinary. The ROV dive tracks overlaid on the multibeam show the dives to be on target, and on good ledge bottom habitat. However both the Georgia EXT and the Georgia Reconfig sites had some of the lowest percent cover of hard bottom (17.94% and 30.07%, respectively) of all the sites. But even though the Georgia Reconfig site had nearly double the amount of hard bottom available for settlement of sessile

biota, both sites had similar paucity of biota. Also confusing is that Northern S. Carolina EXT had the similarly low cover of hard bottom (17.23%) as Georgia Ext, but still had a reasonable amount of biota cover (16.66%). So it remains unexplained, why the paucity of macrobiota at the Georgia sites.

Coral Cover

Based on CPCe Point Count, the percent cover of hard corals ranged from 0 to 0.35% and averaged overall at 0.04% for all sites (Appendix 1, Table 6, Fig. 8). The South Carolina sites had the greatest coral cover (average 0.07%). Of the MPA sites, Edisto MPA had the greatest cover (0.05%). *Oculina varicosa* was the dominant species and was found mostly at Edisto MPA and Edisto Recon 3 (0.04%, respectively). However, deepwater azooxanthellate (white due to low light levels) *Oculina varicosa* colonies (>10 cm) were quite abundant at the North Cape Lookout 3 site (Dives 16, 17) which is a deepwater ledge habitat (110 m). The *Oculina* was common (41 counted) on the rock outcrops and ledges, quite healthy, but a few were standing dead colonies. At another deeper site, North Carolina, Snowy Wreck MPA site (Dive 14), a deep ridge (80-96 m depth) also had large, azooxanthellate (40 cm) *Oculina varicosa* colonies. Unfortunately, none of the points of the Point Count landed on the coral at these sites, so Appendix 1 indicates 0% coral. The deepest recorded depth for *Oculina varicosa* for all sites was 111.5 m.

Octocorals (gorgonians) consisted of at least 11 species and probably more. Many could only be identified to genus or family without a specimen in hand. Percent cover averaged 1.29% for all sites and was greatest at the South Carolina sites (average 1.70%). The Charleston Shelf site had the greatest cover of octocorals (4.88%) followed by 2.93% at South Cape Lookout NC Overall, *Diodogorgia* sp. was the most common species (0.36%), followed by *Ellisella* sp. (0.20%), *Nicella* sp. (0.16%) and *Telesto* (*Carijoa*) sp. (0.15%). Antipatharian black corals were present at most sites, averaging 0.61% overall cover, with a maximum of 1.62% at Edisto Recon 3. The South Carolina sites had the greatest cover (0.67%).

**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 macrobiota densities (Fig. 9). In general, there were 4 main groups. The Georgia Ext site is a clear outlier due to the low percentage of benthic biota as explained above (Fig. 7). North Carolina, North Cape Lookout 3 is also an outlier due to its much greater depth (91-113 m) which had much different fauna compared to the other shelf-edge reef sites that generally averaged 40-80 m depths. The Northern S. Carolina MPA site and adjacent non-MPA site were grouped as they were of similar depth (149-168) and were both iceberg scar habitat; thus the benthic species were similar. The remaining sites clustered together showing little difference between the MPA status (inside vs outside) and region (Florida to North Carolina). These surveys appear to provide good baseline data for the MPA sites which only have been of protected status for less than a decade.

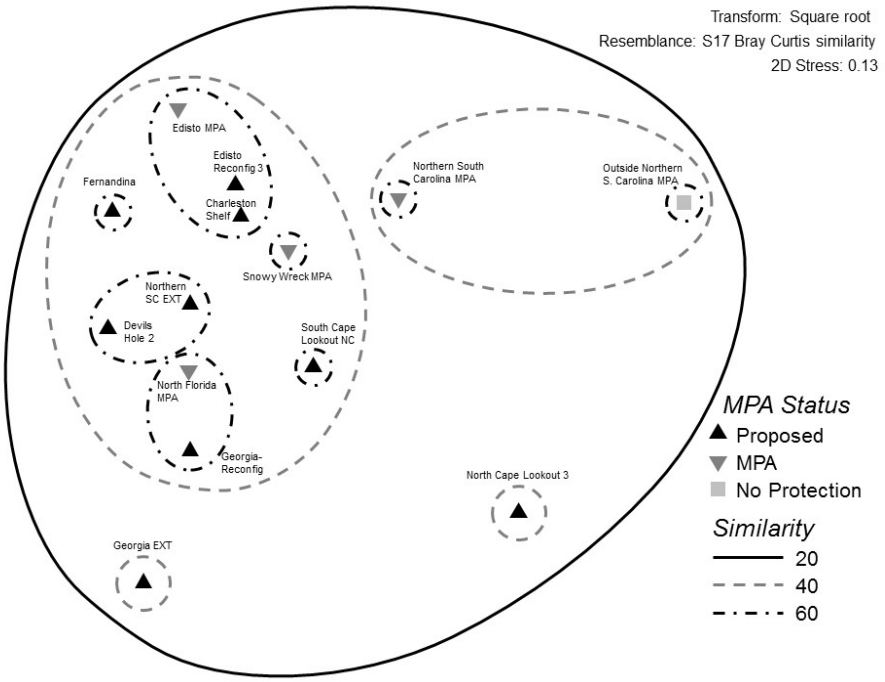


Figure 9. Multi-dimensional scaling (MDS) plot of ROV dives by protection status (i.e., MPA sites, non-MPA sites) based on Bray-Curtis similarity matrix calculated from square-root transformation of benthic macrobiota percent cover for the 2014 NOAA Ship *Pisces* cruise. Assemblage similarity at 20-60% are indicated.

**Analysis of Fish Video Surveys**

Appendix 2 lists all fish species identified from the quantitative video transects at each dive site and their densities (# individual $m^{-3}$). A total of 119 species were observed. Dives 13, 20, 25, and 26 were excluded from all analyses. Dives 13 and 20 were aborted shortly after launch because of a lack of ROV and ship control due to bad weather conditions (i.e., wind and current). Dives 25 and 26 were made on newly sunk barges that now make up the Deep Charleston Artificial MPA. Since they had been sunk only two months prior to diving on them, there were not many fish species present yet. ROV dives will be made in subsequent years on these barges so that a comparison of fish assemblages over time can be made.

Fish assemblages 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 10; PRIMER 6.0). Six statistically different groups resulted from the SIMPROF test ($p<0.05$). Letters in the figure indicate statistically significant groups. Fish assemblages were generally more similar by geographic region than they were by level of protection (inside vs. outside). Fish assemblages were more similar inside and outside North Florida MPA compared to all other sites. The same is true for the Edisto MPA. Fish assemblages outside the Snowy Wreck MPA formed a statistically significant group of their own. Fish assemblages inside the Northern South Carolina MPA and outside the Georgia MPA formed a distinct group as did fish assemblages outside the Northern South Carolina MPA and inside the Snowy Wreck MPA. So, why are the fish assemblages inside and outside both the Northern South Carolina and Snowy

Wreck MPAs significantly different from one another? Why didn't they group together like the North Florida and Edisto MPAs? SIMPER analyses were run to find out what species were responsible for these trends. For the Northern South Carolina MPA, differences were due to higher abundances of sunshinefish (*Chromis insolata*), cubbyu (*Pareques umbrosus*), purple reeffish (*Chromis scotti*), and roughtongue bass (*Pronotogrammus martinicensis*) than outside the MPA. For the Snowy Wreck MPA, differences were due to higher abundances of tomtate (*Haemulon aurolineatum*) and creole-fish *(Paranthias furcifer*) inside the MPA and higher abundances of anthiids outside the MPA. Depth also played a major role in the composition of fish species as all the deep dives conducted both inside and outside the Northern South Carolina MPA formed a statistically significant group and, therefore, had a distinct assemblage of fish compared to the shallower dives.

Densities of fish species in the snapper-grouper complex were compared inside and outside for each of the MPAs (Table 7). No dives were made inside the Georgia MPA, so comparisons could not be made. Average densities of graysby (*Cephalopholis cruentatus*), scamp (*Mycteroperca phenax*), and amberjack (*Seriola* sp.) were higher inside the Snowy Wreck MPA compared to outside. Only blueline tilefish (*Caulolatilus microps*) densities were higher inside the Northern South Carolina MPA. Tomtate (*Haemulon aurolineatum*), white grunt (*Haemulon plumieri*), and porgies (Sparidae) were more abundant inside the Edisto MPA. Tomtate and vermilion snapper (*Rhomboplites aurorubens*) had higher densities inside the North Florida MPA. There were also fish species that had higher average densities outside each of the MPAs. At this point, analyses of this data are in the process of being conducted to determine if these differences are statistically significant. In this report, they are based strictly on raw densities.

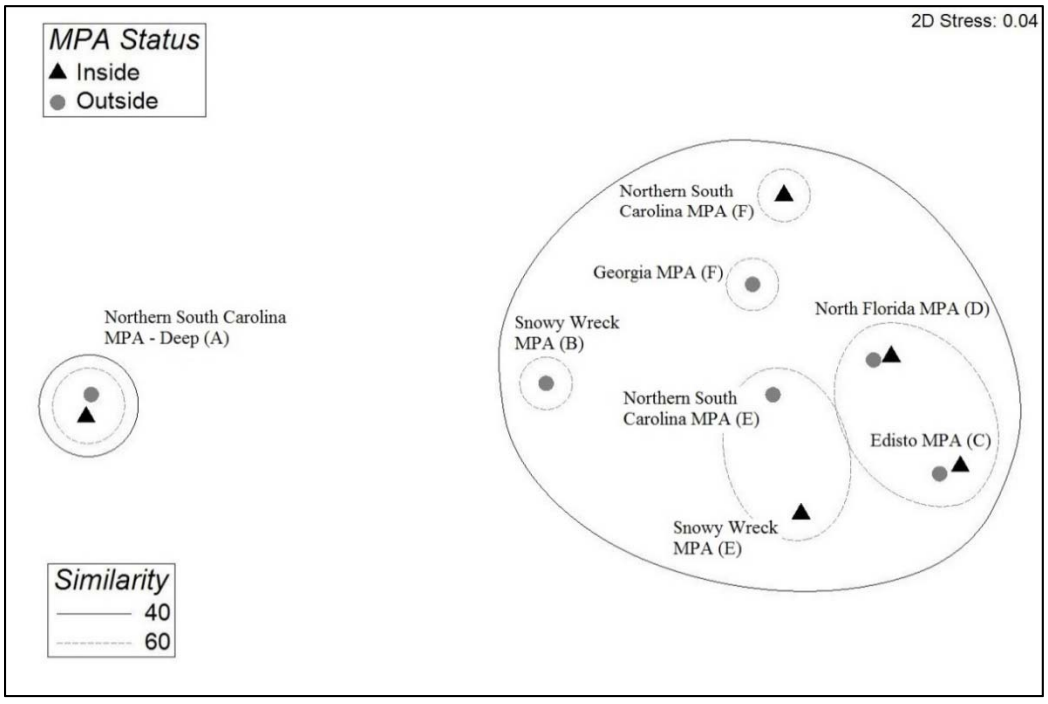


Figure 10. Multi-dimensional scaling (MDS) plot of ROV dive sites within and outside of the protected management areas (MPAs) based on Bray-Curtis similarity matrix calculated using fourth-root transformed data of fish species. Assemblage similarity at 40 and 60% are indicated. Statistically different groups (SIMPROF, $p<0.05$) are indicated by letters.

Table 7. 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, ED= Edisto MPA, GA= Georgia 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 inside and/or outside that MPA and a comparison could not be made.

| Scientific Name | Inside NC | Outside NC | Higher Inside NC | Inside SC | Outside SC | Higher Inside SC | Inside ED | Outside ED | Higher Inside ED | Outside GA | Inside FL | Outside FL | Higher Inside FL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Balistes capriscus* | 2E-04 | | N/A | 1E-04 | | N/A | 0.0004 | 0.0005 | | 0.0007 | 4E-04 | 0.0005 | |
| *Balistes* sp. | | | N/A | | | N/A | 0.0002 | 0.0004 | | | 1E-04 | | N/A |
| *Balistes vetula* | | | N/A | 1E-04 | 0.0001 | | 0.0002 | 0.0005 | | | 1E-04 | 0.0004 | |
| *Calamus* sp. | 7E-04 | | N/A | 7E-04 | 0.0007 | | 0.001 | 0.0021 | | 0.0004 | 1E-04 | 0.0001 | |
| *Caulolatilus microps* | | | N/A | 5E-04 | 0.0003 | X | | | N/A | | | | N/A |
| *Cephalopholis cruentata* | 5E-04 | 0.0002 | X | 1E-04 | 0.0001 | | 0.0009 | 0.0012 | | | 1E-04 | | N/A |
| *Epinephelus adscensionis* | 2E-04 | | N/A | | | N/A | | 0.0006 | N/A | | | | N/A |
| *Epinephelus drummondhayi* | 2E-04 | | N/A | | 0.0003 | N/A | | | N/A | | | | N/A |
| *Epinephelus morio* | 1E-04 | | N/A | | | N/A | | | N/A | | | | N/A |
| *Haemulon aurolineatum* | 0.012 | | N/A | | 0.0097 | N/A | 0.1425 | 0.116 | X | 0.0012 | 0.024 | 0.0184 | X |
| *Haemulon plumieri* | | | N/A | 1E-04 | | N/A | 0.0003 | 0.0001 | X | | | | N/A |
| *Haemulon striatum* | 0.004 | | N/A | | | N/A | 0.0299 | 0.0454 | | | 0.013 | | N/A |
| *Hyporthodus niveatus* | | 0.0002 | N/A | 6E-04 | 0.0013 | | | | N/A | | | | N/A |
| *Lachnolaimus maximus* | 3E-04 | | N/A | 2E-04 | 0.0008 | | 0.0001 | 0.0003 | | 0.0001 | 3E-04 | 0.0006 | |
| *Lutjanus analis* | | | N/A | | | N/A | | | N/A | | 1E-04 | | N/A |
| *Lutjanus buccanella* | 0.002 | | N/A | | | N/A | | | N/A | | | | N/A |
| *Lutjanus campechanus* | | | N/A | | | N/A | | | N/A | 0.0007 | | | N/A |
| *Lutjanus griseus* | | | N/A | | | N/A | 0.0014 | | N/A | | | | N/A |
| *Lutjanus jocu* | | | N/A | | | N/A | 9E-05 | | N/A | | | | N/A |
| *Lutjanus* sp. | | | N/A | | 0.0001 | N/A | 0.0002 | | N/A | | | | N/A |
| *Mycteroperca microlepis* | 5E-04 | | N/A | | 0.0001 | N/A | 0.0001 | 0.0002 | | 0.0004 | | | N/A |
| *Mycteroperca phenax* | 0.001 | 0.0003 | X | 2E-04 | 0.0009 | | 0.0011 | 0.0011 | | 0.0018 | 1E-04 | 0.0003 | |
| *Mycteroperca* sp. | 1E-04 | | N/A | | | N/A | 0.0005 | | N/A | | | | N/A |
| *Pagrus pagrus* | 0.001 | 0.0006 | | 0.001 | 0.0013 | | 0.0015 | 0.0076 | | 0.004 | 3E-04 | 0.0022 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Rhomboplites aurorubens* | 0.003 | | N/A | | | N/A | 0.0301 | 0.0459 | | 0.0019 | 0.024 | 0.0019 | X |
| *Seriola dumerili* | 2E-04 | 0.0001 | X | | 0.0004 | N/A | 0.0003 | 0.0006 | | 0.0015 | | 0.0007 | N/A |
| *Seriola fasciata* | | 0.0001 | N/A | | 0.0063 | N/A | | | N/A | | | | N/A |
| *Seriola rivoliana* | 0.002 | 0.0001 | X | 1E-04 | 0.0006 | | 0.0003 | 0.0008 | | 0.0001 | 1E-04 | 0.0009 | |
| *Seriola* sp. | | 0.0002 | N/A | | 0.0061 | N/A | 0.0001 | 0.0004 | | 0.0014 | 1E-04 | 0.0001 | |
| Serranidae | 1E-04 | | N/A | | | N/A | | | N/A | | | | N/A |
| Sparidae | | | N/A | 1E-04 | 0.0001 | | 0.0007 | 0.001 | X | 0.0009 | | 0.0008 | N/A |

## 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 11. In years past, lionfish densities have been the highest off the two South Carolina MPAs. While the highest densities were observed inside the Edisto MPA this year, variances were also high, so there was no significant difference among MPAs (P=0.72). Densities inside and outside the remaining MPAs were fairly similar with the lowest densities being observed outside the Snowy Wreck MPA and inside the Northern South Carolina MPA. An ANOVA was run to compare lionfish densities inside and outside with all MPAs combined which was also not significant (P=0.25, Fig. 12).

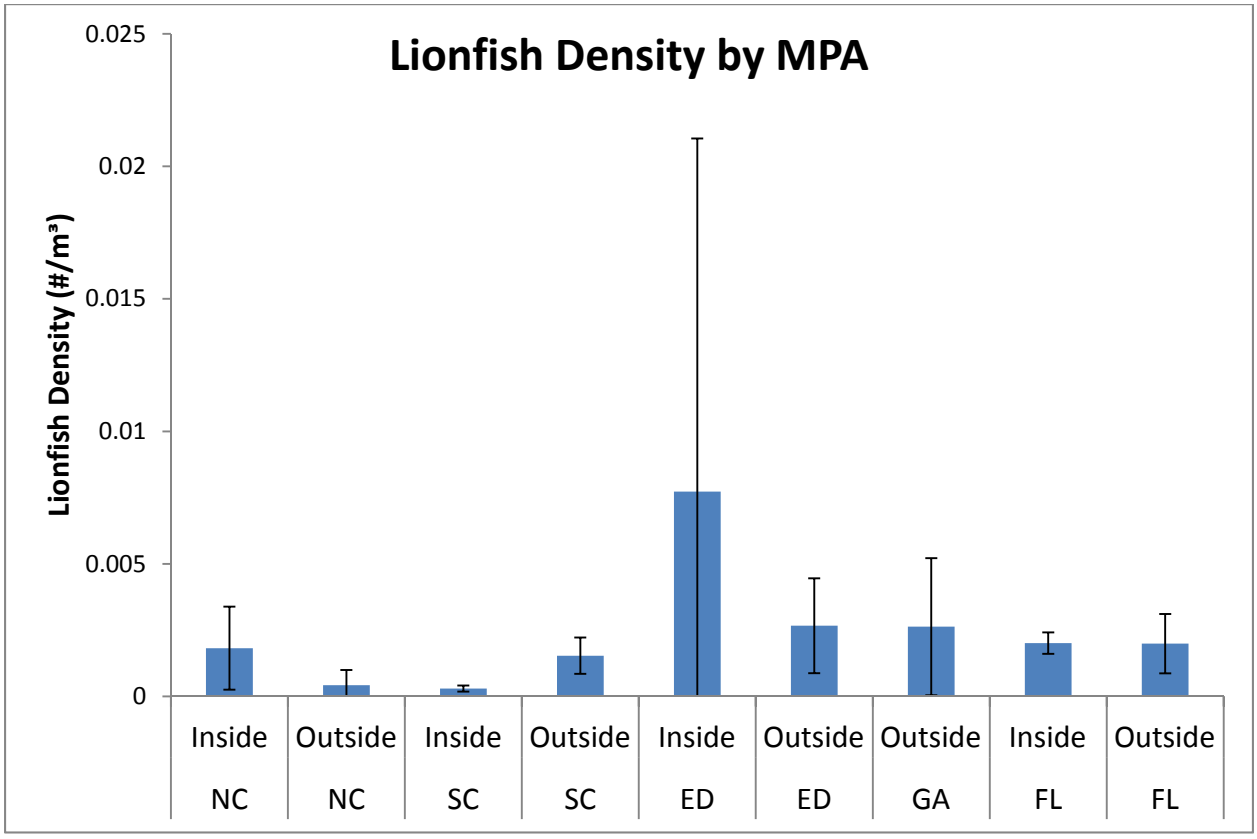

Figure 11. Density of lionfish (# individuals $m^{-3}$) from quantitative ROV video transects during 2014 NOAA Ship *Nancy Foster* cruise at sites inside and outside each shelf-edge MPA. MPA names are abbreviated (NC=North Carolina or Snowy Wreck MPA, SC=Northern South Carolina MPA, ED=Edisto MPA, and FL=North Florida MPA).

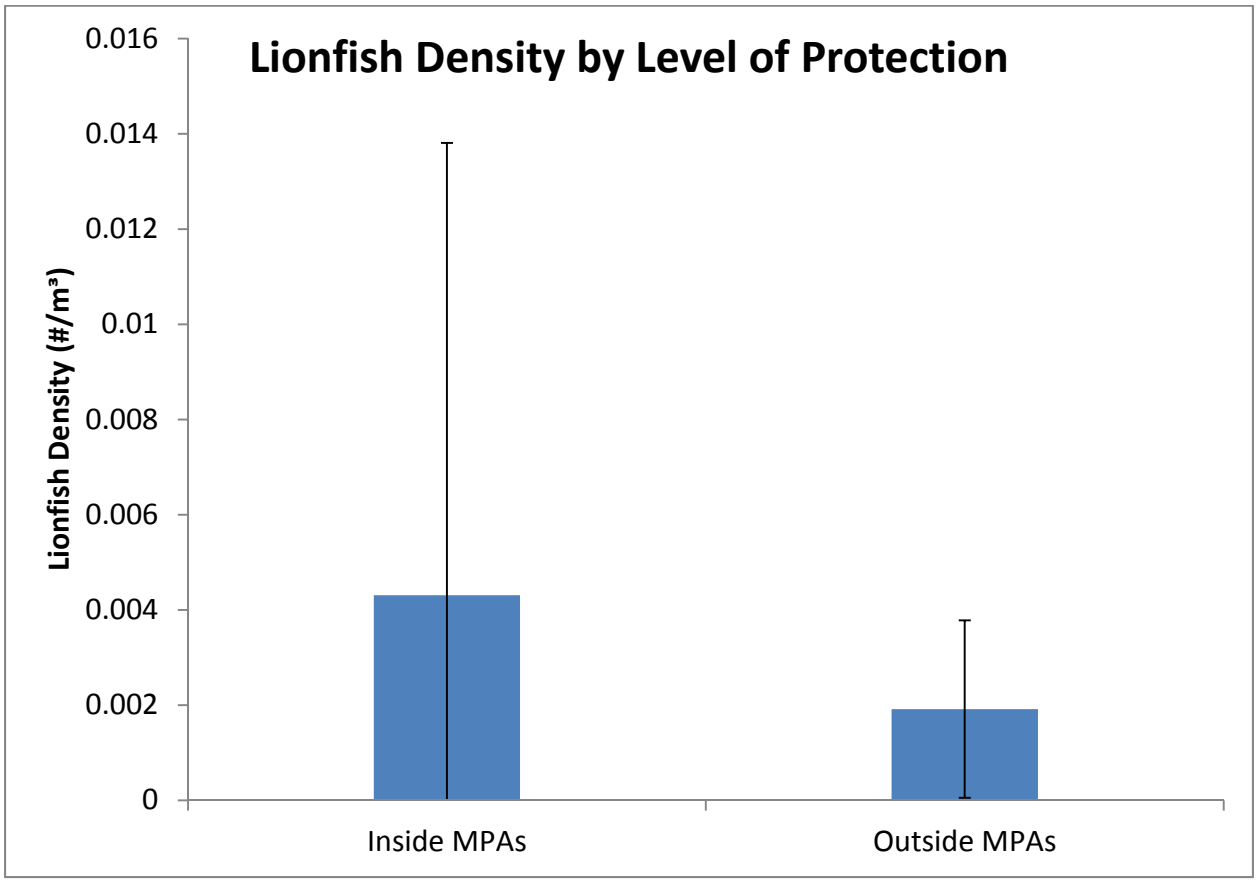


Figure 12. Lionfish densities (# individuals $m^{-3}$) based on quantitative ROV video transects summarized by all dives within and outside of the shelf-edge MPA sites during 2014 NOAA Ship *Nancy Foster* cruise.

## 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 both within and outside the current 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 # ROV 14-01 | ROV 14-02 | ROV 14-03 | ROV 14-04 | ROV 14-05 | ROV 14-06 | ROV 14-07 | ROV 14-08 | ROV 14-09 | ROV 14-10 | ROV 14-11 | ROV 14-12 | ROV 14-14 | ROV 14-15 | ROV 14-16 | ROV 14-17 | ROV 14-18 | ROV 14-19 | ROV 14-21 | ROV 14-22 | ROV 14-23 | ROV 14-24 | ROV 14-27 | ROV 14-28 | ROV 14-29 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Biota | 4.36% | 2.47% | 2.25% | 3.47% | 16.07% | 16.66% | 5.49% | 30.36% | 8.15% | 4.55% | 5.39% | 6.21% | 12.08% | 33.57% | 15.68% | 15.32% | 19.41% | 46.21% | 40.53% | 34.68% | 47.29% | 27.61% | 13.69% | 15.71% | 12.20% | 19.19% |
| Algae | 0.06% | 0.00% | 0.00% | 0.00% | 1.73% | 4.89% | 0.78% | 21.53% | 0.00% | 0.00% | 0.00% | 0.00% | 2.81% | 27.60% | 0.00% | 0.27% | 6.88% | 20.25% | 19.97% | 15.04% | 32.78% | 4.83% | 0.42% | 4.11% | 1.19% | 7.14% |
| Chlorophyta | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% | 0.00% | 0.00% | 0.39% | 0.00% | 0.00% | 0.00% | 0.00% | 0.09% | 0.48% | 0.00% | 0.00% | 0.00% | 0.07% | 0.49% | 0.19% | 0.13% | 0.00% | 0.00% | 0.07% | 0.00% | 0.07% |
| Corallinales/crustose coralline | 0.06% | 0.00% | 0.00% | 0.00% | 0.78% | 2.08% | 0.52% | 0.48% | 0.00% | 0.00% | 0.00% | 0.00% | 1.12% | 1.43% | 0.00% | 0.00% | 4.75% | 4.79% | 4.72% | 2.24% | 3.85% | 2.90% | 0.34% | 0.72% | 0.15% | 1.40% |
| Cyanophyta | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.52% | 0.00% | 6.11% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.84% | 0.00% | 0.27% | 1.42% | 0.32% | 2.88% | 0.12% | 0.72% | 0.06% | 0.00% | 0.14% | 0.25% | 0.47% |
| Phaeophyta | 0.00% | 0.00% | 0.00% | 0.00% | 0.39% | 0.26% | 0.00% | 9.12% | 0.00% | 0.00% | 0.00% | 0.00% | 1.22% | 18.16% | 0.00% | 0.00% | 0.30% | 7.93% | 2.33% | 8.76% | 22.63% | 0.00% | 0.08% | 0.43% | 0.00% | 3.11% |
| Rhodophyta | 0.00% | 0.00% | 0.00% | 0.00% | 0.52% | 2.03% | 0.26% | 5.43% | 0.00% | 0.00% | 0.00% | 0.00% | 0.37% | 6.69% | 0.00% | 0.00% | 0.40% | 7.15% | 9.55% | 3.73% | 5.46% | 1.87% | 0.00% | 2.74% | 0.79% | 2.09% |
| Porifera | 1.33% | 0.21% | 0.79% | 0.98% | 1.82% | 1.46% | 0.70% | 0.48% | 3.00% | 1.65% | 2.95% | 2.85% | 1.59% | 0.48% | 10.09% | 7.15% | 2.43% | 6.76% | 1.68% | 7.21% | 4.06% | 4.50% | 1.51% | 3.67% | 3.62% | 3.29% |
| Agelas sp. | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.10% | 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% | 0.13% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Aiolochroia crassa | 0.00% | 0.00% | 0.20% | 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% | 0.10% | 0.21% | 0.05% | 0.19% | 0.00% | 0.13% | 0.00% | 0.00% | 0.00% | 0.04% |
| Aplysina 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% | 0.06% | 0.04% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Astrophorida | 0.00% | 0.00% | 0.00% | 0.00% | 0.17% | 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% | 0.01% |
| Auletta sp. | 0.00% | 0.00% | 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% | 0.04% | 0.00% | 0.00% | 0.00% | 0.06% | 0.00% | 0.00% | 0.00% | 0.01% |
| Callyspongia vaginalis | 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% | 0.06% | 0.08% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Chondrilla 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% | 0.04% | 0.06% | 0.00% | 0.00% | 0.00% | 0.01% |
| Cinachyra sp./Cinachyrella 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% | 0.04% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.07% | 0.00% | 0.01% |
| Clathria 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% | 0.04% | 0.00% | 0.06% | 0.00% | 0.00% | 0.00% | 0.07% | 0.00% | 0.01% |
| Cliona 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% | 0.06% | 0.00% | 0.00% | 0.00% | 0.00% |
| Corallistidae | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.38% | 0.00% | 0.11% | 0.07% | 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% |
| Demospongiae | 0.38% | 0.21% | 0.20% | 0.43% | 1.17% | 0.94% | 0.17% | 0.29% | 0.48% | 0.50% | 0.80% | 0.58% | 0.28% | 0.12% | 2.12% | 1.96% | 1.62% | 2.25% | 1.19% | 2.42% | 1.40% | 1.80% | 1.01% | 1.01% | 1.34% | 1.10% |
| Demospongiae- MPA03 | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.17% | 0.00% | 0.07% | 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% |
| Demospongiae- ze tan starlet | 0.13% | 0.00% | 0.00% | 0.00% | 0.04% | 0.05% | 0.09% | 0.19% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.12% | 0.00% | 0.00% | 0.00% | 0.56% | 0.05% | 1.12% | 0.08% | 0.13% | 0.00% | 0.43% | 0.40% | 0.15% |
| Dictyoceratida | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.26% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.11% | 0.00% | 0.12% | 0.13% | 0.00% | 0.00% | 0.00% | 0.00% | 0.03% |
| Erylus 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% | 0.08% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Farrea sp. | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.10% | 0.08% | 0.11% | 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% |
| Geodia 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% | 0.18% | 0.00% | 0.06% | 0.04% | 0.84% | 0.00% | 0.07% | 0.00% | 0.05% |
| Hadromerida | 0.00% | 0.00% | 0.13% | 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% | 0.01% |
| Holopsamma 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% | 0.07% | 0.00% | 0.00% |
| Ircinia campana | 0.00% | 0.00% | 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% | 0.06% | 0.76% | 0.00% | 0.00% | 0.65% | 0.00% | 0.07% |
| Ircinia sp. | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% | 0.05% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.05% | 0.00% | 0.00% | 0.25% | 0.05% | 0.19% | 0.21% | 0.06% | 0.08% | 0.07% | 0.10% | 0.06% |
| Ircinia strobilina | 0.00% | 0.00% | 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% | 0.04% | 0.00% | 0.00% | 0.07% | 0.00% | 0.01% |
| Leiodermatium sp. | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 2.05% | 0.91% | 1.93% | 2.12% | 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% | 0.30% |
| Neofibularia 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% | 0.08% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Niphates 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% | 0.04% | 0.05% | 0.06% | 0.00% | 0.06% | 0.00% | 0.00% | 0.00% | 0.01% |
| Poecilosclerida | 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% | 0.04% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Scopalina 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% | 0.06% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Spirastrellidae | 0.82% | 0.00% | 0.26% | 0.54% | 0.22% | 0.10% | 0.09% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 1.31% | 0.24% | 7.92% | 5.20% | 0.71% | 3.03% | 0.27% | 2.73% | 0.72% | 1.29% | 0.42% | 1.15% | 1.79% | 1.31% |
| Spongosorites sp. | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.09% | 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% |
| Xestospongia muta | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% | 0.10% | 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% |
| Xestospongia 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% | 0.21% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Coral | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.10% | 0.05% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.35% | 0.05% | 0.00% | 0.08% | 0.06% | 0.00% | 0.00% | 0.00% | 0.04% |
| Oculina varicosa | 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% | 0.04% | 0.00% | 0.00% | 0.08% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Scleractinia colonial | 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% | 0.06% | 0.00% | 0.00% | 0.00% | 0.00% |
| Scleractinia solitary | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.10% | 0.05% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.32% | 0.05% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.03% |
| Alcyonacea- gorgonian | 0.19% | 0.62% | 0.66% | 0.76% | 1.52% | 2.50% | 0.70% | 0.78% | 0.81% | 0.33% | 0.28% | 0.58% | 1.22% | 0.84% | 1.06% | 0.54% | 2.93% | 2.40% | 4.88% | 1.18% | 1.82% | 2.45% | 0.00% | 0.22% | 0.40% | 1.29% |
| Bebryce sp. | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.09% | 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% |
| Diodogorgia sp. | 0.19% | 0.41% | 0.59% | 0.54% | 0.26% | 0.52% | 0.09% | 0.29% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.05% | 0.07% | 0.10% | 1.34% | 1.25% | 0.50% | 0.51% | 0.58% | 0.00% | 0.14% | 0.15% | 0.36% |
| Ellisella sp. | 0.00% | 0.14% | 0.00% | 0.00% | 0.17% | 0.47% | 0.35% | 0.39% | 0.00% | 0.00% | 0.00% | 0.00% | 0.09% | 0.00% | 0.00% | 0.00% | 0.10% | 0.11% | 1.47% | 0.06% | 0.80% | 0.32% | 0.00% | 0.00% | 0.00% | 0.20% |
| Ellisellidae | 0.00% | 0.00% | 0.07% | 0.00% | 0.09% | 0.05% | 0.09% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.30% | 0.21% | 0.11% | 0.37% | 0.21% | 0.51% | 0.00% | 0.00% | 0.10% | 0.09% |
| Gorgonacea | 0.00% | 0.00% | 0.00% | 0.00% | 0.61% | 1.30% | 0.09% | 0.10% | 0.05% | 0.08% | 0.00% | 0.07% | 0.37% | 0.36% | 0.20% | 0.07% | 0.61% | 0.25% | 0.43% | 0.12% | 0.04% | 0.77% | 0.00% | 0.00% | 0.15% | 0.24% |
| Leptogorgia sp. | 0.00% | 0.00% | 0.00% | 0.22% | 0.17% | 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% | 0.07% | 0.00% | 0.02% |
| Muricea 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% | 0.12% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.06% | 0.08% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Nicella sp. | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.10% | 0.00% | 0.00% | 0.33% | 0.08% | 0.23% | 0.51% | 0.00% | 0.36% | 0.00% | 0.00% | 1.82% | 0.35% | 0.33% | 0.06% | 0.04% | 0.26% | 0.00% | 0.00% | 0.00% | 0.16% |
| Titanideum frauenfeldii | 0.00% | 0.07% | 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% |
| Telesto sp./Carijoa sp. | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.43% | 0.17% | 0.06% | 0.00% | 0.75% | 0.00% | 0.81% | 0.40% | 0.00% | 0.04% | 0.81% | 0.00% | 0.13% | 0.00% | 0.00% | 0.00% | 0.00% | 0.15% |
| Swiftia exserta | 0.00% | 0.00% | 0.00% | 0.00% | 0.22% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.11% | 0.49% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% |
| Alcyonacea- Alcyoniina | 0.00% | 0.07% | 0.00% | 0.00% | 0.04% | 0.21% | 0.09% | 0.00% | 0.00% | 0.08% | 0.11% | 0.00% | 0.00% | 0.00% | 0.05% | 0.13% | 0.00% | 0.00% | 0.05% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% |
| Alcyonacea | 0.00% | 0.07% | 0.00% | 0.00% | 0.00% | 0.10% | 0.09% | 0.00% | 0.00% | 0.08% | 0.11% | 0.00% | 0.00% | 0.00% | 0.05% | 0.00% | 0.00% | 0.00% | 0.05% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.02% |
| Chironephthya caribaea | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% | 0.10% | 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% |
| Anthomastus 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% | 0.13% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Antipatharia | 1.01% | 0.00% | 0.33% | 0.76% | 0.87% | 0.31% | 0.00% | 0.10% | 0.00% | 0.00% | 0.00% | 0.00% | 1.12% | 1.08% | 0.00% | 0.13% | 0.61% | 1.62% | 0.33% | 1.99% | 0.59% | 1.93% | 0.08% | 0.00% | 1.34% | 0.61% |
| Antipatharia | 0.51% | 0.00% | 0.00% | 0.22% | 0.30% | 0.31% | 0.00% | 0.10% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.12% | 0.00% | 0.00% | 0.10% | 0.18% | 0.11% | 1.43% | 0.42% | 0.39% | 0.00% | 0.00% | 0.05% | 0.18% |
| Antipatharia atlantica | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.19% | 0.00% | 0.00% | 0.00% | 0.00% | 0.25% | 0.00% | 0.00% | 0.08% | 0.39% | 0.00% | 0.00% | 0.00% | 0.05% |
| Antipathes sp. A | 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% | 0.04% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Stichopathes lutkeni | 0.51% | 0.00% | 0.33% | 0.54% | 0.52% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.47% | 0.36% | 0.00% | 0.00% | 0.51% | 0.95% | 0.22% | 0.31% | 0.08% | 0.97% | 0.08% | 0.00% | 0.55% | 0.27% |
| Tanacetipathes barbadensis | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.47% | 0.60% | 0.00% | 0.13% | 0.00% | 0.21% | 0.00% | 0.25% | 0.00% | 0.19% | 0.00% | 0.00% | 0.74% | 0.10% |
| Cnidaria non-coral | 0.76% | 1.24% | 0.13% | 0.33% | 2.77% | 1.09% | 0.26% | 0.00% | 0.33% | 0.00% | 0.00% | 0.00% | 4.68% | 2.75% | 0.50% | 0.34% | 5.06% | 11.13% | 3.64% | 7.27% | 2.92% | 1.87% | 5.29% | 5.98% | 4.96% | 2.82% |
| Actiniaria | 0.00% | 0.00% | 0.07% | 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% | 0.05% | 0.01% |
| Corallimorpharia | 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% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.06% | 0.00% | 0.00% | 0.00% | 0.01% |
| Hydroidolina | 0.76% | 0.07% | 0.07% | 0.33% | 2.77% | 1.04% | 0.26% | 0.00% | 0.33% | 0.00% | 0.00% | 0.00% | 4.68% | 2.75% | 0.50% | 0.27% | 5.06% | 11.13% | 3.42% | 7.27% | 2.92% | 1.80% | 5.29% | 5.98% | 4.81% | 2.75% |
| Pennatulacea | 0.00% | 0.14% | 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% |
| Zoanthidae | 0.00% | 0.00% | 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% | 0.22% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.10% | 0.02% |
| Virgularia sp. | 0.00% | 0.21% | 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% |
| Virgularia presbytes | 0.00% | 0.82% | 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% |
| Annelida | 0.00% | 0.00% | 0.00% | 0.00% | 0.17% | 0.00% | 0.00% | 0.19% | 3.43% | 0.66% | 1.65% | 2.19% | 0.00% | 0.00% | 0.30% | 0.00% | 0.00% | 0.11% | 2.01% | 0.00% | 0.00% | 0.32% | 6.30% | 1.37% | 0.00% | 0.73% |
| Annelida | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 1.76% | 0.41% | 0.45% | 0.07% | 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% | 0.13% |
| Filograna sp. | 0.00% | 0.00% | 0.00% | 0.00% | 0.17% | 0.00% | 0.00% | 0.19% | 0.14% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.07% | 2.01% | 0.00% | 0.00% | 0.26% | 6.30% | 1.37% | 0.00% | 0.37% |
| Sabellidae | 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% | 0.20% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Serpulidae | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 1.53% | 0.25% | 1.19% | 2.12% | 0.00% | 0.00% | 0.10% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.22% |
| Spirobranchus gigantea | 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% | 0.04% | 0.00% | 0.00% | 0.00% | 0.06% | 0.00% | 0.00% | 0.00% | 0.01% |
| Mollusca | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.09% | 0.00% | 0.05% | 0.00% | 0.11% | 0.07% | 0.00% | 0.00% | 0.55% | 0.07% | 0.00% | 0.04% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.05% |

| Group/Major/Minor Categories | ROV 14-01 | ROV 14-02 | ROV 14-03 | ROV 14-04 | ROV 14-05 | ROV 14-06 | ROV 14-07 | ROV 14-08 | ROV 14-09 | ROV 14-10 | ROV 14-11 | ROV 14-12 | ROV 14-14 | ROV 14-15 | ROV 14-16 | ROV 14-17 | ROV 14-18 | ROV 14-19 | ROV 14-21 | ROV 14-22 | ROV 14-23 | ROV 14-24 | ROV 14-27 | ROV 14-28 | ROV 14-29 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bivalvia | 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% | 0.55% | 0.07% | 0.00% | 0.04% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.03% |
| Gastropoda | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.09% | 0.00% | 0.05% | 0.00% | 0.00% | 0.07% | 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% |
| Perotrochus amabilis | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.11% | 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% |
| Arthropoda | 0.00% | 0.00% | 0.00% | 0.00% | 0.09% | 0.00% | 0.00% | 0.00% | 0.14% | 0.00% | 0.23% | 0.15% | 0.00% | 0.00% | 0.05% | 0.00% | 0.00% | 0.04% | 0.00% | 0.00% | 0.08% | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% |
| Decapoda | 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% | 0.04% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Majidae | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.05% | 0.00% | 0.11% | 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% |
| Paguridae | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.10% | 0.00% | 0.11% | 0.15% | 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% |
| Panulirus argus | 0.00% | 0.00% | 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% | 0.08% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Scyllaridae | 0.00% | 0.00% | 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% |
| Stenorhynchus seticornis | 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% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Bryozoa | 0.38% | 0.14% | 0.07% | 0.00% | 0.13% | 1.04% | 1.74% | 0.78% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.28% | 0.43% | 0.06% | 0.13% | 0.45% | 0.08% | 0.22% | 0.25% | 0.24% |
| Bryozoa | 0.32% | 0.14% | 0.07% | 0.00% | 0.13% | 0.62% | 1.48% | 0.39% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% | 0.06% | 0.00% | 0.07% | 0.20% | 0.13% |
| Schizoporella sp. | 0.06% | 0.00% | 0.00% | 0.00% | 0.00% | 0.42% | 0.26% | 0.39% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.28% | 0.43% | 0.06% | 0.08% | 0.39% | 0.08% | 0.14% | 0.05% | 0.11% |
| Echinodermata | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.05% | 0.09% | 0.00% | 0.10% | 0.83% | 0.00% | 0.22% | 0.00% | 0.00% | 2.57% | 6.55% | 0.61% | 0.32% | 0.05% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.46% |
| Asteroidea | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.05% | 0.00% | 0.00% | 0.05% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.05% | 0.00% | 0.00% | 0.00% | 0.05% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Centrostephanus longispinus | 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% | 0.15% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Cidaroidea | 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% | 0.15% | 0.13% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Comactinia meridionalis | 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% | 1.41% | 4.18% | 0.51% | 0.28% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.26% |
| Crinoidea | 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% | 0.10% | 1.35% | 0.10% | 0.04% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.06% |
| Davidaster 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% | 0.54% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.02% |
| Gorgonocephalidae | 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% | 0.10% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| 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% | 0.15% | 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% |
| Narcissia trigonaria | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.09% | 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% |
| Ophioderma devaneyi | 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% | 0.61% | 0.34% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.04% |
| Paracolochirus mysticus | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.05% | 0.83% | 0.00% | 0.07% | 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% |
| Chordata | 0.32% | 0.07% | 0.20% | 0.43% | 1.39% | 0.26% | 0.17% | 0.58% | 0.19% | 0.58% | 0.06% | 0.07% | 0.28% | 0.48% | 0.25% | 0.13% | 0.61% | 1.13% | 0.98% | 1.06% | 0.42% | 1.42% | 0.00% | 0.07% | 0.10% | 0.49% |
| Ascidiacea | 0.06% | 0.07% | 0.00% | 0.00% | 1.21% | 0.21% | 0.17% | 0.48% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.10% | 0.77% | 0.65% | 0.31% | 0.00% | 0.77% | 0.00% | 0.00% | 0.10% | 0.24% |
| Didemnidae | 0.00% | 0.00% | 0.07% | 0.22% | 0.17% | 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% | 0.11% | 0.31% | 0.13% | 0.00% | 0.00% | 0.00% | 0.00% | 0.05% |
| Fish | 0.25% | 0.00% | 0.13% | 0.22% | 0.00% | 0.05% | 0.00% | 0.10% | 0.19% | 0.58% | 0.06% | 0.07% | 0.28% | 0.48% | 0.25% | 0.13% | 0.51% | 0.28% | 0.22% | 0.44% | 0.30% | 0.64% | 0.00% | 0.07% | 0.00% | 0.20% |
| Other organism | 0.13% | 0.00% | 0.00% | 0.00% | 5.16% | 3.33% | 0.26% | 5.43% | 0.05% | 0.00% | 0.00% | 0.00% | 0.28% | 0.36% | 0.25% | 0.00% | 0.30% | 1.80% | 6.35% | 0.87% | 4.27% | 9.72% | 0.00% | 0.07% | 0.30% | 1.77% |
| Other organism | 0.13% | 0.00% | 0.00% | 0.00% | 5.16% | 3.33% | 0.26% | 5.43% | 0.05% | 0.00% | 0.00% | 0.00% | 0.28% | 0.36% | 0.25% | 0.00% | 0.30% | 1.80% | 6.35% | 0.87% | 4.27% | 9.72% | 0.00% | 0.07% | 0.30% | 1.77% |
| Natural detritus | 0.19% | 0.14% | 0.07% | 0.22% | 0.39% | 1.51% | 0.61% | 0.39% | 0.00% | 0.41% | 0.00% | 0.07% | 0.09% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.11% | 0.00% | 0.13% | 0.06% | 0.00% | 0.00% | 0.05% | 0.18% |
| Natural detritus | 0.19% | 0.14% | 0.07% | 0.22% | 0.39% | 1.51% | 0.61% | 0.39% | 0.00% | 0.41% | 0.00% | 0.07% | 0.09% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.11% | 0.00% | 0.13% | 0.06% | 0.00% | 0.00% | 0.05% | 0.18% |
| Bare soft bottom substrate | 72.14% | 86.94% | 78.80% | 72.96% | 53.38% | 66.06% | 89.72% | 67.70% | 44.52% | 53.68% | 63.15% | 49.56% | 55.52% | 45.76% | 26.22% | 29.82% | 40.14% | 6.27% | 34.94% | 16.22% | 26.61% | 19.63% | 73.30% | 62.97% | 56.30% | 48.40% |
| Bare hard bottom substrate | 23.37% | 10.58% | 18.96% | 23.56% | 30.55% | 17.28% | 4.79% | 1.94% | 47.33% | 41.77% | 31.46% | 44.15% | 32.40% | 20.67% | 58.09% | 54.79% | 40.44% | 47.52% | 24.53% | 49.10% | 26.10% | 52.77% | 13.01% | 21.33% | 31.50% | 32.40% |
| Bare hard bottom substrate | 23.37% | 10.58% | 18.96% | 23.56% | 30.55% | 17.28% | 4.79% | 1.94% | 47.33% | 41.77% | 31.46% | 44.15% | 32.40% | 20.67% | 58.09% | 54.79% | 40.44% | 47.52% | 24.53% | 49.10% | 26.10% | 52.77% | 13.01% | 21.33% | 31.50% | 32.40% |
| Bare rock- pavement boulder ledge | 22.62% | 9.35% | 18.43% | 23.34% | 27.64% | 10.20% | 2.26% | 1.07% | 47.19% | 41.77% | 31.29% | 44.08% | 30.81% | 19.35% | 54.06% | 50.27% | 37.92% | 45.19% | 21.81% | 46.61% | 23.39% | 50.90% | 7.98% | 18.23% | 25.05% | 29.95% |
| Bare rubble- rock | 0.76% | 1.24% | 0.53% | 0.22% | 2.90% | 7.08% | 2.53% | 0.87% | 0.14% | 0.00% | 0.17% | 0.07% | 1.59% | 1.31% | 4.03% | 4.52% | 2.53% | 2.32% | 2.71% | 2.49% | 2.71% | 1.87% | 5.04% | 3.10% | 6.45% | 2.46% |
| Human debris | 0.13% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.07% | 0.00% | 0.00% | 0.00% | 0.07% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Human debris | 0.13% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.07% | 0.00% | 0.00% | 0.00% | 0.07% | 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% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.07% | 0.00% | 0.00% | 0.00% | 0.07% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Human debris- other | 0.13% | 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% |
| **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%** |

## 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 $m^{-3}$) of each fish species. The estimated field of view width was ~10 m, and most fish were identified within a 5 m distance.

| Scientific_Name | Common Name | 2014-01 | 2014-02 | 2014-03 | 2014-04 | 2014-05 | 2014-06 | 2014-07 | 2014-08 | 2014-09 | 2014-10 | 2014-11 | 2014-12 | 2014-14 | 2014-15 | 2014-16 | 2014-17 | 2014-18 | 2014-19 | 2014-21 | 2014-22 | 2014-23 | 2014-24 | 2014-27 | 2014-28 | 2014-29 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Acanthurus* sp. | doctorfish | | | | | | 0.0001 | | 0.0002 | | | | | 0.0001 | 0.0034 | | | 0.0012 | 0.0011 | 0.0003 | 0.0004 | 0.0007 | | | 0.0019 | 0.0005 |
| *Alerterus* sp. | filefish | | | | | | | | 0.0001 | | | | | | | | | | | | | | | | | |
| *Aluterus monoceros* | unicorn filefish | | | | | | | | | | | | | | | | | | | | | | 0.0001 | | | |
| *Aluterus scriptus* | scrawled filefish | | | | | | | | | | | | | | | | | | 0.0145 | 0.0001 | | | | | | |
| *Anthias nicholsi* | yellowfin bass | | | | | | | | | 0.0050 | 0.0052 | 0.0109 | 0.0007 | | | | | | | | | | | | | |
| Anthiinae | anthiid | | | | | | | | | 0.0119 | 0.0116 | 0.0786 | 0.0083 | 0.0330 | | 0.0871 | 0.0062 | | | | | | | | | |
| *Antigonia capros* | deepbody boarfish | | | | | | | | | 0.0107 | 0.0024 | 0.0200 | 0.0087 | | | | | | | | | | | | | |
| *Apogon affinis* | bigtooth cardinalfish | | | | | | 0.0068 | | | | | | | | | | | | | | | | | | | |
| *Apogon pseudomaculatus* | twospot cardinalfish | | | 0.0001 | 0.0003 | 0.0001 | | 0.0001 | | | | | | | | | | 0.0002 | 0.0006 | | | 0.0001 | | | | 0.0004 |
| *Apogon* sp. | cardinalfish | | | | 0.0004 | | | | | | | | | | | | | | | 0.0001 | 0.0006 | | | | | |
| *Aulostomus maculatus* | trumpetfish | | | | | | | | | | | | | | | | | | 0.0005 | | | 0.0003 | 0.0000 | | | |
| *Balistes capriscus* | grey triggerfish | 0.0008 | 0.0004 | 0.0005 | 0.0011 | | | | 0.0001 | | | | | | 0.0002 | | | | 0.0009 | 0.0003 | 0.0009 | 0.0007 | 0.0003 | 0.0004 | 0.0008 | 0.0004 |
| *Balistes* sp. | triggerfish | | | | | | | | | | | | | | | | | | 0.0005 | 0.0003 | 0.0007 | 0.0002 | 0.0000 | | | 0.0001 |
| *Balistes vetula* | queen triggerfish | | | | | | 0.0001 | | 0.0001 | | | | | | | | | | 0.0013 | 0.0003 | | 0.0002 | | | 0.0004 | 0.0001 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0009 | | | | 0.0026 | 0.0013 | | 0.0003 | | | | | 0.0019 | 0.0069 | | | 0.0007 | 0.0181 | 0.0042 | 0.0168 | 0.0040 | 0.0012 | 0.0003 | 0.0026 | 0.0034 |
| *Bodianus rufus* | spanish hogfish | | | | | | | | | | | | | | | | | | | | | 0.0005 | | | | |
| Bothidae | flounder | | | | | | | | | | | | 0.0000 | | | | | | | | | | | | | |
| *Calamus* sp. | porgy | 0.0005 | | 0.0001 | 0.0005 | 0.0006 | 0.0007 | 0.0003 | 0.0009 | | | | | 0.0003 | 0.0015 | | | | 0.0042 | 0.0011 | 0.0058 | 0.0007 | 0.0004 | 0.0001 | | 0.0001 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0024 | 0.0013 | 0.0016 | 0.0027 | 0.0150 | 0.0042 | 0.0005 | 0.0012 | | | | | 0.0010 | 0.0104 | 0.0001 | 0.0001 | 0.0032 | 0.0210 | 0.0052 | 0.0456 | 0.0086 | 0.0008 | 0.0025 | 0.0049 | 0.0067 |
| Carangidae | jack | | | | | | | | | | | | | 0.0005 | | | | | | | | 0.0001 | | | 0.0050 | |
| *Caranx bartholomaei* | yellow jack | | | | | | | | | | | | | | | | | | 0.0025 | | | | | | | |
| *Caranx lugubris* | black jack | | | | | | | | | | | | | | | | | | | | 0.0005 | | | | | |
| *Caranx* sp. | jack | | | | | | | | | | | | | | | | | | | | 0.0004 | | | | | |
| Carcharhinidae | shark | | | | | | | | | | | | | | | | | | | | | | 0.0000 | | | |
| *Caulolatilus microps* | blueline tilefish | | | | | | | | | 0.0001 | 0.0004 | 0.0017 | 0.0001 | | | | | | | | | | | | | |
| *Centropristis ocyurus* | bank sea bass | | 0.0017 | | | | | | | | | | | | | 0.0001 | 0.0000 | | | | 0.0008 | | | 0.0002 | | 0.0001 |
| *Centropristis* sp. | sea bass | | | | | | | | | | | | | | | | 0.0000 | | | | | | | | | |
| *Centropristis striata* | black sea bass | | 0.0007 | | | | | | 0.0001 | | | | | | | | | | | | | | | | | |
| *Centropyge argi* | cherubfish | | | | | 0.0004 | 0.0010 | | 0.0001 | | | | | | 0.0003 | | | | 0.0003 | 0.0005 | | 0.0033 | 0.0001 | 0.0020 | 0.0004 | |
| *Cephalopholis cruentata* | graysby | | | | | | 0.0001 | | 0.0001 | | | | | 0.0002 | 0.0008 | | | 0.0002 | 0.0017 | 0.0003 | 0.0046 | 0.0008 | 0.0000 | | | 0.0001 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0015 | 0.0003 | 0.0005 | 0.0011 | 0.0009 | 0.0005 | | 0.0003 | | | | | 0.0002 | 0.0007 | | | 0.0007 | 0.0019 | 0.0007 | 0.0007 | 0.0005 | 0.0002 | 0.0004 | 0.0011 | 0.0004 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0033 | 0.0012 | 0.0017 | 0.0018 | 0.0050 | 0.0019 | 0.0014 | 0.0010 | | | | | 0.0024 | 0.0086 | 0.0005 | 0.0001 | 0.0020 | 0.0150 | 0.0079 | 0.0101 | 0.0067 | 0.0009 | 0.0042 | 0.0079 | 0.0057 |
| *Chaetodon* sp. | butterflyfish | | | | | | | | | | | | | | | | | | | | | 0.0007 | | | | 0.0016 |
| Chaetodontidae | butterflyfish | | | | | | | | | | | | | | | | | | 0.0019 | 0.0010 | 0.0007 | 0.0004 | 0.0001 | | | 0.0003 |
| *Chilomycterus* sp. | burrfish | | | | | | | | | | | | | | | | | | | 0.0001 | | | | | | |
| *Chromis cyaneus* | blue chromis | | | | | | | | | | | | | 0.0010 | 0.0039 | | | | 0.0051 | 0.0012 | 0.0025 | | | | | |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0059 | 0.0034 | 0.0020 | 0.0017 | 0.0058 | 0.0042 | 0.0131 | 0.0009 | | | | | 0.0001 | | | | 0.0005 | 0.0050 | 0.0033 | 0.0052 | 0.0028 | 0.0017 | 0.0037 | 0.0084 | 0.0128 |
| *Chromis insolata* | sunshinefish | 0.0006 | | | | 0.0080 | 0.0025 | | 0.0001 | | | | | 0.0001 | 0.0096 | | | 0.0013 | 0.0368 | 0.0049 | 0.0023 | 0.0131 | 0.0113 | 0.0006 | 0.0009 | 0.0011 |
| *Chromis scotti* | purple reeffish | 0.0006 | | | | 0.0021 | 0.0018 | | | | | | | 0.0004 | 0.0027 | | | | 0.0604 | 0.0020 | 0.0096 | 0.0262 | 0.0075 | | 0.0035 | 0.0025 |
| *Chromis* sp. | damselfish | 0.0021 | | | | 0.0031 | 0.0090 | | 0.0003 | | | | | | 0.0033 | | | 0.0050 | 0.0224 | 0.0073 | 0.0016 | 0.0040 | 0.0029 | | 0.0007 | 0.0007 |
| *Clepticus parrai* | creole wrasse | | | | | | | | | | | | | | 0.0051 | | | | | | | 0.0001 | 0.0013 | | | |
| *Dasyatis americana* | southern stingray | | | | | 0.0001 | 0.0001 | | | | | | | | | | | | | | | | | | | |
| *Dasyatis* sp. | stingray | | | | | | | | | | | | | | | | | | | 0.0001 | | | | | | |
| *Decapterus punctatus* | round scad | | 0.0729 | | | | | | | | | | | | | | | | | | | | | | | |
| *Decodon puellaris* | red hogfish | | | | 0.0001 | | 0.0001 | | | 0.0003 | 0.0026 | 0.0017 | 0.0002 | 0.0001 | | 0.0004 | 0.0000 | | | | | | | | | |
| *Diodon holocanthus* | balloonfish | | | | | | | | | | | | | | | | | | | | | | | 0.0006 | | |
| *Diodon hystrix* | porcupinefish | | | | | | | | | | | | | | | | | | | | | 0.0001 | | | | |
| *Diplodus holbrooki* | spottail pinfish | | | | | | | | | | | | | | | | | | 0.0023 | | 0.0019 | | | | | |
| *Epinephelus adscensionis* | rock hind | | | | | | | | | | | | | 0.0001 | 0.0003 | | | | | 0.0006 | | | | | | |
| *Epinephelus drummondhayi* | speckled hind | | | | | 0.0001 | 0.0012 | | | | | | | 0.0002 | | | | | | | | | | | | |
| *Epinephelus morio* | red grouper | | | | | | | | | | | | | | 0.0001 | | | | | | | | | | | |
| *Equetus lanceolatus* | jack-knife fish | | 0.0002 | 0.0001 | | | | | | | | | | 0.0002 | | | 0.0001 | | | | | 0.0001 | 0.0000 | | 0.0003 | |
| *Fistularia petimba* | red cornetfish | | | | | | | | | | | | | | | | | | 0.0003 | | | | | | | |
| *Fistularia* sp. | cornetfish | | | | | | | | | | | | | | | | | | | | 0.0003 | | 0.0001 | | | 0.0001 |
| *Fistularia tabacaria* | bluespotted cornetfish | | | | | | | | | | | | | | | | | | 0.0013 | | 0.0005 | | 0.0002 | | | 0.0001 |
| *Gephyroberyx darwinii* | big roughy | | | | | | | | | 0.0005 | 0.0011 | 0.0015 | 0.0003 | | | | | | | | | | | | | |
| Gobiidae | goby | | | | | | | | | | | | | | | | | | | 0.0017 | | | | | | |
| *Gymnothorax moringa* | spotted moray eel | | | | | | | | 0.0001 | | | | | | | | | | | | | | | | | 0.0007 |
| *Gymnothorax vicinus* | purplemouth moray eel | | | | | | | | | | | | | | | | | | | | | | | 0.0001 | | |
| *Haemulon aurolineatum* | tomtate | | 0.0012 | | | 0.0097 | | | | | | | | 0.0037 | 0.0212 | | | | 0.2320 | 0.0406 | 0.4992 | 0.1992 | 0.0801 | 0.0007 | 0.0332 | 0.0240 |
| *Haemulon plumieri* | white grunt | | | | | | | | 0.0001 | | | | | | | | | | | 0.0001 | 0.0003 | | | | | |
| *Haemulon striatum* | striped grunt | | | | | | | | | | | | | | 0.0035 | | | | 0.0454 | | 0.1502 | 0.0497 | 0.0194 | | | 0.0133 |
| *Halichoeres bivittattus* | greenband wrasse | | | | | | 0.0001 | | | | | | | | | | 0.0000 | 0.0007 | | | | | | | | |
| *Halichoeres garnoti* | yellowhead wrasse | | | | | 0.0001 | | | 0.0002 | | | | | | 0.0045 | | | | 0.0006 | 0.0009 | 0.0007 | 0.0023 | 0.0000 | 0.0013 | 0.0021 | 0.0005 |
| *Halichoeres* sp. | wrasse | 0.0039 | 0.0065 | 0.0033 | 0.0022 | 0.0160 | 0.0143 | 0.0094 | 0.0040 | 0.0002 | | | 0.0001 | 0.0037 | 0.0032 | 0.0078 | 0.0010 | 0.0036 | 0.0090 | 0.0187 | 0.0117 | 0.0048 | 0.0003 | 0.0050 | 0.0084 | 0.0106 |
| *Hemanthias vivanus* | red barbier | | | | | | | | | 0.0009 | 0.0014 | 0.0023 | 0.0015 | | | 0.0060 | 0.0003 | | | | | | | | | |
| *Holacanthus bermudensis* | blue angelfish | 0.0011 | 0.0005 | 0.0008 | 0.0009 | 0.0023 | 0.0007 | 0.0007 | 0.0006 | | | | | 0.0001 | 0.0009 | | | 0.0010 | 0.0100 | 0.0023 | 0.0078 | 0.0031 | 0.0008 | 0.0005 | 0.0019 | 0.0025 |
| *Holacanthus tricolor* | rock beauty | | | | | 0.0001 | 0.0001 | | | | | | | 0.0001 | 0.0023 | | | 0.0008 | 0.0003 | 0.0003 | | 0.0006 | | | | |
| Holocentridae | squirrelfish | 0.0007 | 0.0002 | | | 0.0007 | 0.0008 | | 0.0004 | 0.0001 | | 0.0006 | 0.0001 | 0.0003 | 0.0086 | 0.0001 | 0.0000 | 0.0022 | 0.0029 | 0.0032 | 0.0046 | 0.0045 | 0.0014 | 0.0008 | 0.0024 | 0.0010 |
| *Hyporthodus niveatus* | snowy grouper | | | | | | | | | 0.0013 | 0.0014 | 0.0015 | 0.0003 | | | 0.0002 | | | | | | | | | | |
| *Jeboehklia gladifer* | bladefin bass | | | | | | | | | | | 0.0002 | | | | | | | | | | | | | | |
| *Lachnolaimus maximus* | hogfish | 0.0001 | | | | 0.0004 | 0.0010 | | 0.0002 | | | | | 0.0002 | 0.0003 | | | | 0.0006 | 0.0003 | 0.0003 | | 0.0000 | | 0.0006 | 0.0003 |
| *Lactophrys polygonia* | honeycomb cowfish | | | | | | | | | | | | | | | | | | | | 0.0004 | | | | | |
| *Lactophrys quadricornis* | scrawled cowfish | | | | | | | | 0.0001 | | | | | | | | | | 0.0003 | | | | | | | 0.0001 |
| *Lactophrys* sp. | cowfish | 0.0003 | | | | | | | 0.0001 | | | | | | | | | | 0.0006 | 0.0003 | 0.0007 | 0.0003 | | 0.0001 | | 0.0002 |
| *Laemonema* sp. | mora cod | | | | | | | | | 0.0003 | 0.0004 | 0.0005 | 0.0001 | | | | | | | | | | | | | |
| *Liopropoma eukrines* | wrasse bass | 0.0003 | 0.0010 | 0.0001 | 0.0001 | 0.0008 | 0.0005 | 0.0001 | 0.0002 | | | | | 0.0002 | | 0.0012 | 0.0001 | | 0.0004 | 0.0003 | 0.0015 | 0.0003 | | | 0.0008 | 0.0003 |
| *Lutjanus analis* | mutton snapper | | | | | | | | | | | | | | | | | | | | | | | | | 0.0001 |
| *Lutjanus buccanella* | blackfin snapper | | | | | | | | | | | | | | 0.0021 | | | | | | | | | | | |
| *Lutjanus campechanus* | red snapper | | | 0.0007 | | | | | | | | | | | | | | | | | | | | | | |
| *Lutjanus griseus* | grey snapper | | | | | | | | | | | | | | | | | | | | 0.0003 | 0.0114 | 0.0000 | | | |

| Scientific_Name | Common Name | 2014-01 | 2014-02 | 2014-03 | 2014-04 | 2014-05 | 2014-06 | 2014-07 | 2014-08 | 2014-09 | 2014-10 | 2014-11 | 2014-12 | 2014-14 | 2014-15 | 2014-16 | 2014-17 | 2014-18 | 2014-19 | 2014-21 | 2014-22 | 2014-23 | 2014-24 | 2014-27 | 2014-28 | 2014-29 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Lutjanus jocu* | dog snapper | | | | | | | | | | | | | | | | | | | | | | 0.0000 | | | |
| *Lutjanus* sp. | snapper | | | | | | 0.0001 | | | | | | | | | | | | | | 0.0005 | 0.0003 | 0.0000 | | | |
| *Macrorhamphosus scolopax* | longspine snipefish | | | | | | | | | | 0.0003 | 0.0003 | 0.0004 | | | | | | | | | | | | | |
| *Malacanthus plumieri* | sand tilefish | | | | | | | | | | | | | | | | | 0.0004 | | 0.0001 | | | | | 0.0003 | |
| *Monacanthus hispidus* | planehead filefish | | | | | | | | | | | | | | | | | | 0.0006 | 0.0001 | 0.0005 | | 0.0000 | | | |
| *Monacanthus* sp. | filefish | | | | | | | | | | | | | | | | | | 0.0003 | | | | | | | |
| *Mulloidichthys martinicus* | yellow goatfish | | | | | | | | | | | | | | | | | | | | 0.0042 | 0.0013 | | | | |
| *Muraena retifera* | reticulate moray eel | | 0.0002 | 0.0001 | 0.0001 | | 0.0001 | | | 0.0001 | | 0.0002 | | 0.0001 | | | | | | | | | | | | 0.0001 |
| Muraenidae | moray eel | 0.0003 | 0.0005 | 0.0002 | 0.0002 | 0.0001 | | | | | | 0.0002 | | | | | | 0.0002 | 0.0003 | | 0.0004 | | | | | 0.0002 |
| *Mycteroperca microlepis* | gag grouper | | 0.0010 | 0.0003 | 0.0001 | | 0.0001 | | | | | | | | 0.0005 | | | | 0.0003 | 0.0002 | 0.0008 | 0.0001 | 0.0000 | | | |
| *Mycteroperca phenax* | scamp | 0.0009 | 0.0023 | 0.0025 | 0.0007 | 0.0014 | 0.0004 | 0.0003 | 0.0001 | | | | | 0.0005 | 0.0029 | 0.0007 | 0.0001 | | 0.0021 | 0.0004 | 0.0028 | 0.0017 | 0.0007 | 0.0001 | 0.0019 | 0.0001 |
| *Mycteroperca* sp. | grouper | | | | | | | | | | | | | | 0.0001 | | | | | | 0.0005 | | | | | |
| *Myrichthys acuminatus* | sharptail eel | 0.0003 | | | | | | | | | | | | | | | | | | | | | | | | |
| *Myripristis jacobus* | blackbar soldierfish | | | | | | | | | | | | | | 0.0005 | | | | 0.0008 | | 0.0076 | 0.0001 | | 0.0001 | 0.0021 | 0.0009 |
| *Opsanus* sp. | toadfish | | | | | | | | | | | | | | | | | | | | 0.0004 | | | 0.0001 | | |
| *Ostichthys trachypoma* | bigeye soldierfish | | | | | | | | | | 0.0002 | 0.0003 | 0.0001 | | | | | | | | | | | | | |
| *Pagrus pagrus* | red porgy | 0.0022 | 0.0054 | 0.0042 | 0.0049 | 0.0016 | | 0.0010 | 0.0013 | 0.0012 | 0.0012 | 0.0027 | 0.0007 | 0.0010 | | 0.0014 | 0.0000 | | 0.0120 | 0.0012 | 0.0052 | 0.0004 | 0.0014 | 0.0028 | 0.0016 | 0.0003 |
| *Paranthias furcifer* | creole-fish | | | | | 0.0001 | 0.0006 | | | | | | | 0.0005 | 0.0243 | | | 0.0002 | 0.0013 | 0.0024 | | 0.0032 | 0.0004 | | 0.0019 | |
| *Pareques iwamotoi* | blackbar drum | 0.0146 | 0.0047 | | 0.0001 | | | | | 0.0003 | 0.0006 | 0.0010 | 0.0004 | | | 0.0067 | 0.0005 | | | | | | | | | |
| *Pareques* sp. | drum | | | | | | | | | | | | | | | | 0.0006 | | | | | | | | | |
| *Pareques umbrosus* | cubbyu | 0.0168 | 0.0003 | 0.0024 | 0.0115 | 0.0024 | 0.0016 | | | | | | | 0.0029 | 0.0106 | 0.0011 | 0.0001 | | 0.0028 | 0.0129 | 0.0047 | 0.0010 | 0.0004 | | 0.0019 | 0.0005 |
| *Plectranthias garrupellus* | apricot bass | | | | | | | | | 0.0002 | 0.0005 | 0.0010 | 0.0002 | | | 0.0009 | 0.0000 | | | | | | | | | |
| *Plectrypops retrospinis* | cardinal soldierfish | | | | | | | | | | | | | 0.0002 | | 0.0008 | 0.0001 | | | 0.0001 | | | | | | |
| *Pomacanthus arcuatus* | grey angelfish | | | | | | | | | | | | | | | | | | 0.0003 | | 0.0003 | | | | | |
| *Pomacanthus paru* | french angelfish | | | | | | | | | | | | | | | | | 0.0005 | | 0.0001 | | | | | | 0.0002 |
| *Pomacanthus* sp. | angelfish | | | | | | 0.0001 | | | | | | | | | | | | | 0.0001 | | | | | | |
| Priacanthidae | bigeye | | | | | | | | | | | | | | | | | | | | | | | | | 0.0001 |
| *Priacanthus arenatus* | bigeye | 0.0003 | | | 0.0001 | | | 0.0003 | | | | | 0.0000 | 0.0010 | 0.0133 | | | 0.0002 | 0.0003 | | | 0.0003 | | 0.0006 | 0.0007 | 0.0003 |
| *Pristigenys alta* | short bigeye | 0.0010 | 0.0051 | 0.0024 | 0.0011 | 0.0020 | 0.0005 | 0.0042 | | | 0.0003 | 0.0002 | 0.0000 | 0.0004 | | 0.0011 | 0.0000 | 0.0025 | 0.0010 | 0.0005 | 0.0083 | 0.0003 | 0.0001 | 0.0005 | 0.0008 | 0.0003 |
| *Prognathodes aculeatus* | longsnout butterflyfish | 0.0003 | | | | | | | | | | | | | 0.0001 | | | | 0.0003 | 0.0001 | 0.0008 | 0.0009 | 0.0000 | | | |
| *Prognathodes aya* | bank butterflyfish | 0.0011 | 0.0014 | 0.0017 | 0.0015 | 0.0033 | 0.0011 | 0.0005 | 0.0002 | | 0.0003 | | 0.0001 | 0.0004 | | 0.0025 | 0.0004 | | 0.0017 | 0.0020 | 0.0007 | 0.0002 | 0.0002 | | | 0.0005 |
| *Prognathodes guyanensis* | french butterflyfish | | | | | | | | | | | | 0.0001 | 0.0001 | | | | | | | | | | | | |
| *Pronotogrammus martinicensis* | roughtongue bass | | | | | 0.0007 | 0.0035 | | | 0.0004 | | 0.0002 | 0.0002 | 0.0374 | | 0.0337 | 0.0046 | | | | | | | | | |
| *Pseudupeneus maculatus* | spotted goatfish | | | | | | | | | | | | | | 0.0023 | | | | 0.0045 | 0.0001 | 0.0031 | 0.0013 | 0.0003 | | 0.0003 | 0.0003 |
| *Pterois volitans* | lionfish | 0.0023 | 0.0045 | 0.0020 | 0.0003 | 0.0017 | 0.0013 | 0.0002 | 0.0003 | | | | | 0.0012 | 0.0033 | 0.0003 | 0.0001 | 0.0010 | 0.0042 | 0.0009 | 0.0330 | 0.0027 | 0.0006 | 0.0018 | 0.0018 | 0.0020 |
| *Rachycentron canadum* | cobia | | | | | | | | | | | | | | | | | | | 0.0005 | | 0.0001 | | | | |
| *Rhomboplites aurorubens* | vermilion snapper | | 0.0002 | 0.0003 | 0.0049 | | | | | | | | | 0.0029 | | | | | 0.0459 | | 0.2280 | 0.0074 | 0.0109 | | 0.0019 | 0.0238 |
| *Rypticus maculatus* | whitespotted soapfish | | 0.0005 | 0.0001 | | | | | | | | | | | | | | | | | 0.0008 | | | | | |
| *Rypticus saponaceus* | greater soapfish | | | | | | | | | | | | | 0.0005 | 0.0013 | | | | | | | | | | | |
| *Rypticus* sp. | soapfish | | | | 0.0001 | | | | | | | | | | | | | | | | 0.0003 | | | | | 0.0001 |
| *Scorpaena plumieri* | spotted scorpionfish | | | | | | | | | | | | | | | | | | | | 0.0003 | | | | | |
| *Scorpaena* sp. | scorpionfish | | | | | | | | | | | | | | | | | | | | 0.0004 | | | | | |
| Scorpaenidae | scorpionfish | 0.0001 | | 0.0001 | | | | | | 0.0003 | 0.0019 | 0.0018 | 0.0002 | | 0.0002 | 0.0034 | 0.0001 | | 0.0003 | | 0.0020 | | | 0.0002 | | |
| *Seriola dumerili* | greater amberjack | 0.0025 | 0.0002 | | | | 0.0004 | | | | | | | 0.0002 | 0.0003 | | 0.0001 | | 0.0005 | 0.0006 | 0.0003 | 0.0008 | 0.0000 | 0.0006 | 0.0012 | |
| *Seriola fasciata* | lesser amberjack | | | | | | 0.0063 | | | | | | | | | 0.0001 | | | | | | | | | | |
| *Seriola rivoliana* | almaco jack | 0.0001 | | | | 0.0004 | 0.0008 | 0.0001 | 0.0001 | 0.0001 | | | | 0.0016 | 0.0029 | 0.0002 | 0.0001 | | 0.0011 | 0.0007 | 0.0003 | | | | 0.0009 | 0.0001 |
| *Seriola* sp. | amberjack | 0.0008 | 0.0019 | 0.0007 | 0.0025 | 0.0005 | 0.0010 | | | 0.0106 | 0.0003 | | | | | | 0.0001 | 0.0003 | 0.0004 | 0.0004 | 0.0003 | 0.0002 | 0.0001 | 0.0001 | | 0.0001 |
| Serranidae | sea bass | | | | | | | | | | | | | | 0.0001 | | | | | | | | | | | |
| *Serranus annularis* | orangeback bass | 0.0006 | 0.0021 | | 0.0001 | 0.0024 | 0.0004 | | 0.0001 | | | | | 0.0002 | 0.0001 | | | | 0.0004 | 0.0005 | 0.0005 | 0.0004 | | 0.0010 | 0.0003 | 0.0010 |
| *Serranus baldwini* | lantern bass | | | | | | | | | | | | | | | | | | | | | 0.0005 | | 0.0001 | 0.0012 | 0.0007 |
| *Serranus chionaraia* | snow bass | | | | | 0.0003 | | | | | | | | 0.0001 | | | | | | | | | | | | |
| *Serranus notospilus* | saddle bass | 0.0001 | 0.0010 | 0.0004 | 0.0003 | | | | | | | 0.0002 | 0.0000 | | | | 0.0000 | | | | | | | | | |
| *Serranus phoebe* | tattler | 0.0027 | 0.0010 | 0.0019 | 0.0010 | 0.0042 | 0.0033 | 0.0083 | 0.0005 | | | | | 0.0004 | | 0.0005 | 0.0000 | 0.0011 | 0.0013 | 0.0017 | 0.0013 | 0.0006 | 0.0002 | 0.0023 | 0.0024 | 0.0024 |
| *Serranus* sp. | sea bass | | | | | 0.0004 | | | | | | | | | | | | | 0.0003 | | | | | 0.0006 | 0.0006 | |
| *Serranus tigrinus* | harlequin bass | | | | | | | | | | | | | | | | | | 0.0003 | | | | | | | |
| Sparidae | porgy | | | | 0.0009 | 0.0001 | | | 0.0001 | | | | | | | | | | 0.0010 | | 0.0008 | 0.0003 | | 0.0020 | 0.0005 | |
| *Sparisoma atomarium* | greenblotch parrotfish | | | | | 0.0001 | | | 0.0001 | | | | | | 0.0003 | | | | 0.0017 | 0.0005 | | 0.0007 | 0.0001 | | | |
| *Sparisoma* sp. | parrotfish | | | | | | | | | | | | | | | | | | | | | 0.0011 | | | 0.0006 | 0.0001 |
| *Sphoeroides spengleri* | bandtail puffer | 0.0005 | 0.0005 | 0.0006 | 0.0006 | 0.0003 | 0.0005 | | | | | | | | | | | | 0.0005 | | 0.0010 | | 0.0000 | | | |
| *Sphyraena barracuda* | barracuda | | | | | | | | | | | | | | | | | | | 0.0007 | 0.0004 | 0.0011 | | | | |
| *Stegastes partitus* | bicolor damselfish | 0.0001 | | | | 0.0001 | | 0.0002 | | | | | | | 0.0005 | | | | 0.0011 | 0.0003 | 0.0003 | 0.0015 | | 0.0007 | 0.0003 | 0.0001 |
| *Synagrops* sp. | synagrops sea bass | | | | | | | | | 0.0003 | | | | | | | | | | | | | | | | |
| *Syngnathus* sp. | pipefish | | | | | | | | | | | | | | | | | | | | | 0.0003 | | | | |
| *Synodus intermedius* | sand diver | | | 0.0001 | | | 0.0001 | | | | | | | | | | | | | | | 0.0001 | | | | |
| *Synodus* sp. | lizardfish | 0.0003 | | | | | | | | | | | | | | | | | | | | | | | | |
| Tetraodontidae | puffer | 0.0001 | | | | | | | | | | | | | | | | | 0.0006 | | | | | | | |
| *Thalassoma bifasciatum* | bluehead wrasse | | | | | | | | | | | | | | | | | | | | 0.0003 | | | | | |
| *Urophycis* sp. | hake | 0.0004 | | | 0.0001 | | | | | | | | | | | | | | | | | | | | | |
| *Xanthichthys ringens* | sargassum triggerfish | | | | | 0.0004 | | | | | | | | | | | | | | | | | | | | |

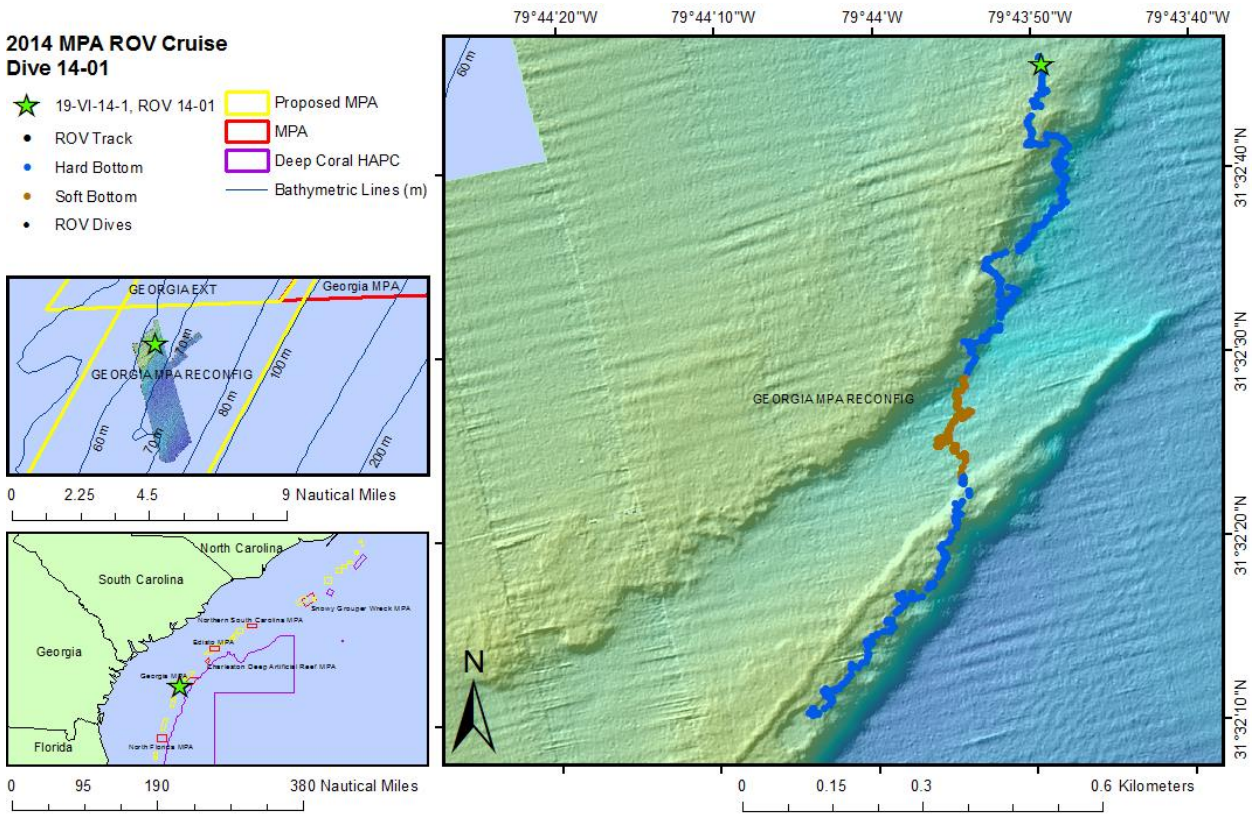
## APPENDIX 3

## 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 $m^{-3}$ for each species).

**Dive Site:** ROV 14-01; Georgia, Inside Proposed Georgia MPA Reconfig, 65 m SW/NE Ridge, UNCW Dive 51

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

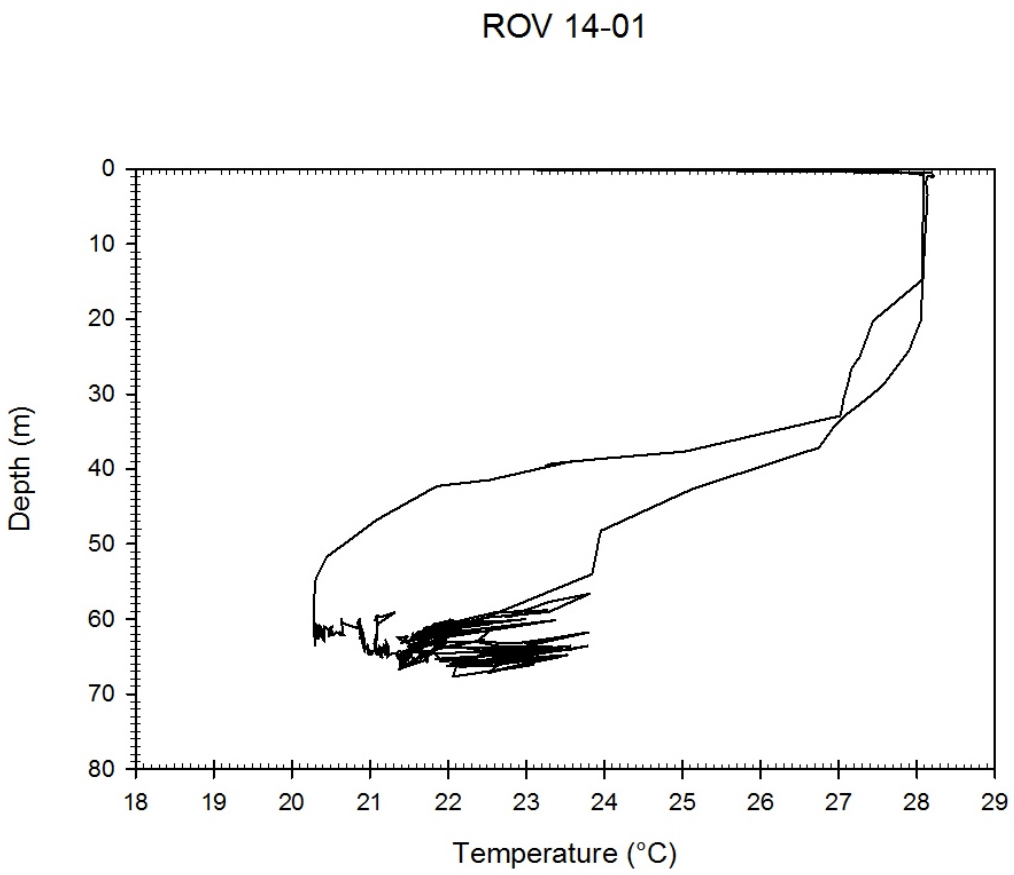
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | NancyFoster_10_15_Georgia East_bag.bag |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/19/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 137 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-01; Georgia, Inside Proposed Georgia MPA Reconfig, 65 m SW/NE Ridge, UNCW Dive 51

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -58 | **Total Transect Length (km):** | 1.17 |
| **Maximum Bottom Depth (m):** | -74 | **Surface Current (kn):** | 0.25 |
| **On Bottom (Time- EDT):** | 8:18 | **On Bottom (Lat/Long):** | 31.55°N; -79.73°W |
| **Off Bottom (Time- EDT):** | 10:22 | **Off Bottom (Lat/Long):** | 31.54°N; -79.73°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-01; Georgia, Inside Proposed Georgia MPA Reconfig, 65 m SW/NE Ridge, UNCW Dive 51

**Dive Imagery:**

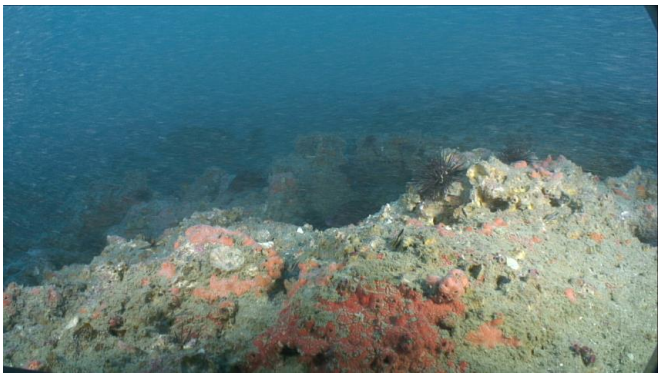


**Figure 1:** -61.9 m
Rocky hard bottom habitat with encrusting sponges

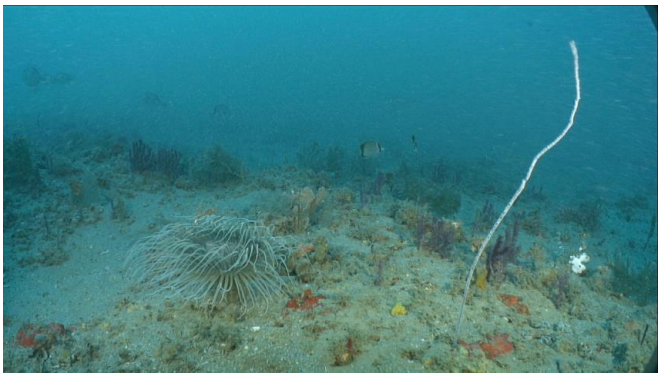


**Figure 2:** -61.9 m
*Cerianthid* and *Stichopathes* on hard bottom.

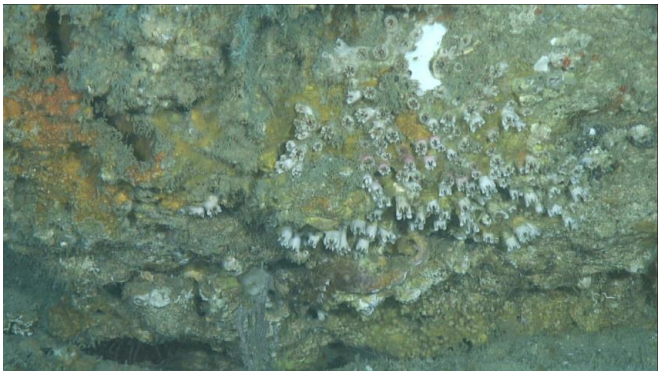


**Figure 3:** -64.8 m
Solitary cup corals on rock outcrops

**Figure 4:** -64.2 m
Eel surrounded by hydroid encrusted rocks

**Dive Site:** ROV 14-01; Georgia, Inside Proposed Georgia MPA Reconfig, 65 m SW/NE Ridge, UNCW Dive 51

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-01, UNCW Mohawk ROV Dive 51; Site #- 19-VI-14-1. Target Site - Georgia, Inside Proposed Georgia MPA Reconfig, 65 m SW/NE Ridge. Ground-truth multibeam sonar of site (NancyFoster_10_15 _GeorgiaEast_bag.bag - 2010 Nancy Foster data). Conduct video/photo transect NE to SW, along 65 m 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 1-2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Surface current approx. 2 kn, bottom current ~0-1 kn.

Site Description/Habitat/Biota:
Traveled across a double SW to NE oriented ridge. The northern ridge was rocky outcrops with low relief; tapering off into soft bottom towards the SE. The second southeastern ridge was larger rock boulders with higher rugosity and an large increase in benthic species including large patches of *Muricea* gorgonacea in parts. The second ridge also tapers off on both sides into rubble and then 100 % sediment.

**Dive Site:** ROV 14-01; Georgia, Inside Proposed Georgia MPA Reconfig, 65 m SW/NE Ridge, UNCW Dive 51

**CPCe Percent Cover Analysis:**

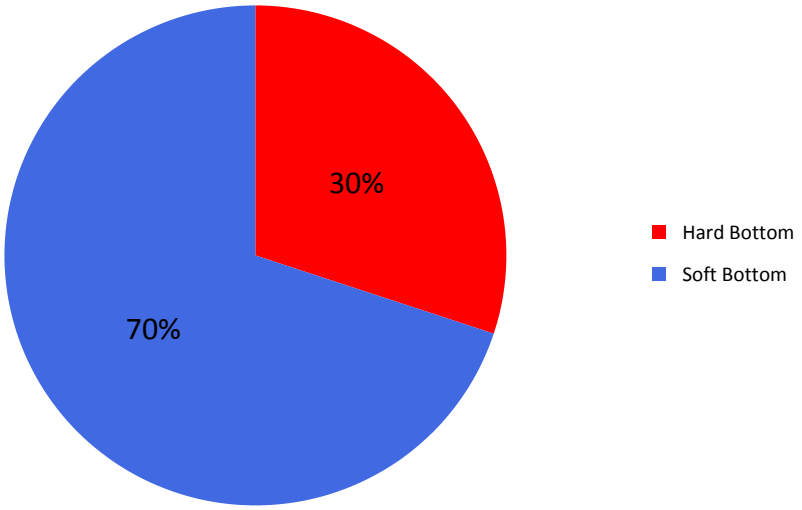
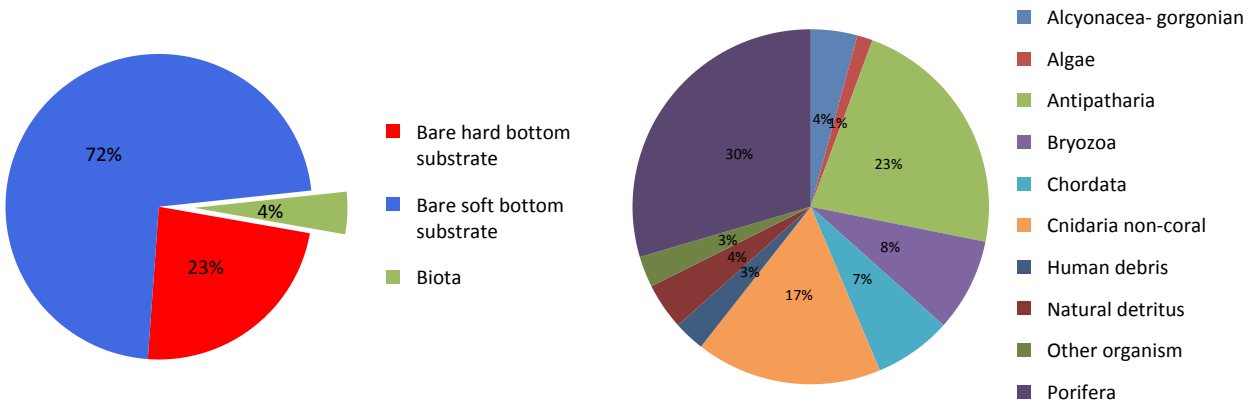



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-01. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-01.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-01; Georgia, Inside Proposed Georgia MPA Reconfig, 65 m SW/NE Ridge, UNCW Dive 51

**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 14-01.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 69 | 4.36% |
| Algae | 1 | 0.06% |
| Corallinales/crustose coralline | 1 | 0.06% |
| Porifera | 21 | 1.33% |
| Demospongiae | 6 | 0.38% |
| Demospongiae- ze tan starlet | 2 | 0.13% |
| Spirastrellidae | 13 | 0.82% |
| Alcyonacea- gorgonian | 3 | 0.19% |
| Diodogorgia sp. | 3 | 0.19% |
| Antipatharia | 16 | 1.01% |
| Antipatharia | 8 | 0.51% |
| Stichopathes lutkeni | 8 | 0.51% |
| Cnidaria non-coral | 12 | 0.76% |
| Hydroidolina | 12 | 0.76% |
| Bryozoa | 6 | 0.38% |
| Bryozoa | 5 | 0.32% |
| Schizoporella sp. | 1 | 0.06% |
| Chordata | 5 | 0.32% |
| Ascidiacea | 1 | 0.06% |
| Fish | 4 | 0.25% |
| Other organism | 2 | 0.13% |
| Natural detritus | 3 | 0.19% |
| Human debris | 2 | 0.13% |
| Human debris | 2 | 0.13% |
| Human debris- other | 2 | 0.13% |
| Bare soft bottom substrate | 1142 | 72.14% |
| Bare hard bottom substrate | 370 | 23.37% |
| Bare hard bottom substrate | 370 | 23.37% |
| Bare rock- pavement boulder ledge | 358 | 22.62% |
| Bare rubble- rock | 12 | 0.76% |
| **Grand Total** | **1583** | **100.00%** |

**Dive Site:** ROV 14-01; Georgia, Inside Proposed Georgia MPA Reconfig, 65 m SW/NE Ridge, UNCW Dive 51

**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-01.

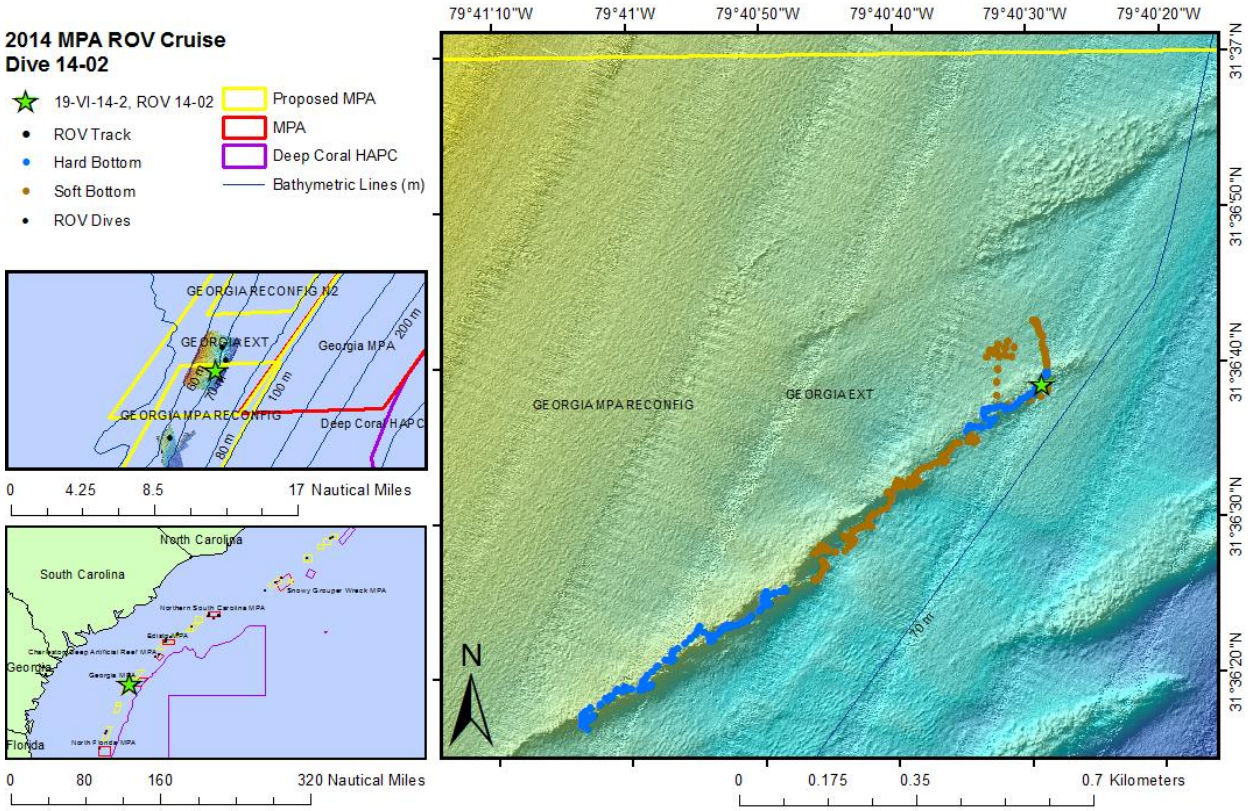
| Scientific Name | Common Name | Density |
|---|---|---|
| *Balistes capriscus* | grey triggerfish | 0.0008 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0009 |
| *Calamus* sp. | porgy | 0.0005 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0024 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0015 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0033 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0059 |
| *Chromis insolata* | sunshinefish | 0.0006 |
| *Chromis scotti* | purple reeffish | 0.0006 |
| *Chromis* sp. | damselfish | 0.0021 |
| *Halichoeres* sp. | wrasse | 0.0039 |
| *Holacanthus bermudensis* | blue angelfish | 0.0011 |
| Holocentridae | squirrelfish | 0.0007 |
| *Lachnolaimus maximus* | hogfish | 0.0001 |
| *Lactophrys* sp. | cowfish | 0.0003 |
| *Liopropoma eukrines* | wrasse bass | 0.0003 |
| Muraenidae | moray eel | 0.0003 |
| *Mycteroperca phenax* | scamp | 0.0009 |
| *Myrichthys acuminatus* | sharptail eel | 0.0003 |
| *Pagrus pagrus* | red porgy | 0.0022 |
| *Pareques iwamotoi* | blackbar drum | 0.0146 |
| *Pareques umbrosus* | cubbyu | 0.0168 |
| *Priacanthus arenatus* | bigeye | 0.0003 |
| *Pristigenys alta* | short bigeye | 0.0010 |
| *Prognathodes aculeatus* | longsnout butterflyfish | 0.0003 |
| *Prognathodes aya* | bank butterflyfish | 0.0011 |
| *Pterois volitans* | lionfish | 0.0023 |
| Scorpaenidae | scorpionfish | 0.0001 |
| *Seriola dumerili* | greater amberjack | 0.0025 |
| *Seriola rivoliana* | almaco jack | 0.0001 |
| *Seriola* sp. | amberjack | 0.0008 |
| *Serranus annularis* | orangeback bass | 0.0006 |
| *Serranus notospilus* | saddle bass | 0.0001 |
| *Serranus phoebe* | tattler | 0.0027 |
| *Sphoeroides spengleri* | bandtail puffer | 0.0005 |
| *Stegastes partitus* | bicolor damselfish | 0.0001 |

**Dive Site:** ROV 14-01; Georgia, Inside Proposed Georgia MPA Reconfig, 65 m SW/NE Ridge, UNCW Dive 51

| | | |
|---|---|---|
| *Synodus* sp. | lizardfish | 0.0003 |
| Tetraodontidae | puffer | 0.0001 |
| *Urophycis* sp. | hake | 0.0004 |

**Dive Site:** ROV 14-02; Georgia, Inside Proposed Georgia EXT & Georgia MPA Recon, 70 m SW/NE Ridge, UNCW Dive 52

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

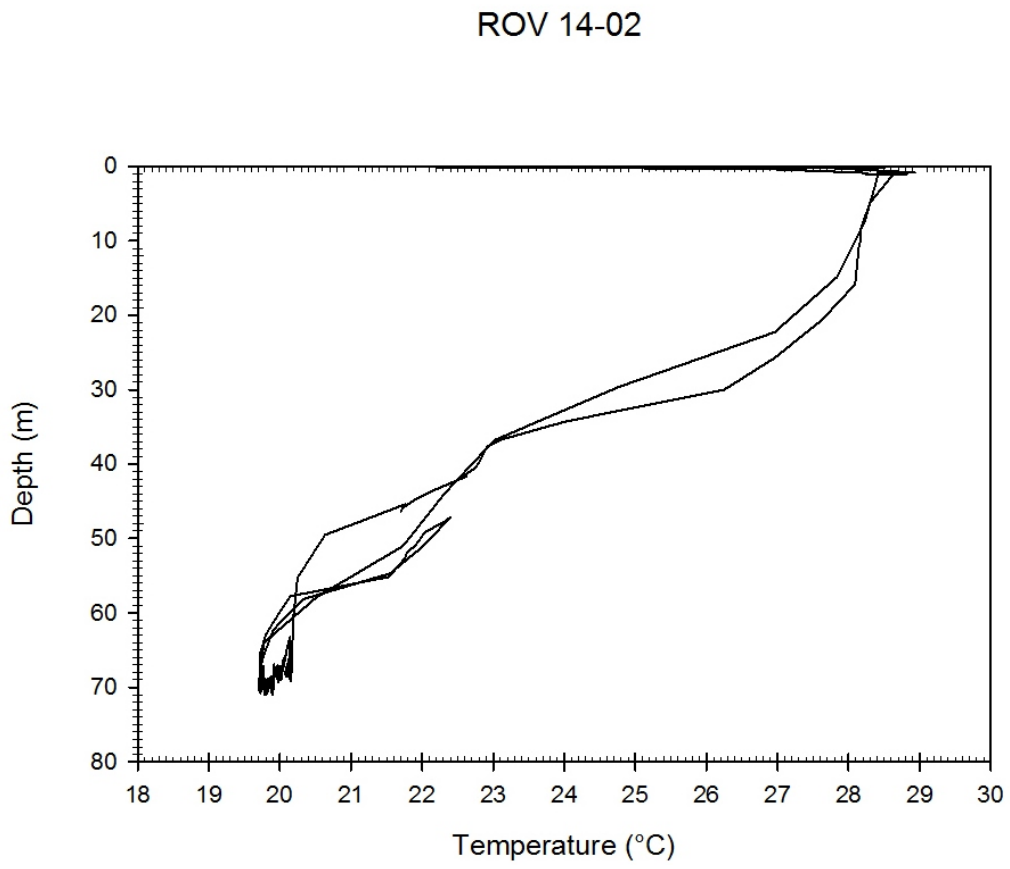
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | NancyFoster_14_08_MPA_GA_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/19/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 138 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-02; Georgia, Inside Proposed Georgia EXT & Georgia MPA Recon, 70 m SW/NE Ridge, UNCW Dive 52

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -47 | **Total Transect Length (km):** | 0.92 |
| **Maximum Bottom Depth (m):** | -72 | **Surface Current (kn):** | 0 |
| **On Bottom (Time- EDT):** | 11:53 | **On Bottom (Lat/Long):** | 31.6°N; -79.67°W |
| **Off Bottom (Time- EDT):** | 13:48 | **Off Bottom (Lat/Long):** | 31.6°N; -79.68°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-02; Georgia, Inside Proposed Georgia EXT & Georgia MPA Recon, 70 m SW/NE Ridge, UNCW Dive 52

**Dive Imagery:**

**Figure 1:** -69 m
*Titanideum* and *Diodogorgia* octocorals on sediment veneered hard bottom

**Figure 2:** -69 m
Morey eel under rock outcrop

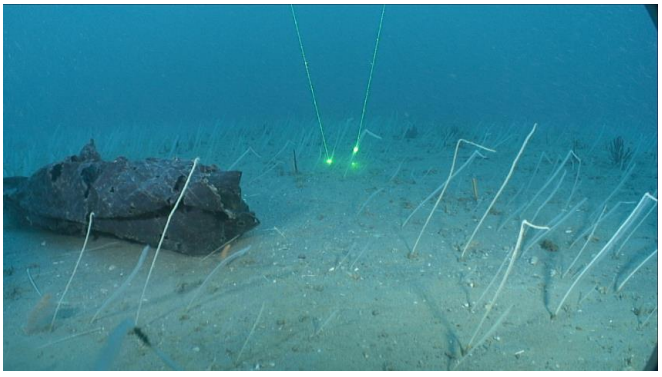


**Figure 3:** -70.6 m
Sea pens and human debris on soft bottom

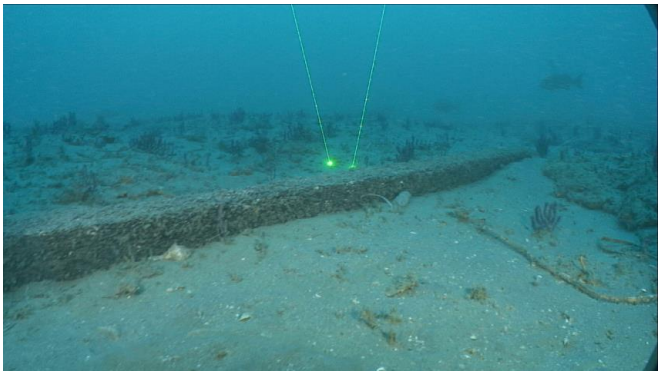


**Figure 4:** -70.1 m
Human debris on rocky hard bottom

**Dive Site:** ROV 14-02; Georgia, Inside Proposed Georgia EXT & Georgia MPA Recon, 70 m SW/NE Ridge, UNCW Dive 52

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-02, UNCW Mohawk ROV Dive 52; Site #- 19-VI-14-2. Target Site - Georgia, Inside Proposed Georgia EXT & Georgia MPA Recon, 70 m SE/NW Ridge. Ground-truth multibeam sonar of site (NancyFoster_14_08_MPA_GA_Grid). Conduct video/photo transect from NE to SW 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Main logging computer had a failure so logged on TAS's computer, starting log in Excel and then brought the data in post dive. Dive note order will be off also. Logged in CSTD instead of ESTD - all Access notes were pushed forward an hour (already done for inverts after the dive).

Site Description/Habitat/Biota:
Narrow rock ledge oriented NE-SW with mostly low relief, hardbottom tapering off to sediment to the north and south. There were large areas leading up to the ledge that had a large area covered in sea pens. There were areas of scattered rock outcrops throughout most of the dive with hardbottom increasing as the ridge was approached.

**Dive Site:** ROV 14-02; Georgia, Inside Proposed Georgia EXT & Georgia MPA Recon, 70 m SW/NE Ridge, UNCW Dive 52

**CPCe Percent Cover Analysis:**

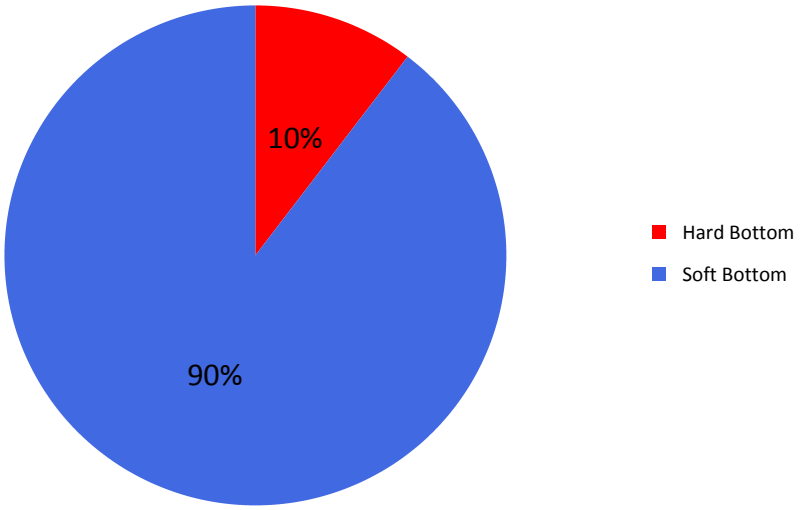
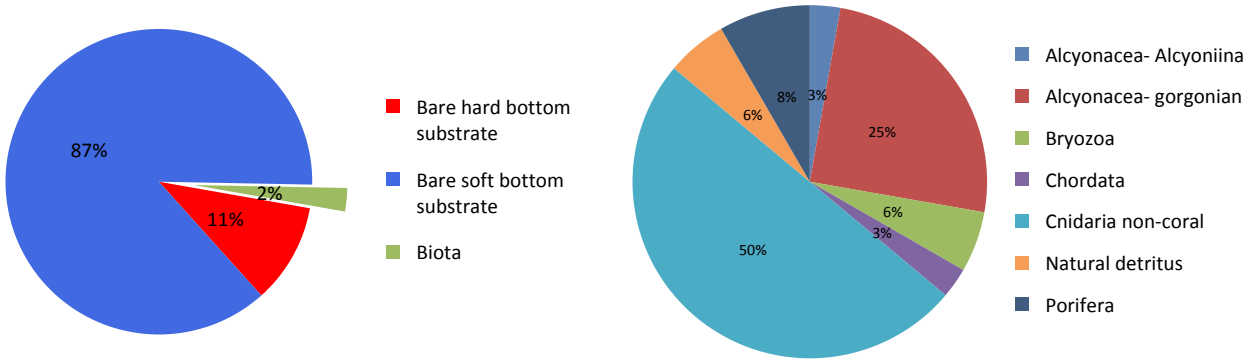



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-02. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-02.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-02; Georgia, Inside Proposed Georgia EXT & Georgia MPA Recon, 70 m SW/NE Ridge, UNCW Dive 52

**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 14-02.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 36 | 2.47% |
| Porifera | 3 | 0.21% |
| Demospongiae | 3 | 0.21% |
| Alcyonacea- Alcyoniina | 1 | 0.07% |
| Alcyonacea | 1 | 0.07% |
| Alcyonacea- gorgonian | 9 | 0.62% |
| Diodogorgia sp. | 6 | 0.41% |
| Ellisella sp. | 2 | 0.14% |
| Titanideum frauenfeldii | 1 | 0.07% |
| Cnidaria non-coral | 18 | 1.24% |
| Hydroidolina | 1 | 0.07% |
| Pennatulacea | 2 | 0.14% |
| Virgularia sp. | 3 | 0.21% |
| Virgularia presbytes | 12 | 0.82% |
| Bryozoa | 2 | 0.14% |
| Bryozoa | 2 | 0.14% |
| Chordata | 1 | 0.07% |
| Ascidiacea | 1 | 0.07% |
| Natural detritus | 2 | 0.14% |
| Bare soft bottom substrate | 1265 | 86.94% |
| Bare hard bottom substrate | 154 | 10.58% |
| Bare hard bottom substrate | 154 | 10.58% |
| Bare rock- pavement boulder ledge | 136 | 9.35% |
| Bare rubble- rock | 18 | 1.24% |
| **Grand Total** | **1455** | **100.00%** |

**Dive Site:** ROV 14-02; Georgia, Inside Proposed Georgia EXT & Georgia MPA Recon, 70 m SW/NE Ridge, UNCW Dive 52

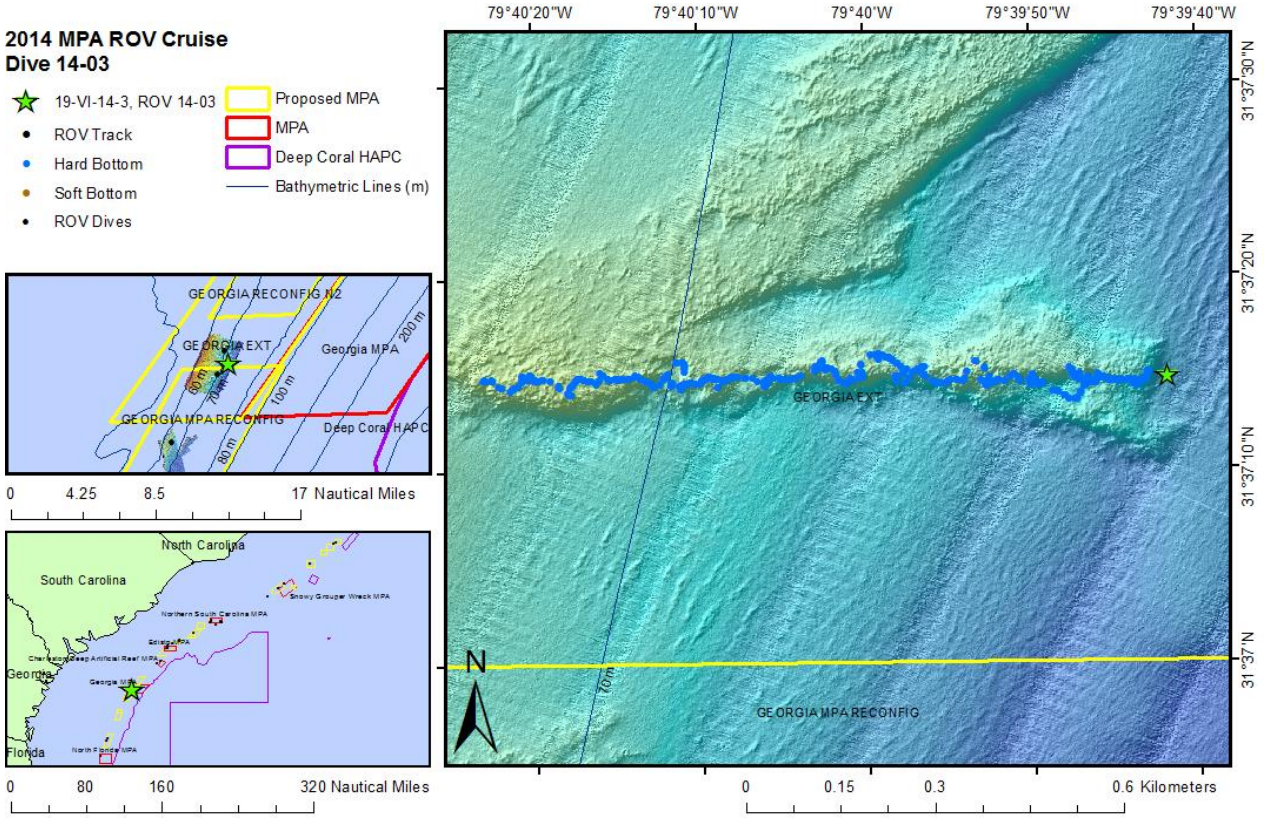
**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-02.

| Scientific Name | Common Name | Density |
|---|---|---|
| *Balistes capriscus* | grey triggerfish | 0.0004 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0013 |
| *Centropristis ocyurus* | bank sea bass | 0.0017 |
| *Centropristis striata* | black sea bass | 0.0007 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0003 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0012 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0034 |
| *Decapterus punctatus* | round scad | 0.0729 |
| *Equetus lanceolatus* | jack-knife fish | 0.0002 |
| *Haemulon aurolineatum* | tomtate | 0.0012 |
| *Halichoeres* sp. | wrasse | 0.0065 |
| *Holacanthus bermudensis* | blue angelfish | 0.0005 |
| Holocentridae | squirrelfish | 0.0002 |
| *Liopropoma eukrines* | wrasse bass | 0.0010 |
| *Muraena retifera* | reticulate moray eel | 0.0002 |
| Muraenidae | moray eel | 0.0005 |
| *Mycteroperca microlepis* | gag grouper | 0.0010 |
| *Mycteroperca phenax* | scamp | 0.0023 |
| *Pagrus pagrus* | red porgy | 0.0054 |
| *Pareques iwamotoi* | blackbar drum | 0.0047 |
| *Pareques umbrosus* | cubbyu | 0.0003 |
| *Pristigenys alta* | short bigeye | 0.0051 |
| *Prognathodes aya* | bank butterflyfish | 0.0014 |
| *Pterois volitans* | lionfish | 0.0045 |
| *Rhomboplites aurorubens* | vermilion snapper | 0.0002 |
| *Rypticus maculatus* | whitespotted soapfish | 0.0005 |
| *Seriola dumerili* | greater amberjack | 0.0002 |
| *Seriola* sp. | amberjack | 0.0019 |
| *Serranus annularis* | orangeback bass | 0.0021 |
| *Serranus notospilus* | saddle bass | 0.0010 |
| *Serranus phoebe* | tattler | 0.0010 |
| *Sphoeroides spengleri* | bandtail puffer | 0.0005 |

**Dive Site:** ROV 14-03; Georgia, Inside Proposed Georgia EXT, Southern Leg of 65 m V- Shaped Ridge, UNCW Dive 53

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

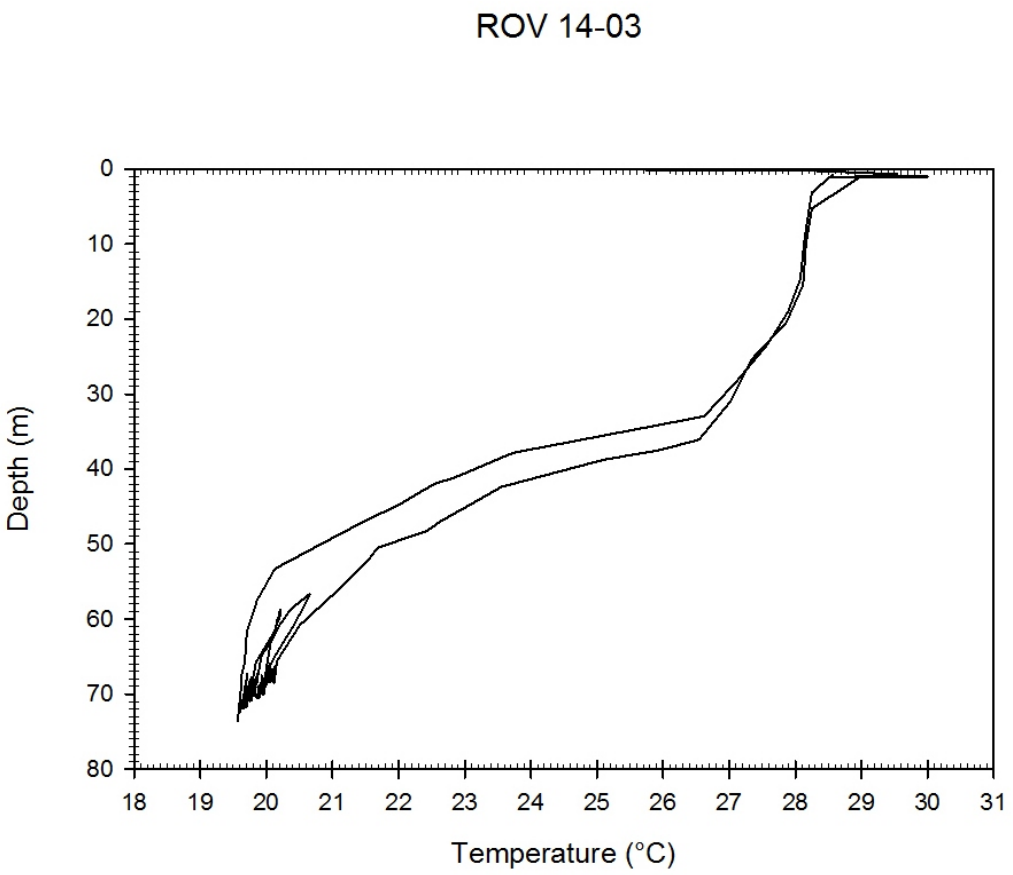
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | NancyFoster_14_08_MPA_GA_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/19/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 116 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-03; Georgia, Inside Proposed Georgia EXT, Southern Leg of 65 m V- Shaped Ridge, UNCW Dive 53

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -56 | **Total Transect Length (km):** | 1.08 |
| **Maximum Bottom Depth (m):** | -79 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 14:38 | **On Bottom (Lat/Long):** | 31.62°N; -79.66°W |
| **Off Bottom (Time- EDT):** | 16:05 | **Off Bottom (Lat/Long):** | 31.62°N; -79.67°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-03; Georgia, Inside Proposed Georgia EXT, Southern Leg of 65 m V- Shaped Ridge, UNCW Dive 53

**Dive Imagery:**

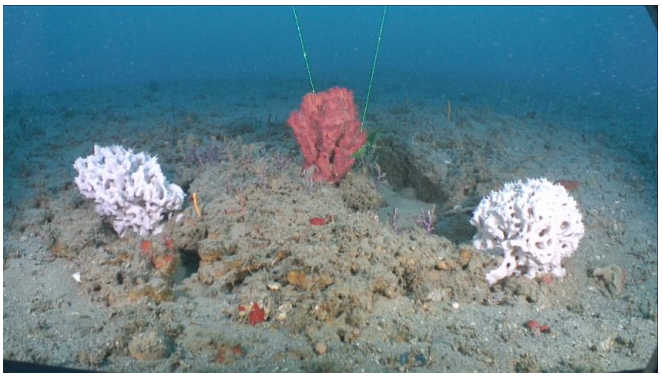


**Figure 1:** -68.6 m
*Clathria* (center) sponge and Didemnidae ascidians (sides) on rocky hard bottom

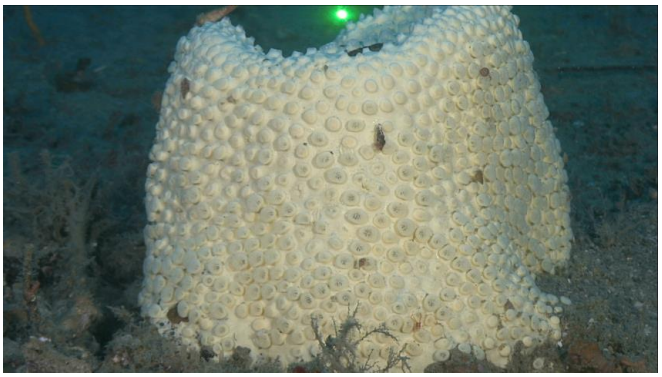


**Figure 2:** -68.6 m
Unidentified *Hadromerida* sponge

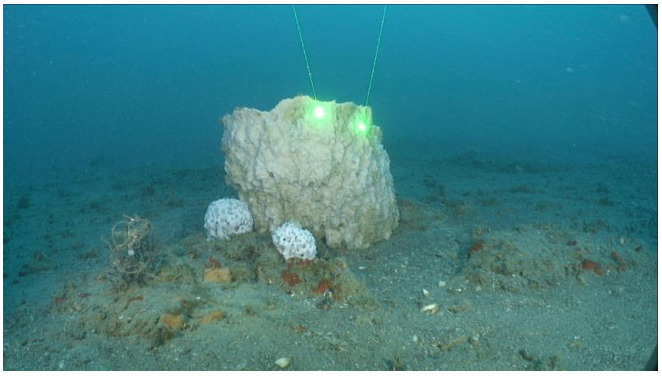


**Figure 3:** -68.7 m
*Ircinia campana* and didemnid

**Figure 4:** -71.7 m
Scamp grouper and human debris on rock outcrops

**Dive Site:** ROV 14-03; Georgia, Inside Proposed Georgia EXT, Southern Leg of 65 m V- Shaped Ridge, UNCW Dive 53

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-03, UNCW Mohawk ROV Dive 53; Site #- 19-VI-14-3. Target Site - Georgia, Inside Proposed Georgia EXT, Southern Leg of 65 m V- Shaped Ridge. Ground-truth multibeam sonar of site (NancyFoster_14_08_MPA_GA_Grid). Conduct video/photo transect west along southern part of V-shaped 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Main logging computer had a failure so logged on TAS's computer.

Site Description/Habitat/Biota:
Started on the eastern side of the V-shaped ridge and traveling west over the rise (southern arm of the V-shaped ledge). Mostly soft bottom with few areas of exposed rock pavement and few outcrops/solution holes throughout the dive. Habitat stayed fairly constant ranging from soft bottom with scattered areas of hardbottom to a few spots of 60-80% cover of exposed pavement and rocks.

**Dive Site:** ROV 14-03; Georgia, Inside Proposed Georgia EXT, Southern Leg of 65 m V- Shaped Ridge, UNCW Dive 53

**CPCe Percent Cover Analysis:**

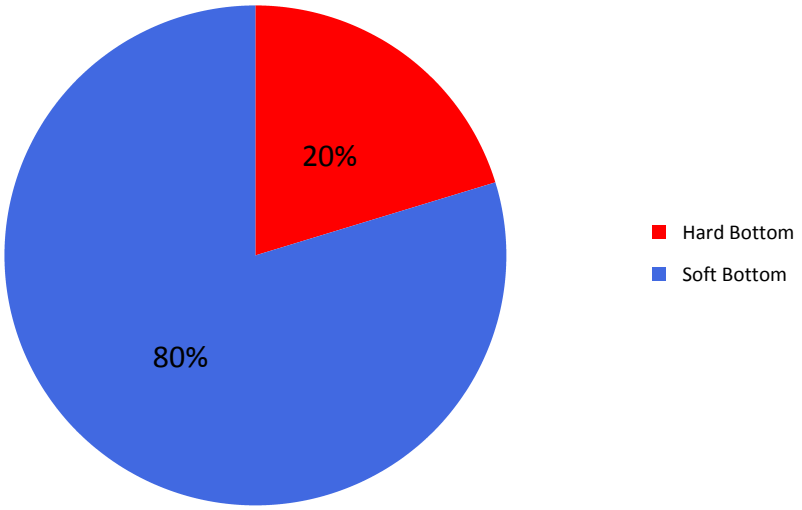
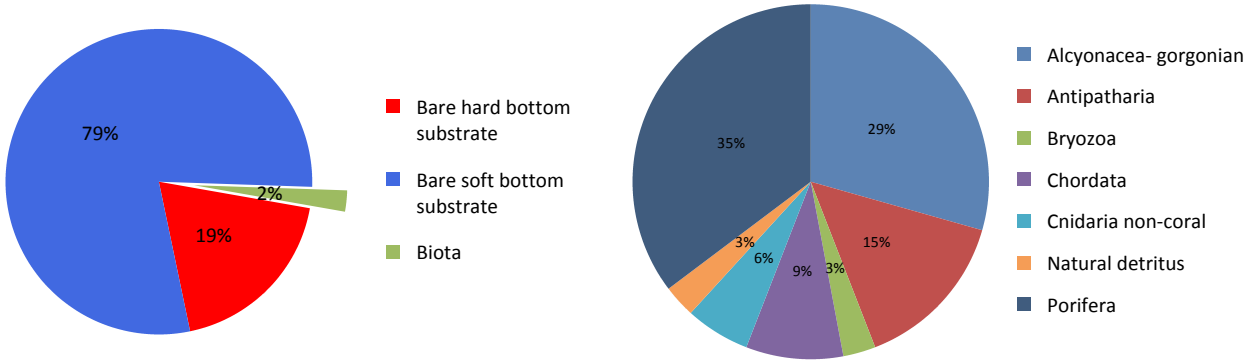



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-03. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-03.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-03; Georgia, Inside Proposed Georgia EXT, Southern Leg of 65 m V- Shaped Ridge, UNCW Dive 53

**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 14-03.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 34 | 2.25% |
| Porifera | 12 | 0.79% |
| Aiolochroia crassa | 3 | 0.20% |
| Demospongiae | 3 | 0.20% |
| Hadromerida | 2 | 0.13% |
| Spirastrellidae | 4 | 0.26% |
| Alcyonacea- gorgonian | 10 | 0.66% |
| Diodogorgia sp. | 9 | 0.59% |
| Ellisellidae | 1 | 0.07% |
| Antipatharia | 5 | 0.33% |
| Stichopathes lutkeni | 5 | 0.33% |
| Cnidaria non-coral | 2 | 0.13% |
| Actiniaria | 1 | 0.07% |
| Hydroidolina | 1 | 0.07% |
| Bryozoa | 1 | 0.07% |
| Bryozoa | 1 | 0.07% |
| Chordata | 3 | 0.20% |
| Didemnidae | 1 | 0.07% |
| Fish | 2 | 0.13% |
| Natural detritus | 1 | 0.07% |
| Bare soft bottom substrate | 1193 | 78.80% |
| Bare hard bottom substrate | 287 | 18.96% |
| Bare hard bottom substrate | 287 | 18.96% |
| Bare rock- pavement boulder ledge | 279 | 18.43% |
| Bare rubble- rock | 8 | 0.53% |
| **Grand Total** | **1514** | **100.00%** |

**Dive Site:** ROV 14-03; Georgia, Inside Proposed Georgia EXT, Southern Leg of 65 m V- Shaped Ridge, UNCW Dive 53

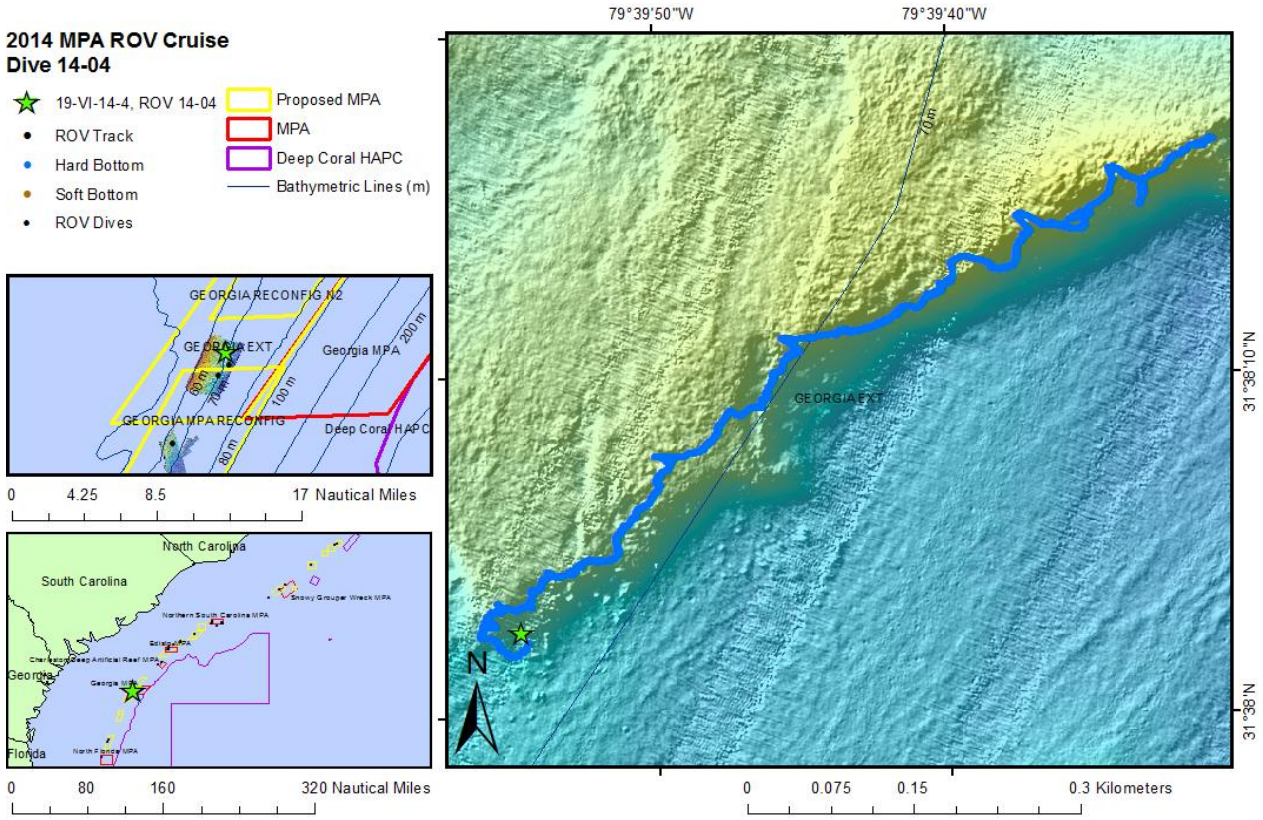
**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-03.

| Scientific Name | Common Name | Density |
|---|---|---|
| *Apogon pseudomaculatus* | twospot cardinalfish | 0.0001 |
| *Balistes capriscus* | grey triggerfish | 0.0005 |
| *Calamus* sp. | porgy | 0.0001 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0016 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0005 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0017 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0020 |
| *Equetus lanceolatus* | jack-knife fish | 0.0001 |
| *Halichoeres* sp. | wrasse | 0.0033 |
| *Holacanthus bermudensis* | blue angelfish | 0.0008 |
| *Liopropoma eukrines* | wrasse bass | 0.0001 |
| *Lutjanus campechanus* | red snapper | 0.0007 |
| *Muraena retifera* | reticulate moray eel | 0.0001 |
| Muraenidae | moray eel | 0.0002 |
| *Mycteroperca microlepis* | gag grouper | 0.0003 |
| *Mycteroperca phenax* | scamp | 0.0025 |
| *Pagrus pagrus* | red porgy | 0.0042 |
| *Pareques umbrosus* | cubbyu | 0.0024 |
| *Pristigenys alta* | short bigeye | 0.0024 |
| *Prognathodes aya* | bank butterflyfish | 0.0017 |
| *Pterois volitans* | lionfish | 0.0020 |
| *Rhomboplites aurorubens* | vermilion snapper | 0.0003 |
| *Rypticus maculatus* | whitespotted soapfish | 0.0001 |
| Scorpaenidae | scorpionfish | 0.0001 |
| *Seriola* sp. | amberjack | 0.0007 |
| *Serranus notospilus* | saddle bass | 0.0004 |
| *Serranus phoebe* | tattler | 0.0019 |
| *Sphoeroides spengleri* | bandtail puffer | 0.0006 |
| *Synodus intermedius* | sand diver | 0.0001 |

**Dive Site:** ROV 14-04; Georgia, Inside Proposed Georgia EXT, Southeastern Ledge of 66 m Plateau, UNCW Dive 54

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

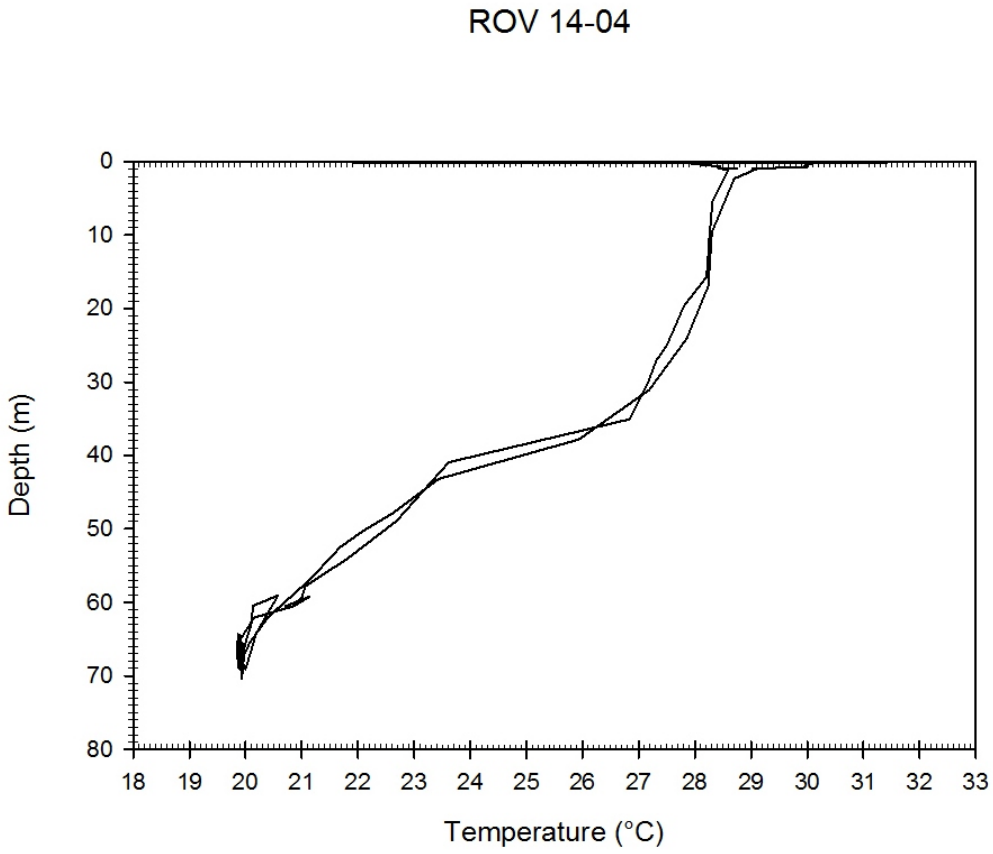
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | NancyFoster_14_08_MPA_GA_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/19/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 45 |
| **DVD:** | 1 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-04; Georgia, Inside Proposed Georgia EXT, Southeastern Ledge of 66 m Plateau, UNCW Dive 54

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -60 | **Total Transect Length (km):** | 0.77 |
| **Maximum Bottom Depth (m):** | -72 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 17:04 | **On Bottom (Lat/Long):** | 31.63°N; -79.67°W |
| **Off Bottom (Time- EDT):** | 17:54 | **Off Bottom (Lat/Long):** | 31.64°N; -79.66°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-04; Georgia, Inside Proposed Georgia EXT, Southeastern Ledge of 66 m Plateau, UNCW Dive 54

**Dive Imagery:**

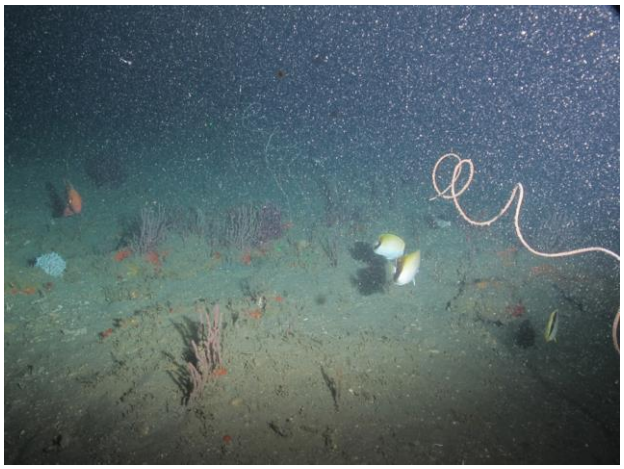


**Figure 1:** -68.6 m
Butterflyfish and Stichopathes on pavement.

**Figure 2:** -68.6 m
Cubbyu under a rock ledge

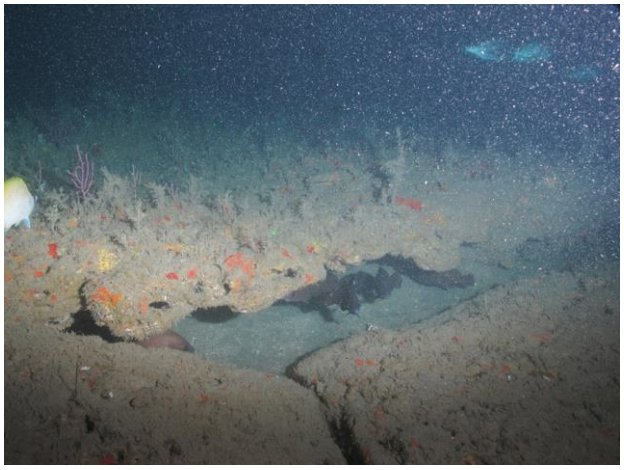


**Figure 3:** -67.6 m
Cubbyu under a rock ledge

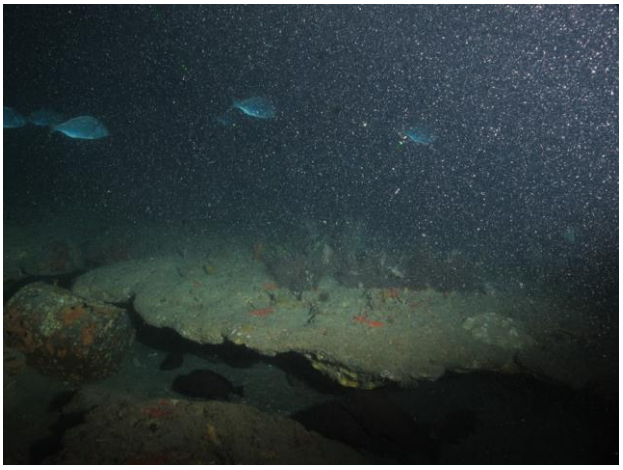


**Figure 4:** -67.7 m
Cubbyu under a rock ledge

**Dive Site:** ROV 14-04; Georgia, Inside Proposed Georgia EXT, Southeastern Ledge of 66 m Plateau, UNCW Dive 54

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-04, UNCW Mohawk ROV Dive 54; Site #- 19-VI-14-4. Target Site - Georgia, Inside Proposed Georgia EXT, Southeastern Ledge of 66 m Plateau. Ground-truth multibeam sonar of site (NancyFoster_14_08_MPA_GA_Grid). Conduct video/photo transect, southeastern ledge of a plateau, heading northeast.

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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Main logging computer had a failure so logged on TAS's computer.

Site Description/Habitat/Biota:
Bottom was exposed hard pavement and rock ledges with a few low relief outcrops; flat pavement with ledges 1 m maximum relief. Rock outcrops were rounded and up to 5 m wide. Pavement was dominated by Diodogorgia, Stichopathes, Didemnidae, and white muricid gorgonians; surrounding soft bottom was dominated by sea pens. Habitat remained fairly homogeneous.

**Dive Site:** ROV 14-04; Georgia, Inside Proposed Georgia EXT, Southeastern Ledge of 66 m Plateau, UNCW Dive 54

**CPCe Percent Cover Analysis:**

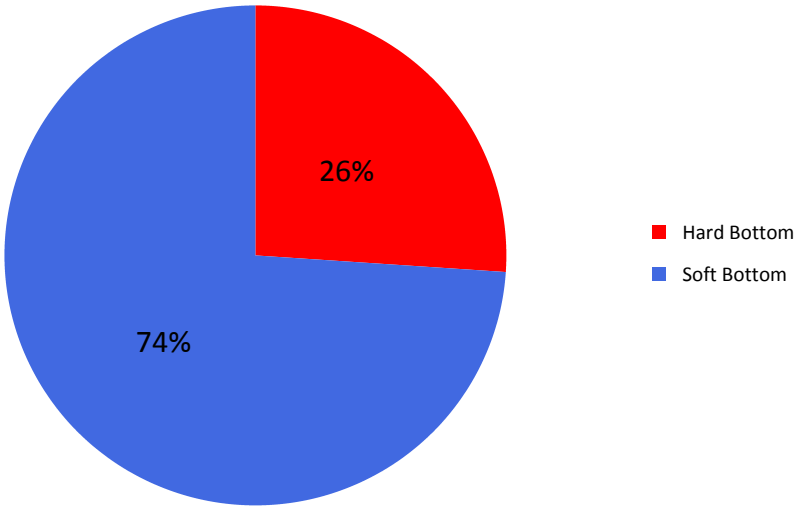
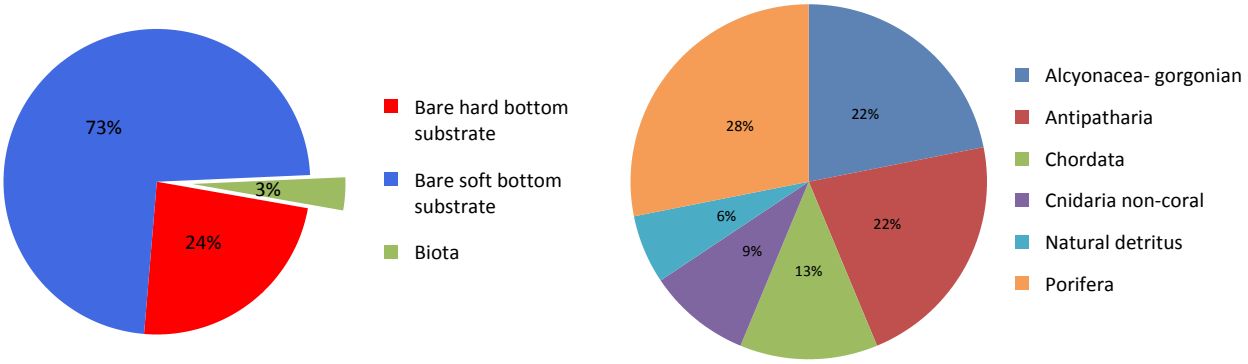



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-04. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-04.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-04; Georgia, Inside Proposed Georgia EXT, Southeastern Ledge of 66 m Plateau, UNCW Dive 54

**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 14-04.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 32 | 3.47% |
| Porifera | 9 | 0.98% |
| Demospongiae | 4 | 0.43% |
| Spirastrellidae | 5 | 0.54% |
| Alcyonacea- gorgonian | 7 | 0.76% |
| Diodogorgia sp. | 5 | 0.54% |
| Leptogorgia sp. | 2 | 0.22% |
| Antipatharia | 7 | 0.76% |
| Antipatharia | 2 | 0.22% |
| Stichopathes lutkeni | 5 | 0.54% |
| Cnidaria non-coral | 3 | 0.33% |
| Hydroidolina | 3 | 0.33% |
| Chordata | 4 | 0.43% |
| Didemnidae | 2 | 0.22% |
| Fish | 2 | 0.22% |
| Natural detritus | 2 | 0.22% |
| Bare soft bottom substrate | 672 | 72.96% |
| Bare hard bottom substrate | 217 | 23.56% |
| Bare hard bottom substrate | 217 | 23.56% |
| Bare rock- pavement boulder ledge | 215 | 23.34% |
| Bare rubble- rock | 2 | 0.22% |
| **Grand Total** | **921** | **100.00%** |

**Dive Site:** ROV 14-04; Georgia, Inside Proposed Georgia EXT, Southeastern Ledge of 66 m Plateau, UNCW Dive 54

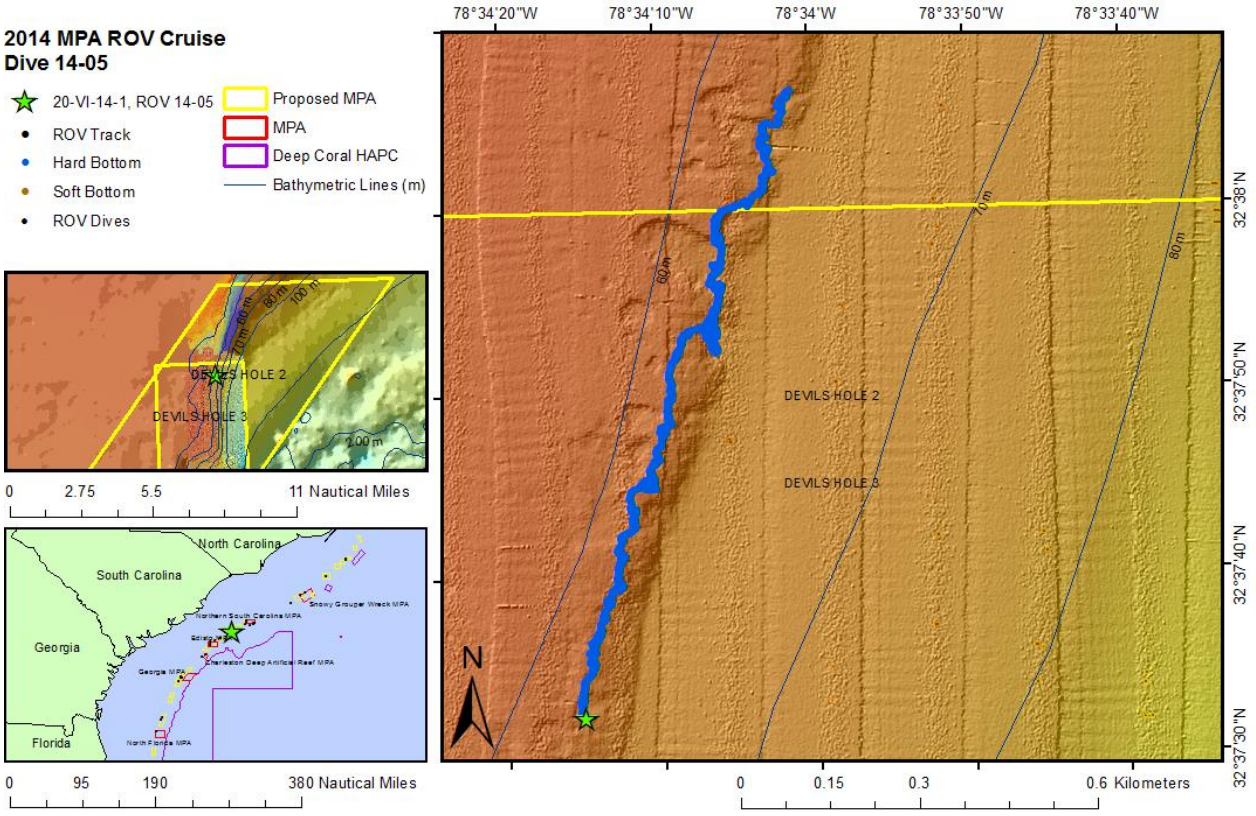
**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-04.

| Scientific Name | Common Name | Density |
|---|---|---|
| *Apogon pseudomaculatus* | twospot cardinalfish | 0.0003 |
| *Apogon* sp. | cardinalfish | 0.0004 |
| *Balistes capriscus* | grey triggerfish | 0.0011 |
| *Calamus* sp. | porgy | 0.0005 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0027 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0011 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0018 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0017 |
| *Decodon puellaris* | red hogfish | 0.0001 |
| *Halichoeres* sp. | wrasse | 0.0022 |
| *Holacanthus bermudensis* | blue angelfish | 0.0009 |
| *Liopropoma eukrines* | wrasse bass | 0.0001 |
| *Muraena retifera* | reticulate moray eel | 0.0001 |
| Muraenidae | moray eel | 0.0002 |
| *Mycteroperca microlepis* | gag grouper | 0.0001 |
| *Mycteroperca phenax* | scamp | 0.0007 |
| *Pagrus pagrus* | red porgy | 0.0049 |
| *Pareques iwamotoi* | blackbar drum | 0.0001 |
| *Pareques umbrosus* | cubbyu | 0.0115 |
| *Priacanthus arenatus* | bigeye | 0.0001 |
| *Pristigenys alta* | short bigeye | 0.0011 |
| *Prognathodes aya* | bank butterflyfish | 0.0015 |
| *Pterois volitans* | lionfish | 0.0003 |
| *Rhomboplites aurorubens* | vermilion snapper | 0.0049 |
| *Rypticus* sp. | soapfish | 0.0001 |
| *Seriola* sp. | amberjack | 0.0025 |
| *Serranus annularis* | orangeback bass | 0.0001 |
| *Serranus notospilus* | saddle bass | 0.0003 |
| *Serranus phoebe* | tattler | 0.0010 |
| Sparidae | porgy | 0.0009 |
| *Sphoeroides spengleri* | bandtail puffer | 0.0006 |
| *Urophycis* sp. | hake | 0.0001 |

**Dive Site:** ROV 14-05; South Carolina, Inside Devil's Hole Proposed MPA, N/S 60 m Ridge, UNCW Dive 55

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

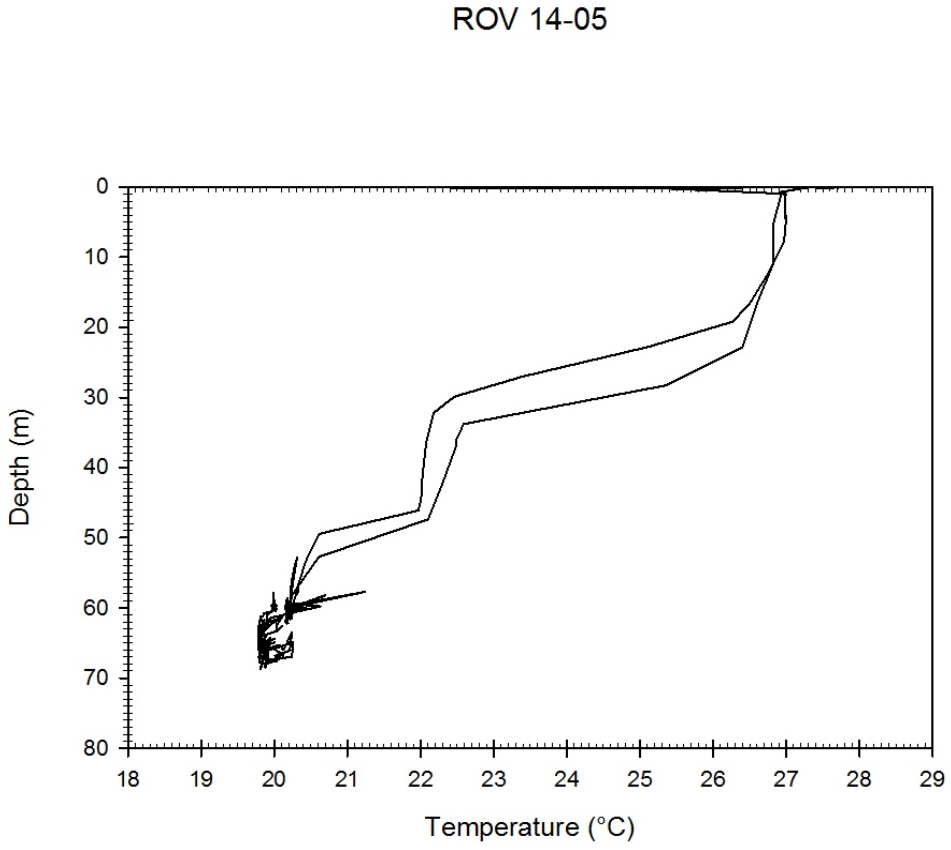
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Pisces_2013_EastDevilsHole MPA_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/20/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 148 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-05; South Carolina, Inside Devil's Hole Proposed MPA, N/S 60 m Ridge, UNCW Dive 55

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -52 | **Total Transect Length (km):** | 1.15 |
| **Maximum Bottom Depth (m):** | -69 | **Surface Current (kn):** | <1 |
| **On Bottom (Time- EDT):** | 8:17 | **On Bottom (Lat/Long):** | 32.63°N; -78.57°W |
| **Off Bottom (Time- EDT):** | 10:17 | **Off Bottom (Lat/Long):** | 32.64°N; -78.57°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-05; South Carolina, Inside Devil's Hole Proposed MPA, N/S 60 m Ridge, UNCW Dive 55

**Dive Imagery:**

**Figure 1:** -61.8 m
*Swiftia* and *Stichopathes* on rocky hard bottom

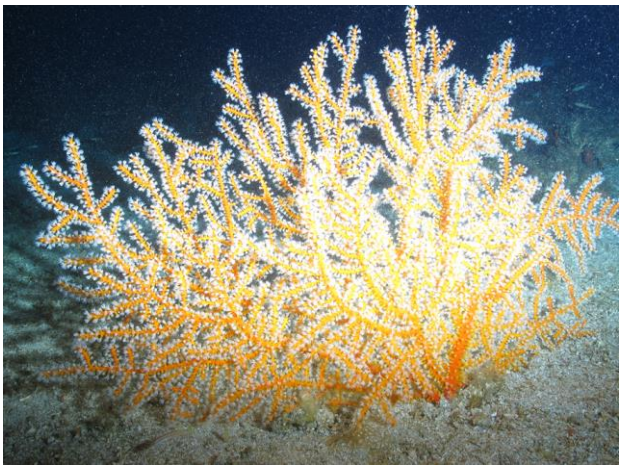


**Figure 2:** -61.8 m
*Swiftia* on rocky hard bottom

**Figure 3:** -61 m
Scamp grouper

**Figure 4:** -61.4 m
*Muricea* close-up

**Dive Site:** ROV 14-05; South Carolina, Inside Devil's Hole Proposed MPA, N/S 60 m Ridge, UNCW Dive 55

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-05, UNCW Mohawk ROV Dive 55; Site #- 20-VI-14-1. Target Site - South Carolina, Inside Devil's Hole Proposed MPA, N/S 60 m Ridge. Ground-truth multibeam sonar of site (Pisces_2013 _EastDevilsHoleMPA_MB_Grid). Conduct video/photo transect along N-S 60 m 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Main logging computer had a failure so logged on TAS's computer.

Site Description/Habitat/Biota:
Transected north along a ridge in the MB. The bottom was pavement on top with interspersed sand patches. The edge of the ridge ends abruptly to the east into sand. The edge of the hard bottom is about 0.5 m relief and flattens to pavement on top. Hydroids dominated with orange bryozoa, Stichopathes, and few sponges but no hard corals. Muricea, Swiftia, Diodogorgia, Stichopathes and Ellisellidae were common in parts.

**Dive Site:** ROV 14-05; South Carolina, Inside Devil's Hole Proposed MPA, N/S 60 m Ridge, UNCW Dive 55

**CPCe Percent Cover Analysis:**

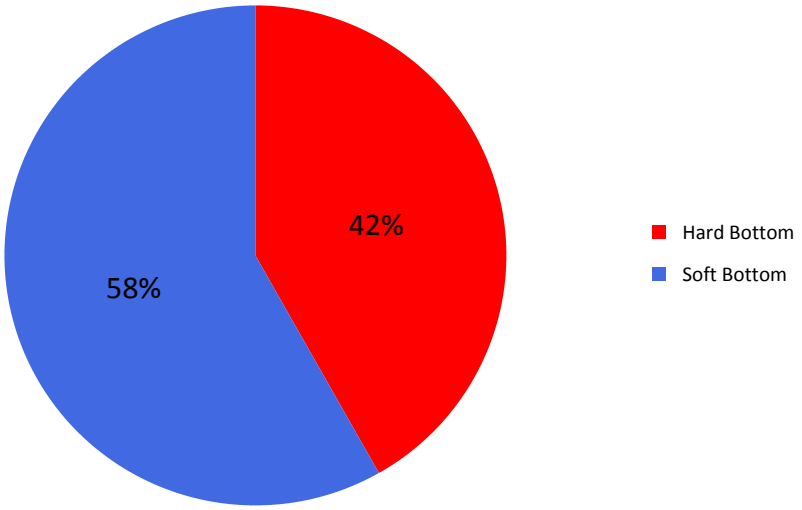
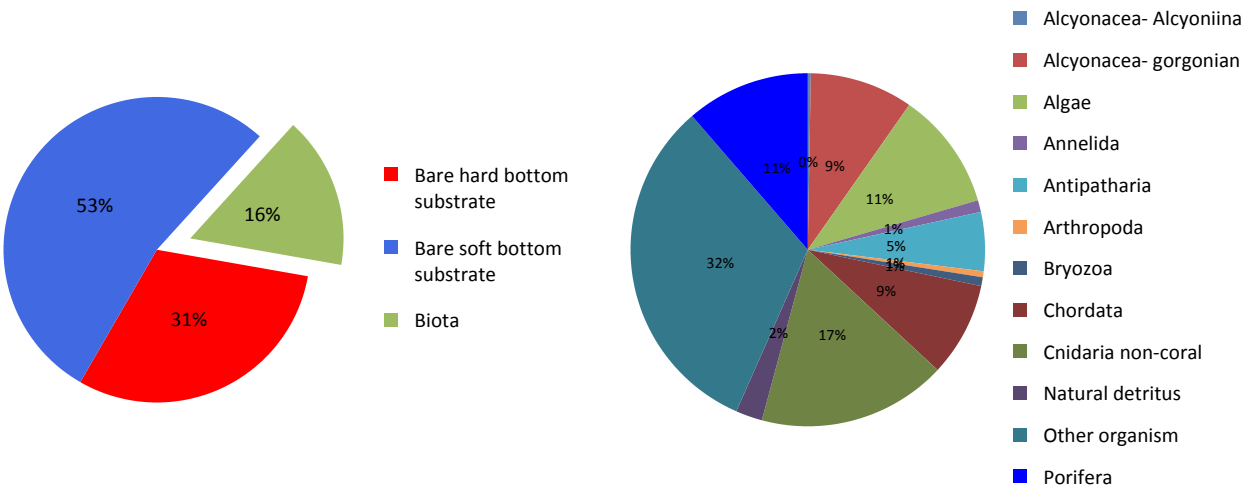



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-05. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-05.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-05; South Carolina, Inside Devil's Hole Proposed MPA, N/S 60 m Ridge, UNCW Dive 55

**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 14-05.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 371 | 16.07% |
| Algae | 40 | 1.73% |
| Chlorophyta | 1 | 0.04% |
| Corallinales/crustose coralline | 18 | 0.78% |
| Phaeophyta | 9 | 0.39% |
| Rhodophyta | 12 | 0.52% |
| Porifera | 42 | 1.82% |
| Astrophorida | 4 | 0.17% |
| Auletta sp. | 1 | 0.04% |
| Demospongiae | 27 | 1.17% |
| Demospongiae- ze tan starlet | 1 | 0.04% |
| Ircinia campana | 1 | 0.04% |
| Ircinia sp. | 1 | 0.04% |
| Ircinia strobilina | 1 | 0.04% |
| Spirastrellidae | 5 | 0.22% |
| Xestospongia muta | 1 | 0.04% |
| Alcyonacea- Alcyoniina | 1 | 0.04% |
| Chironephthya caribaea | 1 | 0.04% |
| Alcyonacea- gorgonian | 35 | 1.52% |
| Diodogorgia sp. | 6 | 0.26% |
| Ellisella sp. | 4 | 0.17% |
| Ellisellidae | 2 | 0.09% |
| Gorgonacea | 14 | 0.61% |
| Leptogorgia sp. | 4 | 0.17% |
| Swiftia exserta | 5 | 0.22% |
| Antipatharia | 20 | 0.87% |
| Antipatharia | 7 | 0.30% |
| Antipatharia atlantica | 1 | 0.04% |
| Stichopathes lutkeni | 12 | 0.52% |
| Cnidaria non-coral | 64 | 2.77% |
| Hydroidolina | 64 | 2.77% |
| Annelida | 4 | 0.17% |
| Filograna sp. | 4 | 0.17% |
| Arthropoda | 2 | 0.09% |
| Panulirus argus | 1 | 0.04% |

**Dive Site:** ROV 14-05; South Carolina, Inside Devil's Hole Proposed MPA, N/S 60 m Ridge, UNCW Dive 55

| | | |
|---|---|---|
| Scyllaridae | 1 | 0.04% |
| Bryozoa | 3 | 0.13% |
| Bryozoa | 3 | 0.13% |
| Chordata | 32 | 1.39% |
| Ascidiacea | 28 | 1.21% |
| Didemnidae | 4 | 0.17% |
| Other organism | 119 | 5.16% |
| Natural detritus | 9 | 0.39% |
| Bare soft bottom substrate | 1232 | 53.38% |
| Bare hard bottom substrate | 705 | 30.55% |
| Bare hard bottom substrate | 705 | 30.55% |
| Bare rock- pavement boulder ledge | 638 | 27.64% |
| Bare rubble- rock | 67 | 2.90% |
| **Grand Total** | **2308** | **100.00%** |

**Dive Site:** ROV 14-05; South Carolina, Inside Devil's Hole Proposed MPA, N/S 60 m Ridge, UNCW Dive 55

**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-05.

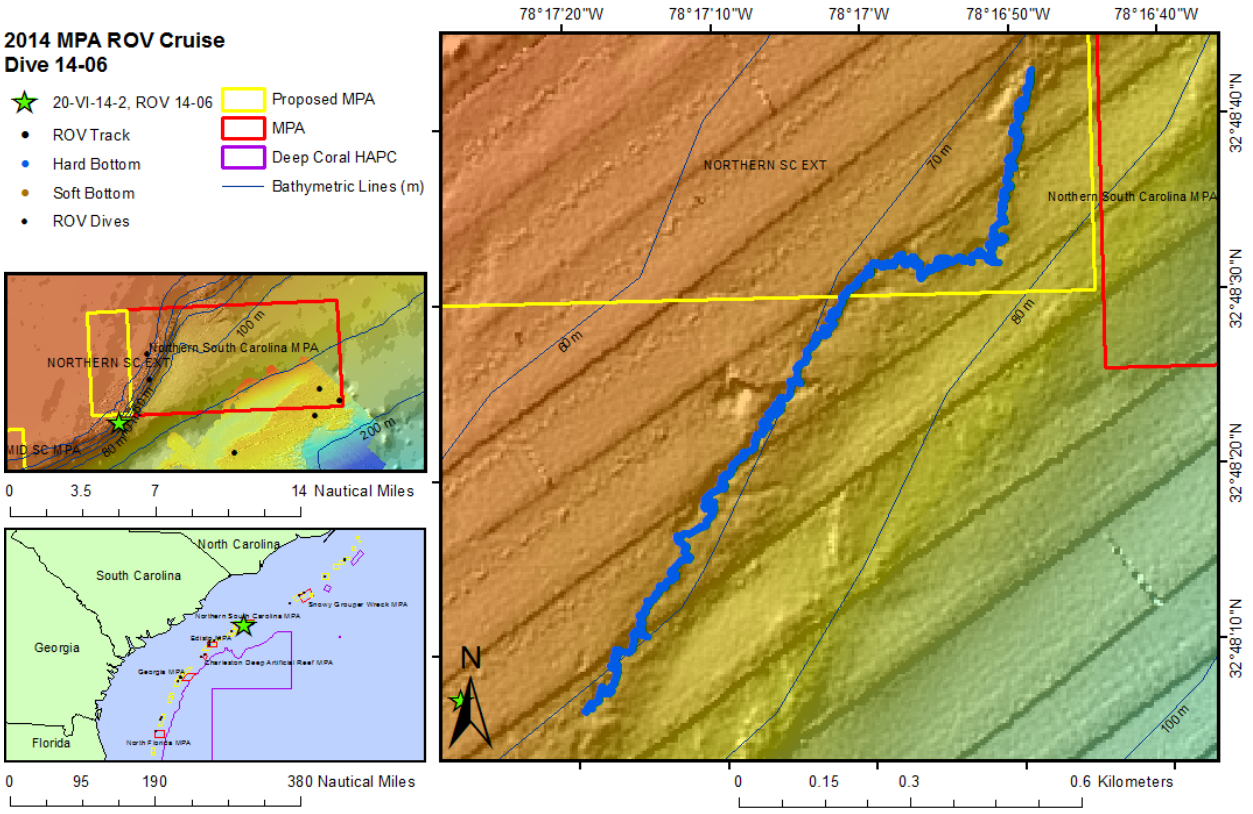
| Scientific Name | Common Name | Density |
|---|---|---|
| *Apogon pseudomaculatus* | twospot cardinalfish | 0.0001 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0026 |
| *Calamus* sp. | porgy | 0.0006 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0150 |
| *Centropyge argi* | cherubfish | 0.0004 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0009 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0050 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0058 |
| *Chromis insolata* | sunshinefish | 0.0080 |
| *Chromis scotti* | purple reeffish | 0.0021 |
| *Chromis* sp. | damselfish | 0.0031 |
| *Dasyatis americana* | southern stingray | 0.0001 |
| *Epinephelus drummondhayi* | speckled hind | 0.0001 |
| *Haemulon aurolineatum* | tomtate | 0.0097 |
| *Halichoeres garnoti* | yellowhead wrasse | 0.0001 |
| *Halichoeres* sp. | wrasse | 0.0160 |
| *Holacanthus bermudensis* | blue angelfish | 0.0023 |
| *Holacanthus tricolor* | rock beauty | 0.0001 |
| Holocentridae | squirrelfish | 0.0007 |
| *Lachnolaimus maximus* | hogfish | 0.0004 |
| *Liopropoma eukrines* | wrasse bass | 0.0008 |
| Muraenidae | moray eel | 0.0001 |
| *Mycteroperca phenax* | scamp | 0.0014 |
| *Pagrus pagrus* | red porgy | 0.0016 |
| *Paranthias furcifer* | creole-fish | 0.0001 |
| *Pareques umbrosus* | cubbyu | 0.0024 |
| *Pristigenys alta* | short bigeye | 0.0020 |
| *Prognathodes aya* | bank butterflyfish | 0.0033 |
| *Pronotogrammus martinicensis* | roughtongue bass | 0.0007 |
| *Pterois volitans* | lionfish | 0.0017 |
| *Seriola rivoliana* | almaco jack | 0.0004 |
| *Seriola* sp. | amberjack | 0.0005 |
| *Serranus annularis* | orangeback bass | 0.0024 |
| *Serranus chionaraia* | snow bass | 0.0003 |
| *Serranus phoebe* | tattler | 0.0042 |
| *Serranus* sp. | sea bass | 0.0004 |
| Sparidae | porgy | 0.0001 |

**Dive Site:** ROV 14-05; South Carolina, Inside Devil's Hole Proposed MPA, N/S 60 m Ridge, UNCW Dive 55

| | | |
|---|---|---|
| *Sparisoma atomarium* | greenblotch parrotfish | 0.0001 |
| *Sphoeroides spengleri* | bandtail puffer | 0.0003 |
| *Stegastes partitus* | bicolor damselfish | 0.0001 |
| *Xanthichthys ringens* | sargassum triggerfish | 0.0004 |

**Dive Site:** ROV 14-06; South Carolina, Outside/Inside Proposed Northern SC EXT, 75 m Ridge, UNCW Dive 56

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

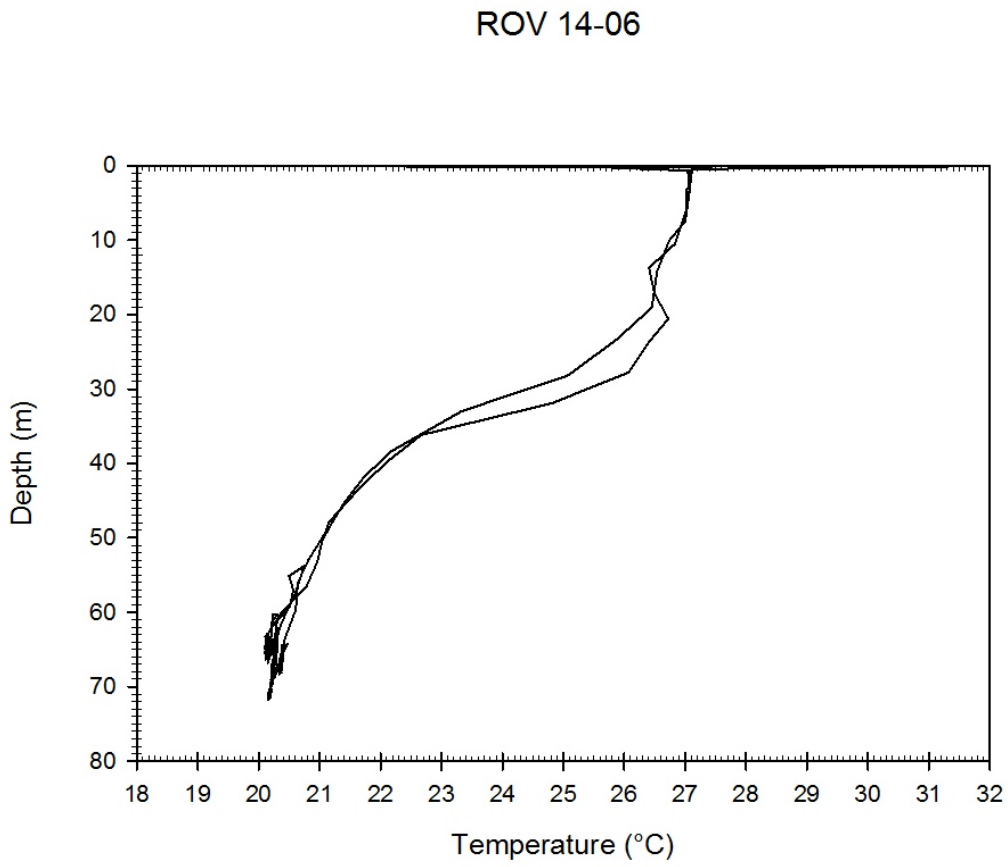
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Pisces_2012_NorthernSouth CarolinaMPA_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/20/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 119 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-06; South Carolina, Outside/Inside Proposed Northern SC EXT, 75 m Ridge, UNCW Dive 56

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -54 | **Total Transect Length (km):** | 1.40 |
| **Maximum Bottom Depth (m):** | -72 | **Surface Current (kn):** | <1 |
| **On Bottom (Time- EDT):** | 12:42 | **On Bottom (Lat/Long):** | 32.8°N; -78.29°W |
| **Off Bottom (Time- EDT):** | 14:26 | **Off Bottom (Lat/Long):** | 32.81°N; -78.28°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-06; South Carolina, Outside/Inside Proposed Northern SC EXT, 75 m Ridge, UNCW Dive 56

**Dive Imagery:**

**Figure 1:** -67.4 m
*Neofibularia* sponge and *Ophiothrix* sp. brittle star

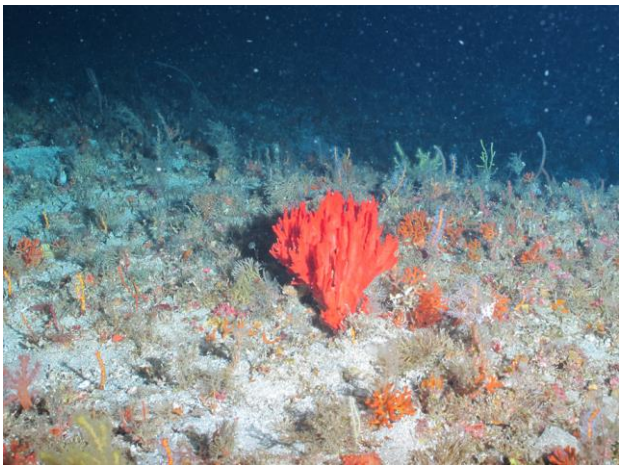


**Figure 2:** -67.4 m
*Clathria* sponge with branching orange bryozoans on pavement hardbottom

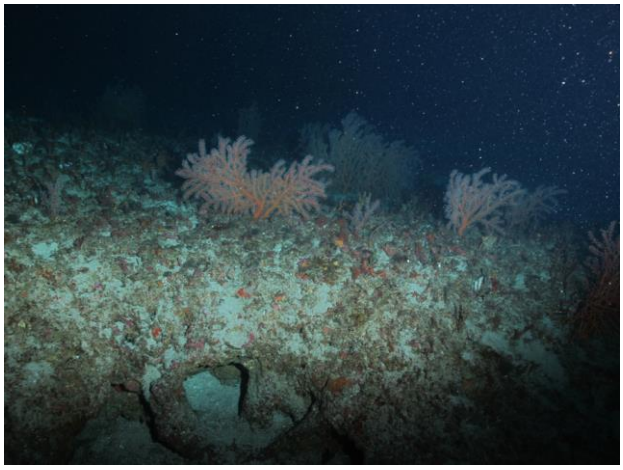


**Figure 3:** -65.4 m
*Swiftia exserta* colonies on hard bottom

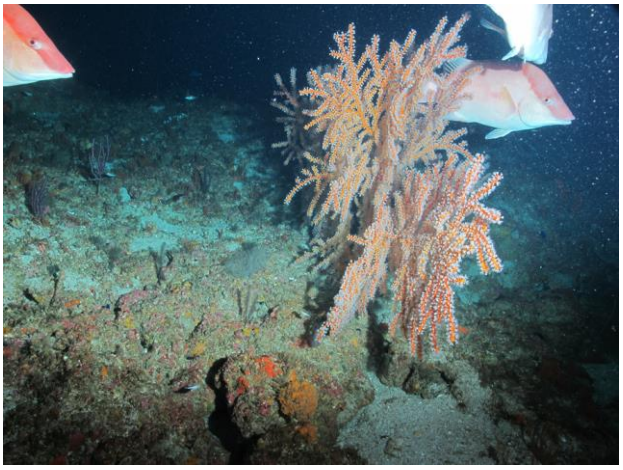


**Figure 4:** -65 m
*Swiftia exserta* and hogfish

**Dive Site:** ROV 14-06; South Carolina, Outside/Inside Proposed Northern SC EXT, 75 m Ridge, UNCW Dive 56

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-06, UNCW Mohawk ROV Dive 56; Site #- 20-VI-14-2. Target Site - South Carolina, Outside/Inside Proposed Northern SC EXT, 75 m Ridge. Ground-truth multibeam sonar of site (Pisces_2012 _NorthernSouthCarolinaMPA_MB_Grid). Conduct video/photo transect over rolling hills.

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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Saved the dive track live feed as a .shp file by MSCsite.

Site Description/Habitat/Biota:
Transected over rolling hills of pavement with interspersed sediment (sand shell hash). Few area with small ledges and undercuts and few large areas of sediment. Most of the hardbottom was 100% covered in fauna, dominated by hydroids. To the east was more sediment or rubble/cobble zone (more towards the north) and crossed into the proposed MPA (Northern SC ext) at 1:40:06 PM.

**Dive Site:** ROV 14-06; South Carolina, Outside/Inside Proposed Northern SC EXT, 75 m Ridge, UNCW Dive 56

**CPCe Percent Cover Analysis:**

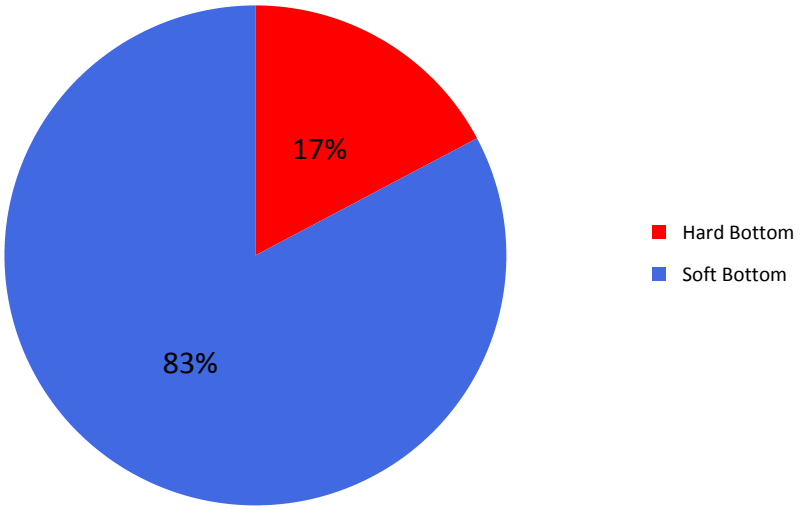
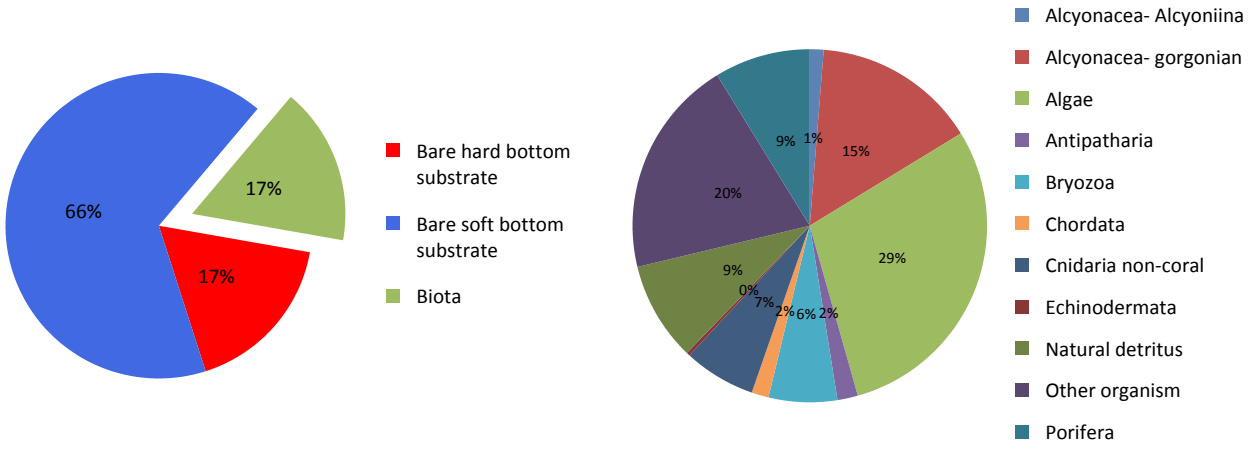



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-06. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-06.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-06; South Carolina, Outside/Inside Proposed Northern SC EXT, 75 m Ridge, UNCW Dive 56

**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 14-06.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 320 | 16.66% |
| Algae | 94 | 4.89% |
| Corallinales/crustose coralline | 40 | 2.08% |
| Cyanophyta | 10 | 0.52% |
| Phaeophyta | 5 | 0.26% |
| Rhodophyta | 39 | 2.03% |
| Porifera | 28 | 1.46% |
| Agelas sp. | 2 | 0.10% |
| Astrophorida | 1 | 0.05% |
| Demospongiae | 18 | 0.94% |
| Demospongiae- ze tan starlet | 1 | 0.05% |
| Hadromerida | 1 | 0.05% |
| Ircinia sp. | 1 | 0.05% |
| Spirastrellidae | 2 | 0.10% |
| Xestospongia muta | 2 | 0.10% |
| Alcyonacea- Alcyoniina | 4 | 0.21% |
| Alcyonacea | 2 | 0.10% |
| Chironephthya caribaea | 2 | 0.10% |
| Alcyonacea- gorgonian | 48 | 2.50% |
| Diodogorgia sp. | 10 | 0.52% |
| Ellisella sp. | 9 | 0.47% |
| Ellisellidae | 1 | 0.05% |
| Gorgonacea | 25 | 1.30% |
| Nicella sp. | 2 | 0.10% |
| Leptogorgia sp. | 1 | 0.05% |
| Antipatharia | 6 | 0.31% |
| Antipatharia | 6 | 0.31% |
| Cnidaria non-coral | 21 | 1.09% |
| Hydroidolina | 20 | 1.04% |
| Zoanthidae | 1 | 0.05% |
| Bryozoa | 20 | 1.04% |
| Bryozoa | 12 | 0.62% |
| Schizoporella sp. | 8 | 0.42% |
| Echinodermata | 1 | 0.05% |
| Asteroidea | 1 | 0.05% |

**Dive Site:** ROV 14-06; South Carolina, Outside/Inside Proposed Northern SC EXT, 75 m Ridge, UNCW Dive 56

| | | |
|---|---|---|
| Chordata | 5 | 0.26% |
| Ascidiacea | 4 | 0.21% |
| Fish | 1 | 0.05% |
| Other organism | 64 | 3.33% |
| Natural detritus | 29 | 1.51% |
| Bare soft bottom substrate | 1269 | 66.06% |
| Bare hard bottom substrate | 332 | 17.28% |
| Bare hard bottom substrate | 332 | 17.28% |
| Bare rock- pavement boulder ledge | 196 | 10.20% |
| Bare rubble- rock | 136 | 7.08% |
| **Grand Total** | **1921** | **100.00%** |

**Dive Site:** ROV 14-06; South Carolina, Outside/Inside Proposed Northern SC EXT, 75 m Ridge, UNCW Dive 56

**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-06.

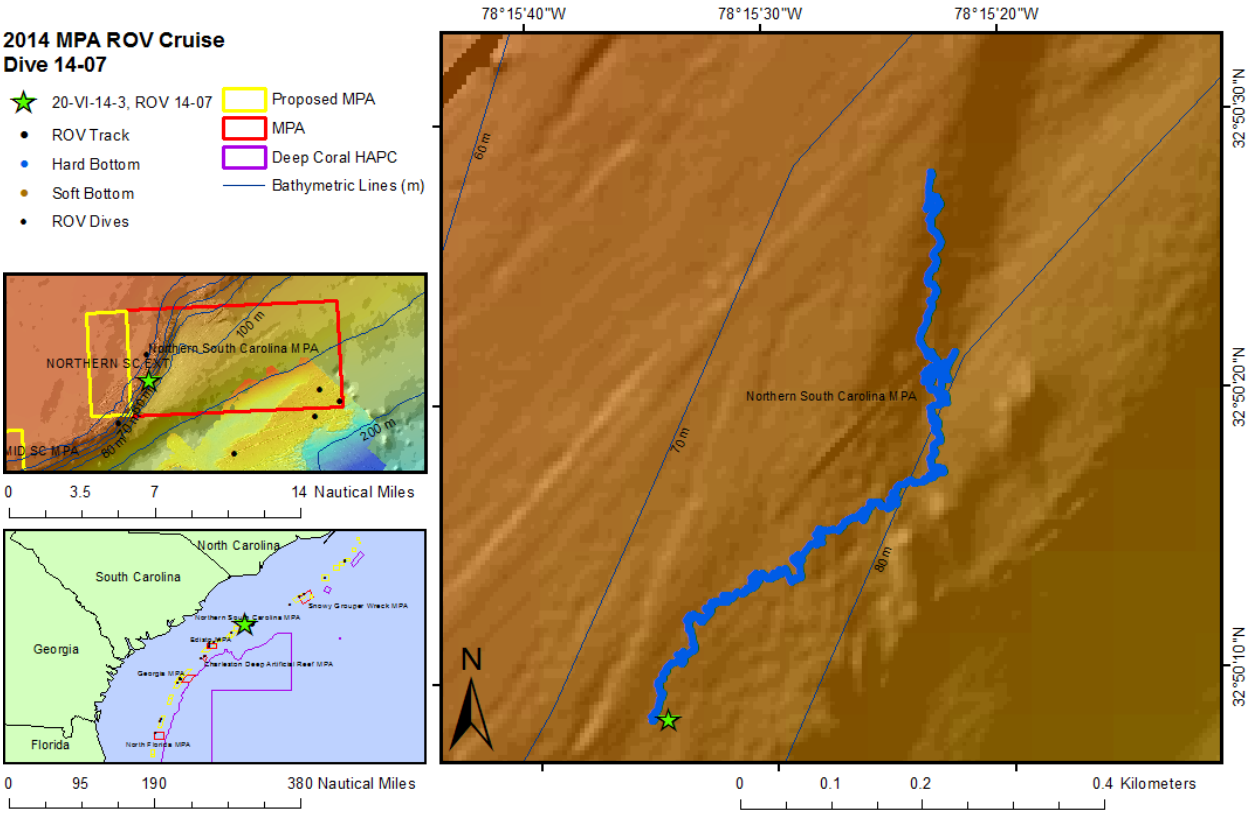
| Scientific Name | Common Name | Density |
|---|---|---|
| *Acanthurus* sp. | doctorfish | 0.0001 |
| *Apogon affinis* | bigtooth cardinalfish | 0.0068 |
| *Balistes vetula* | queen triggerfish | 0.0001 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0013 |
| *Calamus* sp. | porgy | 0.0007 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0042 |
| *Centropyge argi* | cherubfish | 0.0010 |
| *Cephalopholis cruentata* | graysby | 0.0001 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0005 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0019 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0042 |
| *Chromis insolata* | sunshinefish | 0.0025 |
| *Chromis scotti* | purple reeffish | 0.0018 |
| *Chromis* sp. | damselfish | 0.0090 |
| *Dasyatis americana* | southern stingray | 0.0001 |
| *Decodon puellaris* | red hogfish | 0.0001 |
| *Epinephelus drummondhayi* | speckled hind | 0.0012 |
| *Halichoeres bivitattus* | greenband wrasse | 0.0001 |
| *Halichoeres* sp. | wrasse | 0.0143 |
| *Holacanthus bermudensis* | blue angelfish | 0.0007 |
| *Holacanthus tricolor* | rock beauty | 0.0001 |
| Holocentridae | squirrelfish | 0.0008 |
| *Lachnolaimus maximus* | hogfish | 0.0010 |
| *Liopropoma eukrines* | wrasse bass | 0.0005 |
| *Lutjanus* sp. | snapper | 0.0001 |
| *Muraena retifera* | reticulate moray eel | 0.0001 |
| *Mycteroperca microlepis* | gag grouper | 0.0001 |
| *Mycteroperca phenax* | scamp | 0.0004 |
| *Paranthias furcifer* | creole-fish | 0.0006 |
| *Pareques umbrosus* | cubbyu | 0.0016 |
| *Pomacanthus* sp. | angelfish | 0.0001 |
| *Pristigenys alta* | short bigeye | 0.0005 |
| *Prognathodes aya* | bank butterflyfish | 0.0011 |
| *Pronotogrammus martinicensis* | roughtongue bass | 0.0035 |
| *Pterois volitans* | lionfish | 0.0013 |
| *Seriola dumerili* | greater amberjack | 0.0004 |
| *Seriola fasciata* | lesser amberjack | 0.0063 |

**Dive Site:** ROV 14-06; South Carolina, Outside/Inside Proposed Northern SC EXT, 75 m Ridge, UNCW Dive 56

| | | |
|---|---|---|
| *Seriola rivoliana* | almaco jack | 0.0008 |
| *Seriola* sp. | amberjack | 0.0010 |
| *Serranus annularis* | orangeback bass | 0.0004 |
| *Serranus phoebe* | tattler | 0.0033 |
| *Sphoeroides spengleri* | bandtail puffer | 0.0005 |
| *Synodus intermedius* | sand diver | 0.0001 |

**Dive Site:** ROV 14-07; South Carolina, Inside Northern South Carolina MPA, 75 m Slope, UNCW Dive 57

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

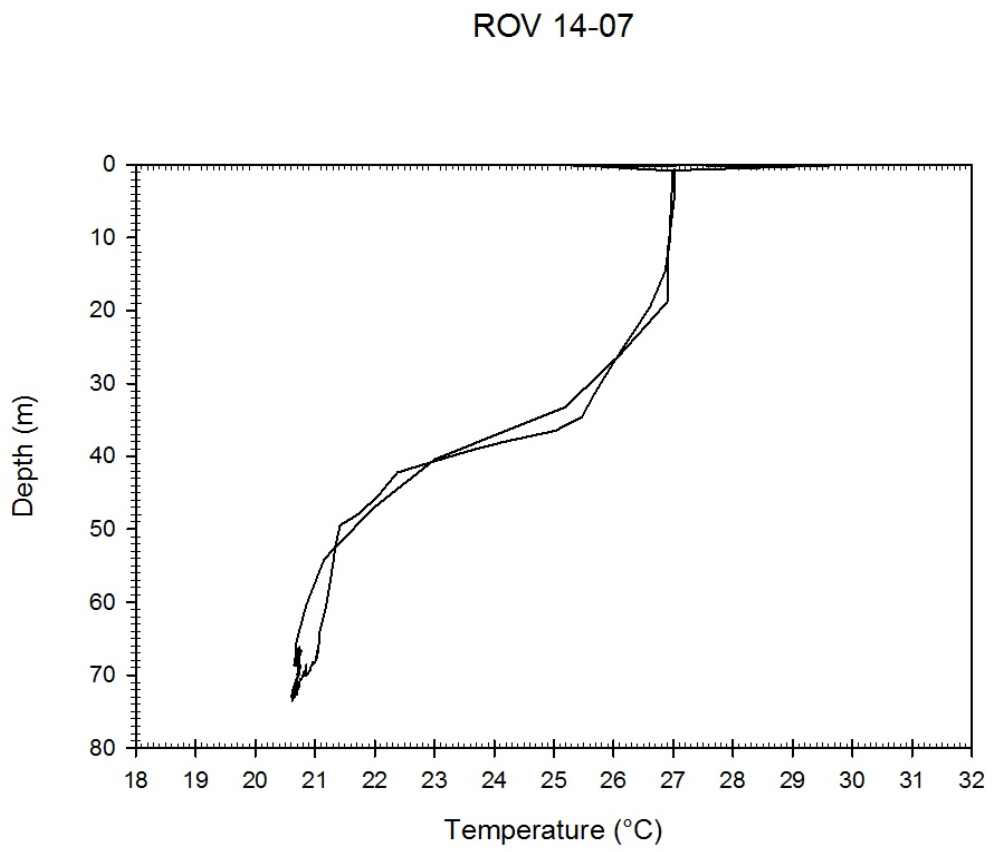
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Sedberry_ngdc_UTM17N_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/20/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 71 |
| **DVD:** | 1 |
| **Hard Drive:** | 1 |

| | |
|---|---|
| **Dive Site:** | ROV 14-07; South Carolina, Inside Northern South Carolina MPA, 75 m Slope, UNCW Dive 57 |

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -66 | **Total Transect Length (km):** | 0.69 |
| **Maximum Bottom Depth (m):** | -74 | **Surface Current (kn):** | <1 |
| **On Bottom (Time- EDT):** | 15:09 | **On Bottom (Lat/Long):** | 32.84°N; -78.26°W |
| **Off Bottom (Time- EDT):** | 16:07 | **Off Bottom (Lat/Long):** | 32.84°N; -78.26°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-07; South Carolina, Inside Northern South Carolina MPA, 75 m Slope, UNCW Dive 57

**Dive Imagery:**

**Figure 1:** -72.2 m
*Ircinia campana* and *Callyspongia vaginalis* on rocky hard bottom

**Figure 2:** -72.2 m
*Spongosorites* with visible symbiotic *Siliquaria* sp.

**Figure 3:** -68.7 m
Hard bottom covered in fauna

**Figure 4:** -70.2 m
*Diodogorgia* and yellow unidentified gorgonians on hard bottom

**Dive Site:** ROV 14-07; South Carolina, Inside Northern South Carolina MPA, 75 m Slope, UNCW Dive 57

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-07, UNCW Mohawk ROV Dive 57; Site #- 20-VI-14-3. Target Site - South Carolina, Inside Northern South Carolina MPA, 75 m Slope. Ground-truth multibeam sonar of site (Sedberry_ngdc_UTM17N_MB_Grid). Conduct video/photo transect.

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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image.

Site Description/Habitat/Biota:
Transected over sediment bottom with few areas of exposed pavement along the slope. Dominated by hydroids, gorgonians, bryozoans and Ircinia sponges (saw *Siliquaria* - 1st one this cruise- spiral shaped mollusk that lives in sponges)

**Dive Site:** ROV 14-07; South Carolina, Inside Northern South Carolina MPA, 75 m Slope, UNCW Dive 57

**CPCe Percent Cover Analysis:**

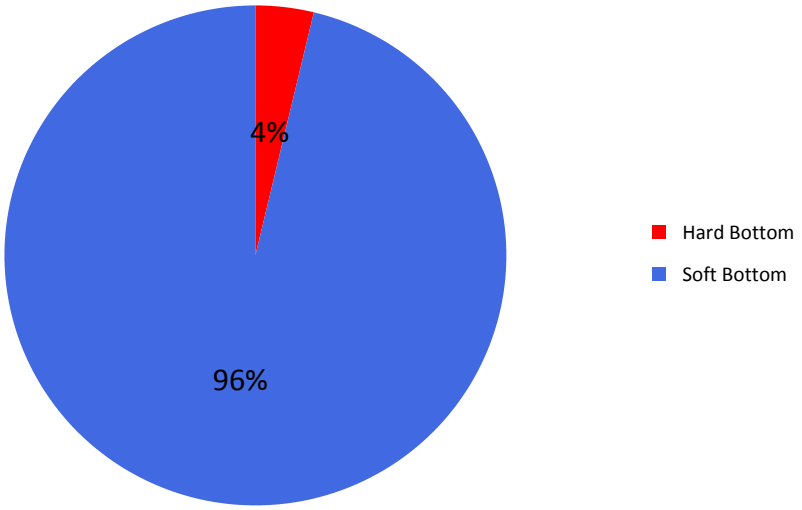
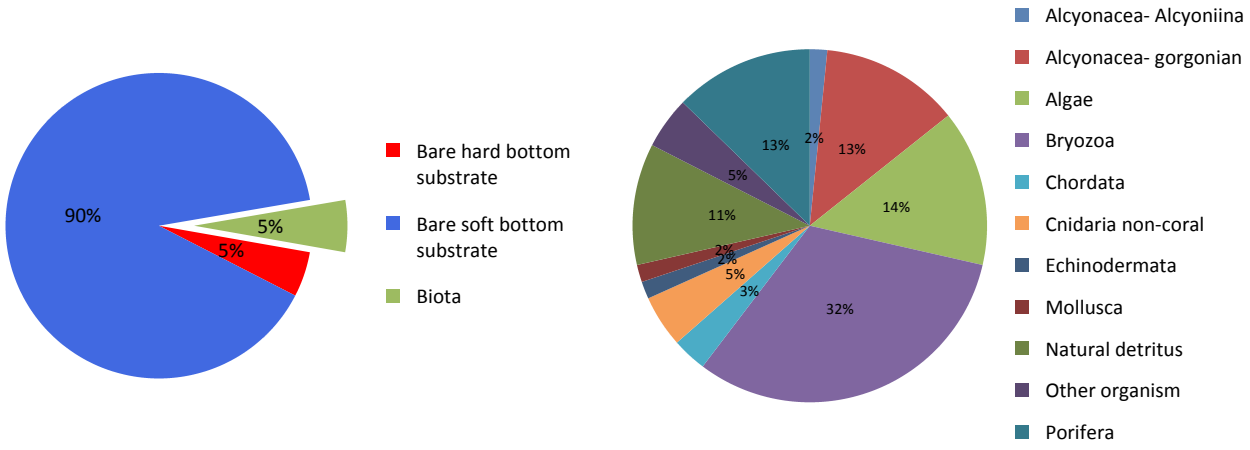



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-07. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-07.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-07; South Carolina, Inside Northern South Carolina MPA, 75 m Slope, UNCW Dive 57

**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 14-07.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 63 | 5.49% |
| Algae | 9 | 0.78% |
| Corallinales/crustose coralline | 6 | 0.52% |
| Rhodophyta | 3 | 0.26% |
| Porifera | 8 | 0.70% |
| Demospongiae | 2 | 0.17% |
| Demospongiae- ze tan starlet | 1 | 0.09% |
| Dictyoceratida | 3 | 0.26% |
| Spirastrellidae | 1 | 0.09% |
| Spongosorites sp. | 1 | 0.09% |
| Alcyonacea- Alcyoniina | 1 | 0.09% |
| Alcyonacea | 1 | 0.09% |
| Alcyonacea- gorgonian | 8 | 0.70% |
| Bebryce sp. | 1 | 0.09% |
| Diodogorgia sp. | 1 | 0.09% |
| Ellisella sp. | 4 | 0.35% |
| Ellisellidae | 1 | 0.09% |
| Gorgonacea | 1 | 0.09% |
| Cnidaria non-coral | 3 | 0.26% |
| Hydroidolina | 3 | 0.26% |
| Mollusca | 1 | 0.09% |
| Gastropoda | 1 | 0.09% |
| Bryozoa | 20 | 1.74% |
| Bryozoa | 17 | 1.48% |
| Schizoporella sp. | 3 | 0.26% |
| Echinodermata | 1 | 0.09% |
| Narcissia trigonaria | 1 | 0.09% |
| Chordata | 2 | 0.17% |
| Ascidiacea | 2 | 0.17% |
| Other organism | 3 | 0.26% |
| Natural detritus | 7 | 0.61% |
| Bare soft bottom substrate | 1030 | 89.72% |
| Bare hard bottom substrate | 55 | 4.79% |
| Bare hard bottom substrate | 55 | 4.79% |
| Bare rock- pavement boulder ledge | 26 | 2.26% |

**Dive Site:** ROV 14-07; South Carolina, Inside Northern South Carolina MPA, 75 m Slope, UNCW Dive 57

| | | |
|---|---|---|
| Bare rubble- rock | 29 | 2.53% |
| **Grand Total** | **1148** | **100.00%** |

**Dive Site:** ROV 14-07; South Carolina, Inside Northern South Carolina MPA, 75 m Slope, UNCW Dive 57

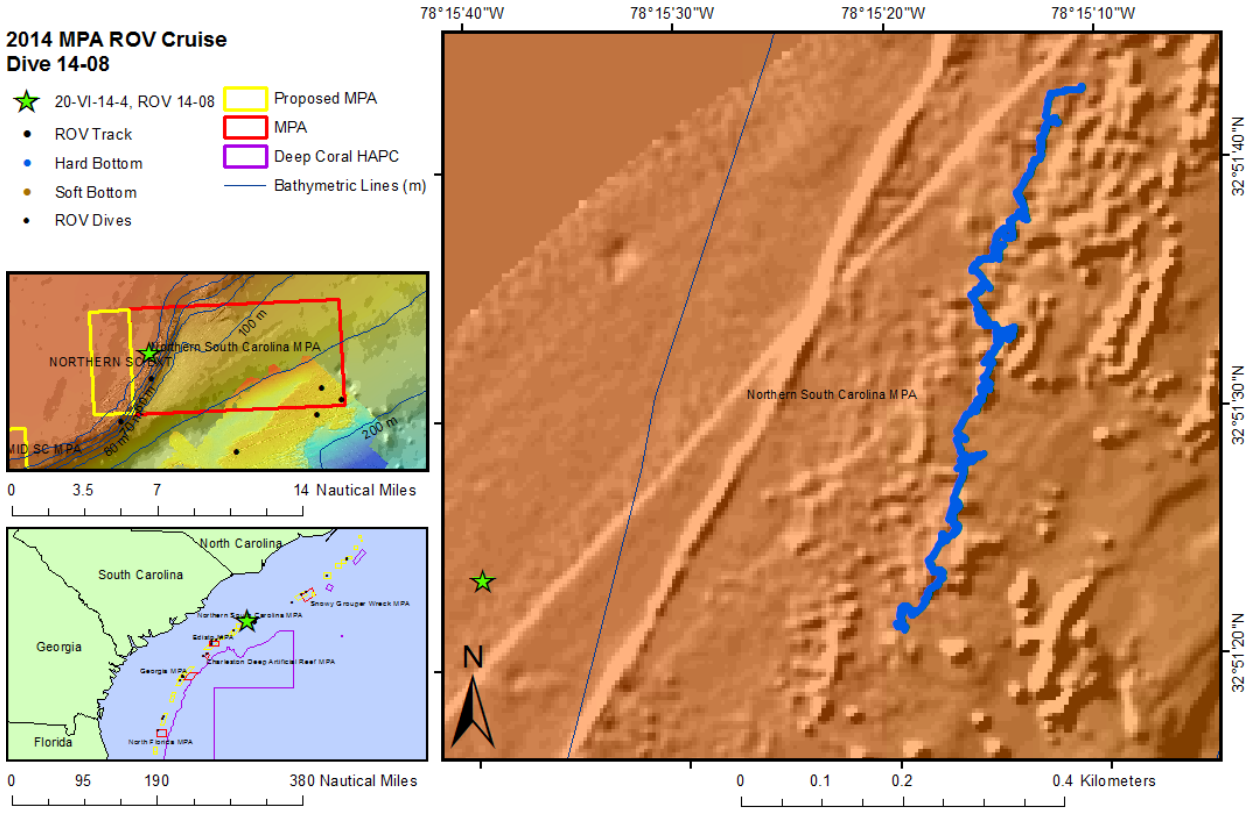
**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-07.

| Scientific Name | Common Name | Density |
|---|---|---|
| *Apogon pseudomaculatus* | twospot cardinalfish | 0.0001 |
| *Calamus* sp. | porgy | 0.0003 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0005 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0014 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0131 |
| *Halichoeres* sp. | wrasse | 0.0094 |
| *Holacanthus bermudensis* | blue angelfish | 0.0007 |
| *Liopropoma eukrines* | wrasse bass | 0.0001 |
| *Mycteroperca phenax* | scamp | 0.0003 |
| *Pagrus pagrus* | red porgy | 0.0010 |
| *Priacanthus arenatus* | bigeye | 0.0003 |
| *Pristigenys alta* | short bigeye | 0.0042 |
| *Prognathodes aya* | bank butterflyfish | 0.0005 |
| *Pterois volitans* | lionfish | 0.0002 |
| *Seriola rivoliana* | almaco jack | 0.0001 |
| *Serranus phoebe* | tattler | 0.0083 |
| *Stegastes partitus* | bicolor damselfish | 0.0002 |

**Dive Site:** ROV 14-08; South Carolina, Inside Northern South Carolina MPA, 51 m Knolls, UNCW Dive 58

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

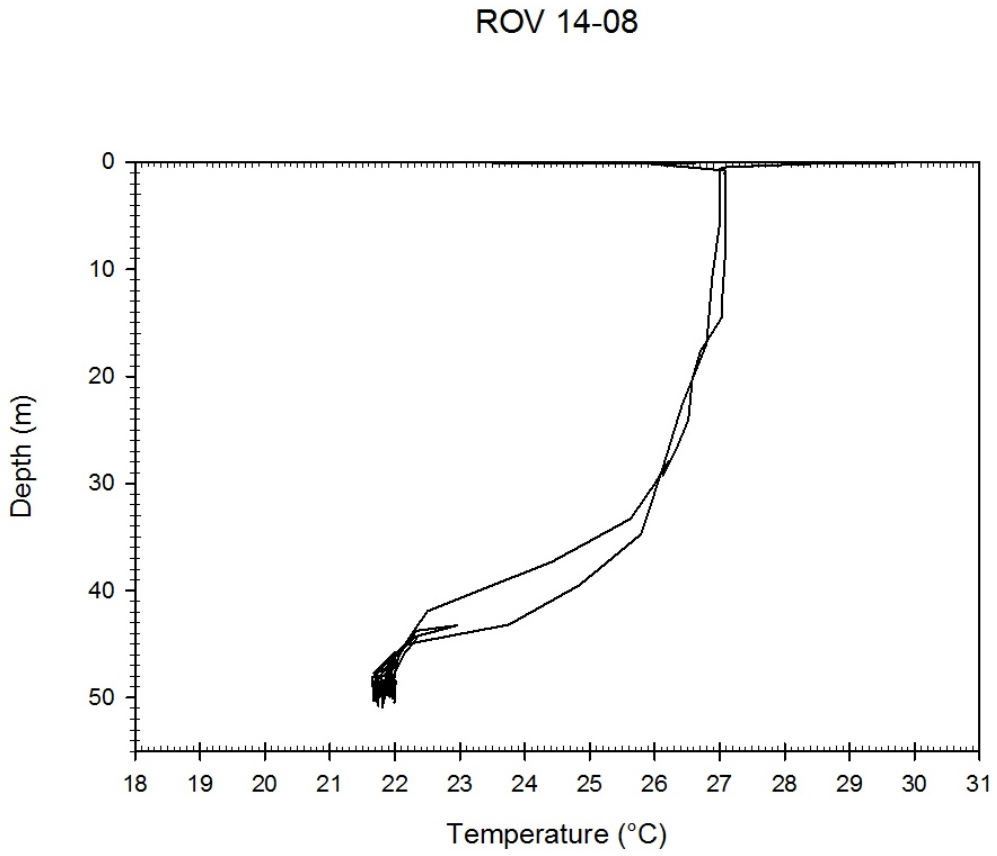
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Sedberry_ngdc_UTM17N_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/20/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 57 |
| **DVD:** | 1 |
| **Hard Drive:** | 0 |

| | |
|---|---|
| **Dive Site:** | ROV 14-08; South Carolina, Inside Northern South Carolina MPA, 51 m Knolls, UNCW Dive 58 |

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -44 | **Total Transect Length (km):** | 0.79 |
| **Maximum Bottom Depth (m):** | -52 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 17:17 | **On Bottom (Lat/Long):** | 32.86°N; -78.26°W |
| **Off Bottom (Time- EDT):** | 18:15 | **Off Bottom (Lat/Long):** | 32.86°N; -78.25°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-08; South Carolina, Inside Northern South Carolina MPA, 51 m Knolls, UNCW Dive 58

**Dive Imagery:**

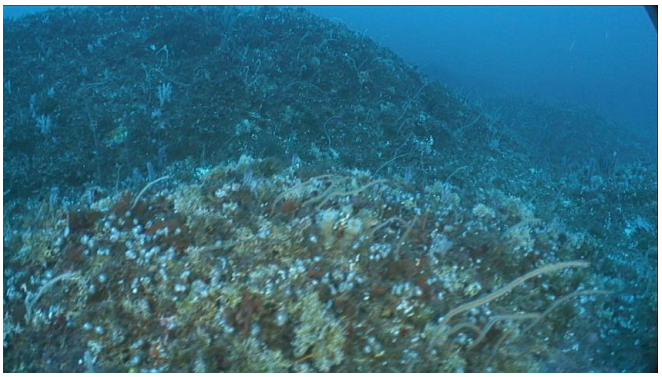


**Figure 1:** -49.5 m
Rounded rocky low rugosity mounds covered 100% in fauna

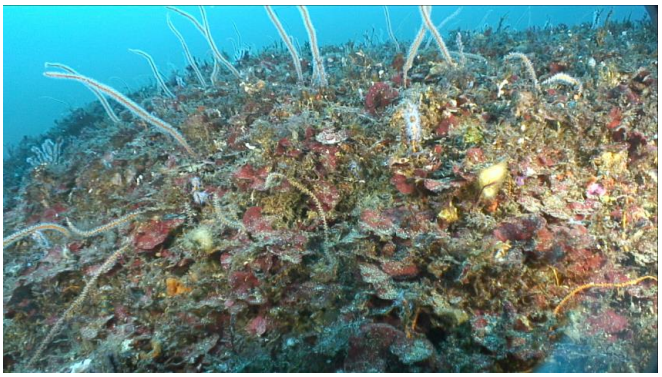


**Figure 2:** -49.5 m
Rounded rocky low rugosity mounds covered 100% in fauna

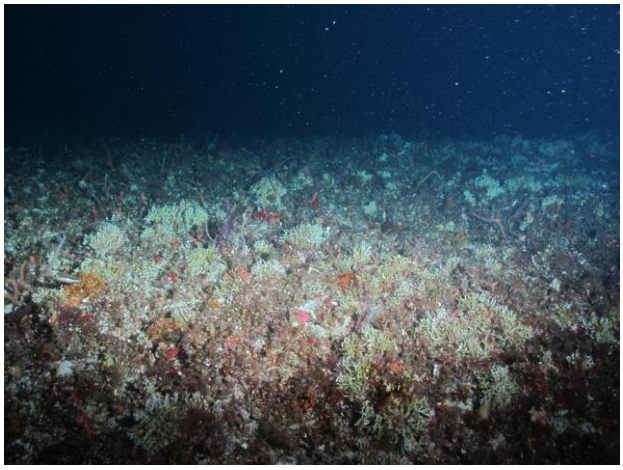


**Figure 3:** -50.1 m
Rounded rocky low rugosity mounds covered 100% in fauna

**Figure 4:** -51.3 m
Lionfish and white grunt on rocky outcrop

**Dive Site:** ROV 14-08; South Carolina, Inside Northern South Carolina MPA, 51 m Knolls, UNCW Dive 58

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-08, UNCW Mohawk ROV Dive 58; Site #- 20-VI-14-4. Target Site - South Carolina, Inside Northern South Carolina MPA, 51 m Knolls. Ground-truth multibeam sonar of site (Sedberry_ngdc_UTM17N_MB_Grid). Conduct video/photo transect over rocky knolls.

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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged live GPS track in ARC as .shp file under MSCSite #.

Site Description/Habitat/Biota:
Landed on smooth rocky knolls. Rounded rock knolls, 1 m tall x 5 m wide. Clumped algae and fauna make a thick cover of 100% on the hard ground knolls. So much fauna it is hard to identify it all. Almost no fish, and only 1 scamp. The knolls taper out (get shorter , <1 m tall) to the west. They appear to match the multibeam map. Dominated by Dictyota, Diodogorgia, Ellisellidae, Ircinia, and algae.

**Dive Site:** ROV 14-08; South Carolina, Inside Northern South Carolina MPA, 51 m Knolls, UNCW Dive 58

**CPCe Percent Cover Analysis:**

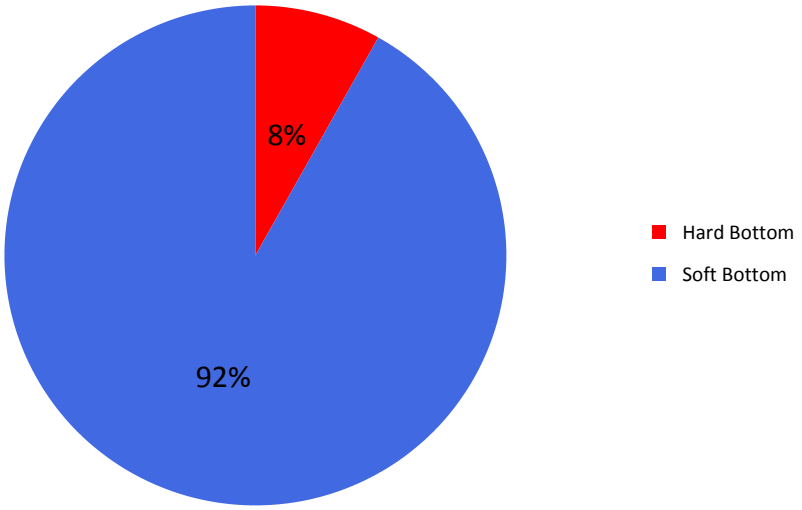
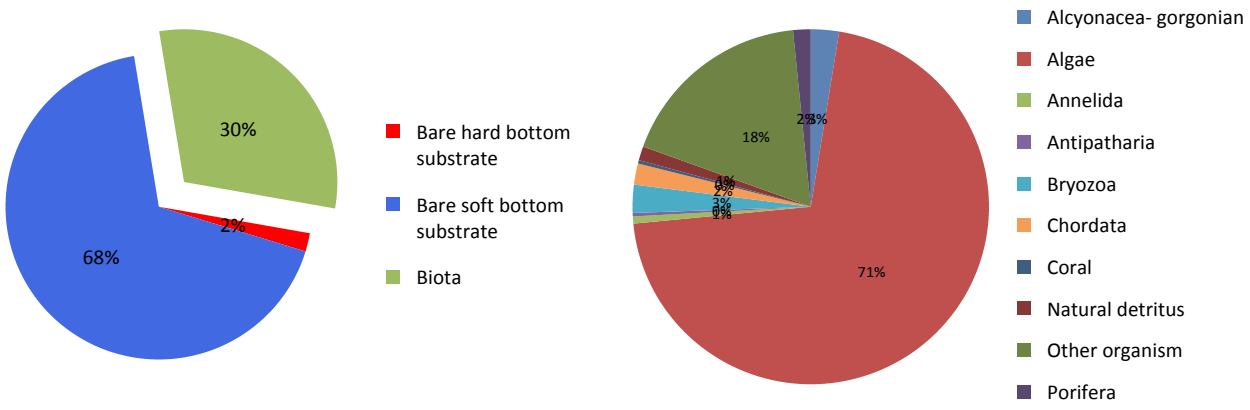



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-08. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-08.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-08; South Carolina, Inside Northern South Carolina MPA, 51 m Knolls, UNCW Dive 58

**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 14-08.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 313 | 30.36% |
| Algae | 222 | 21.53% |
| Chlorophyta | 4 | 0.39% |
| Corallinales/crustose coralline | 5 | 0.48% |
| Cyanophyta | 63 | 6.11% |
| Phaeophyta | 94 | 9.12% |
| Rhodophyta | 56 | 5.43% |
| Porifera | 5 | 0.48% |
| Demospongiae | 3 | 0.29% |
| Demospongiae- ze tan starlet | 2 | 0.19% |
| Coral | 1 | 0.10% |
| Scleractinia solitary | 1 | 0.10% |
| Alcyonacea- gorgonian | 8 | 0.78% |
| Diodogorgia sp. | 3 | 0.29% |
| Ellisella sp. | 4 | 0.39% |
| Gorgonacea | 1 | 0.10% |
| Antipatharia | 1 | 0.10% |
| Antipatharia | 1 | 0.10% |
| Annelida | 2 | 0.19% |
| Filograna sp. | 2 | 0.19% |
| Bryozoa | 8 | 0.78% |
| Bryozoa | 4 | 0.39% |
| Schizoporella sp. | 4 | 0.39% |
| Chordata | 6 | 0.58% |
| Ascidiacea | 5 | 0.48% |
| Fish | 1 | 0.10% |
| Other organism | 56 | 5.43% |
| Natural detritus | 4 | 0.39% |
| Bare soft bottom substrate | 698 | 67.70% |
| Bare hard bottom substrate | 20 | 1.94% |
| Bare hard bottom substrate | 20 | 1.94% |
| Bare rock- pavement boulder ledge | 11 | 1.07% |
| Bare rubble- rock | 9 | 0.87% |
| **Grand Total** | **1031** | **100.00%** |

**Dive Site:** ROV 14-08; South Carolina, Inside Northern South Carolina MPA, 51 m Knolls, UNCW Dive 58

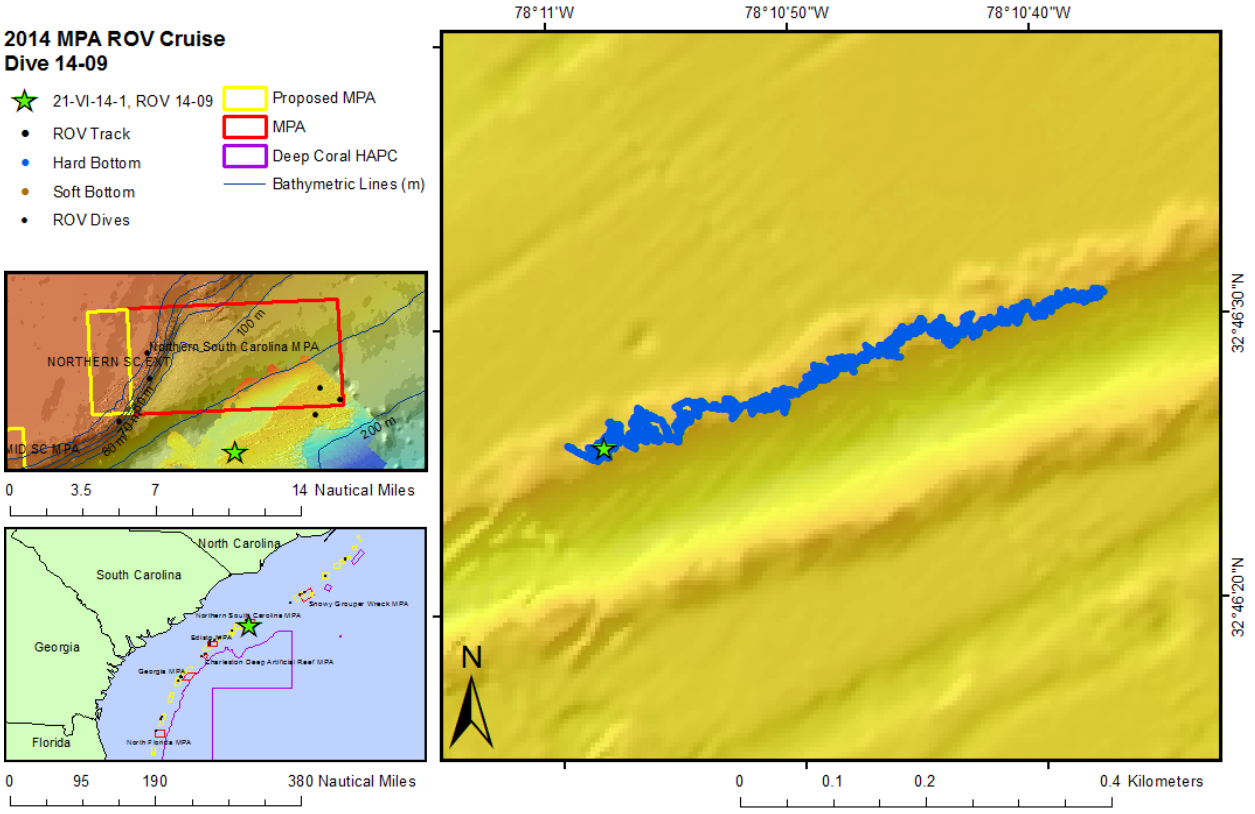
**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-08.

| Scientific Name | Common Name | Density |
|---|---|---|
| *Acanthurus* sp. | doctorfish | 0.0002 |
| *Alerterus* sp. | filefish | 0.0001 |
| *Balistes capriscus* | grey triggerfish | 0.0001 |
| *Balistes vetula* | queen triggerfish | 0.0001 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0003 |
| *Calamus* sp. | porgy | 0.0009 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0012 |
| *Centropristis striata* | black sea bass | 0.0001 |
| *Centropyge argi* | cherubfish | 0.0001 |
| *Cephalopholis cruentata* | graysby | 0.0001 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0003 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0010 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0009 |
| *Chromis insolata* | sunshinefish | 0.0001 |
| *Chromis* sp. | damselfish | 0.0003 |
| *Gymnothorax moringa* | spotted moray eel | 0.0001 |
| *Haemulon plumieri* | white grunt | 0.0001 |
| *Halichoeres garnoti* | yellowhead wrasse | 0.0002 |
| *Halichoeres* sp. | wrasse | 0.0040 |
| *Holacanthus bermudensis* | blue angelfish | 0.0006 |
| Holocentridae | squirrelfish | 0.0004 |
| *Lachnolaimus maximus* | hogfish | 0.0002 |
| *Lactophrys quadricornis* | scrawled cowfish | 0.0001 |
| *Lactophrys* sp. | cowfish | 0.0001 |
| *Liopropoma eukrines* | wrasse bass | 0.0002 |
| *Mycteroperca phenax* | scamp | 0.0001 |
| *Pagrus pagrus* | red porgy | 0.0013 |
| *Prognathodes aya* | bank butterflyfish | 0.0002 |
| *Pterois volitans* | lionfish | 0.0003 |
| *Seriola rivoliana* | almaco jack | 0.0001 |
| *Serranus annularis* | orangeback bass | 0.0001 |
| *Serranus phoebe* | tattler | 0.0005 |
| Sparidae | porgy | 0.0001 |
| *Sparisoma atomarium* | greenblotch parrotfish | 0.0001 |

**Dive Site:** ROV 14-09; South Carolina, Outside Northern South Carolina MPA, 170 m Iceberg Scar, UNCW Dive 59

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

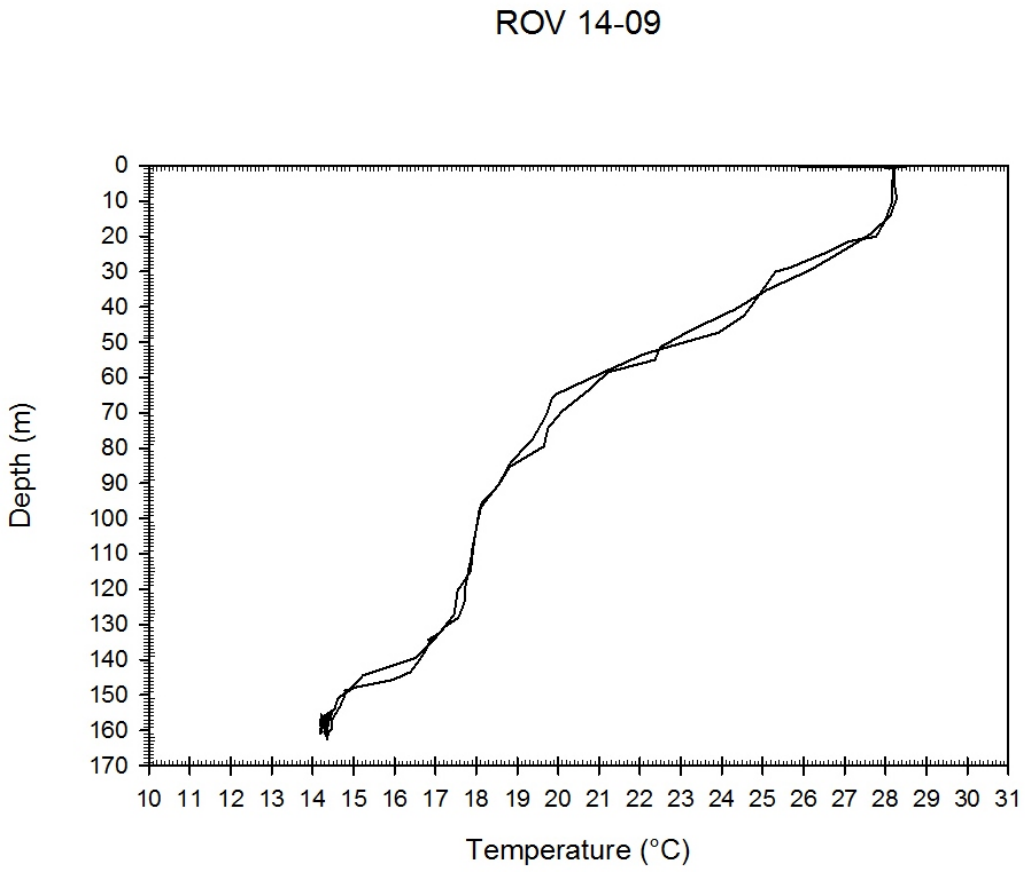
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Sedberry_OEBlock2_5m_UTM17N_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/21/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 124 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-09; South Carolina, Outside Northern South Carolina MPA, 170 m Iceberg Scar, UNCW Dive 59

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -155 | **Total Transect Length (km):** | 0.60 |
| **Maximum Bottom Depth (m):** | -164 | **Surface Current (kn):** | 0.25 |
| **On Bottom (Time- EDT):** | 8:16 | **On Bottom (Lat/Long):** | 32.77°N; -78.18°W |
| **Off Bottom (Time- EDT):** | 9:51 | **Off Bottom (Lat/Long):** | 32.78°N; -78.18°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-09; South Carolina, Outside Northern South Carolina MPA, 170 m Iceberg Scar, UNCW Dive 59

**Dive Imagery:**

**Figure 1:** -158 m
Spider crab on soft bottom

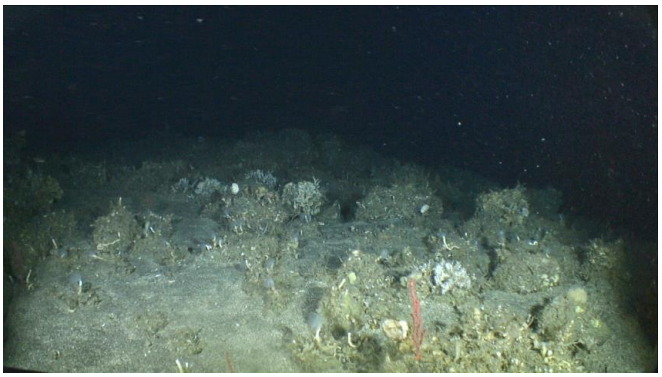


**Figure 2:** -158 m
Rocky hard bottom, typical of the edges of iceberg scars

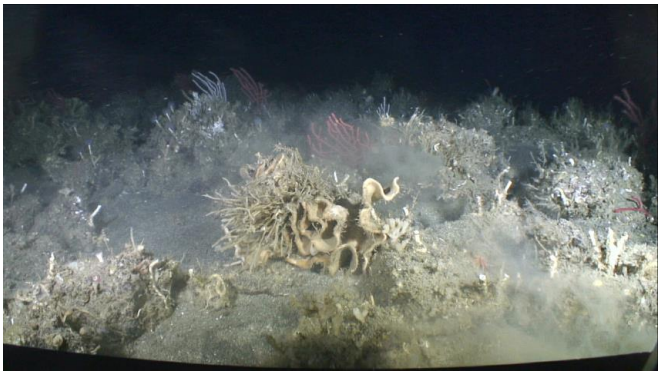


**Figure 3:** -159.4 m
*Leiodermatium* and rock along iceberg scar

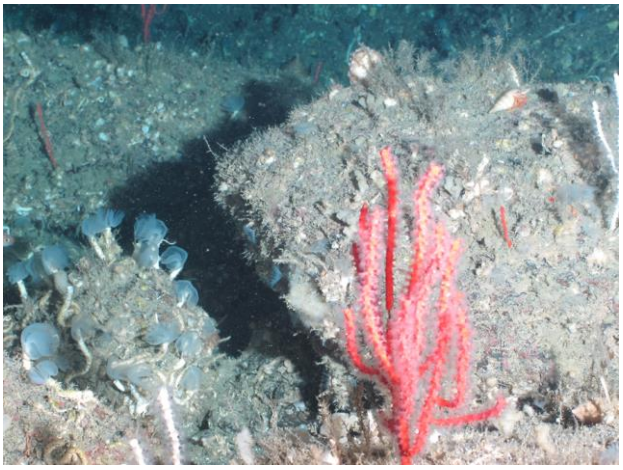


**Figure 4:** -160.2 m
*Nicella* and serpulid worms

**Dive Site:** ROV 14-09; South Carolina, Outside Northern South Carolina MPA, 170 m Iceberg Scar, UNCW Dive 59

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-09, UNCW Mohawk ROV Dive 59; Site #- 21-VI-14-1. Target Site - South Carolina, Outside Northern South Carolina MPA, 170 m Iceberg Scar. Ground-truth multibeam sonar of site (Sedberry_OEBlock2_5m_UTM17N_MB_Grid). Conduct video/photo transect east across the iceberg scar.

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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Tracking is poor. Live Track log: ROV14_09.

Site Description/Habitat/Biota:
Northern edge of the iceberg scar is a jumble of rocks, < 1 m wide and up to 3 m tall with barren rippled sediment between. 100% clean rippled sediment at the base of the northern edge of the scar to the south and north. Three tilefish, snowy groupers, boarfish and eels; the bottom is thick with Leiodermatium and Corallistidae sponges and serpulid feather duster worms. Sediment has many Holothuria lentiginosa enodis, and one slit shell sighted.

**Dive Site:** ROV 14-09; South Carolina, Outside Northern South Carolina MPA, 170 m Iceberg Scar, UNCW Dive 59

**CPCe Percent Cover Analysis:**

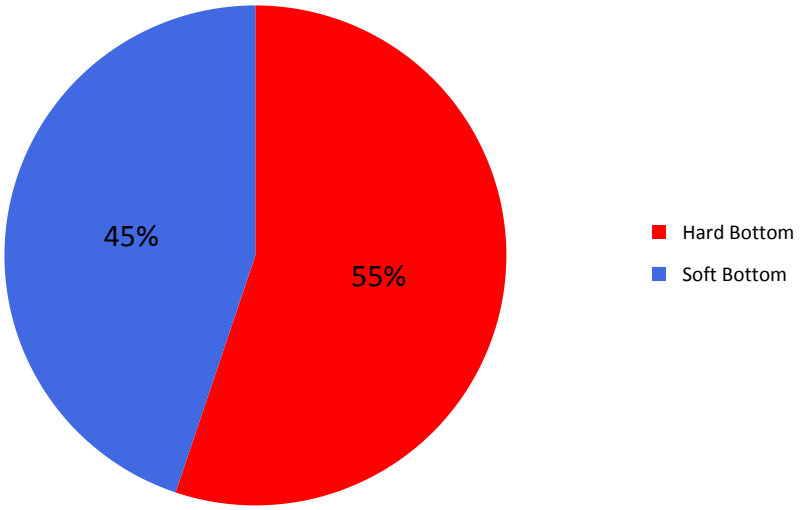
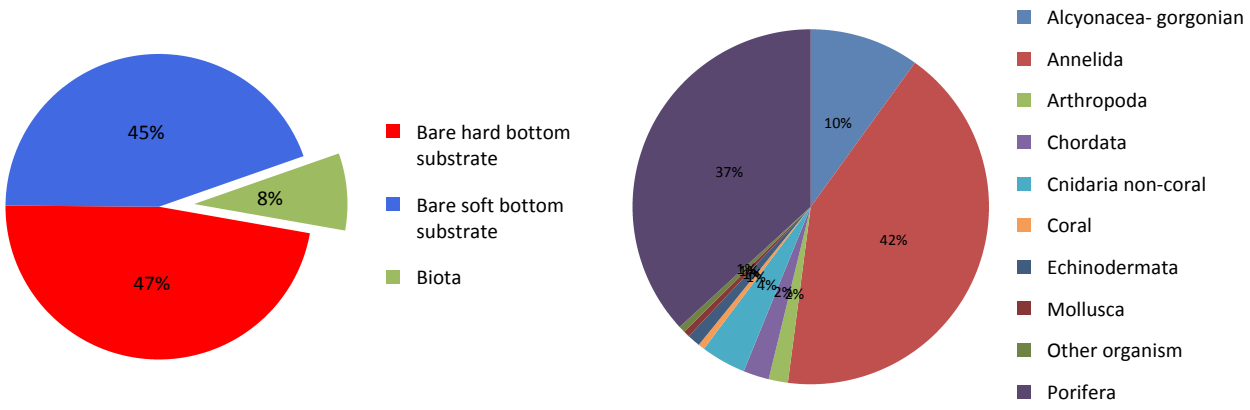



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-09. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-09.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-09; South Carolina, Outside Northern South Carolina MPA, 170 m Iceberg Scar, UNCW Dive 59

**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 14-09.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 171 | 8.15% |
| Porifera | 63 | 3.00% |
| Corallistidae | 8 | 0.38% |
| Demospongiae | 10 | 0.48% |
| Farrea sp. | 2 | 0.10% |
| Leiodermatium sp. | 43 | 2.05% |
| Coral | 1 | 0.05% |
| Scleractinia solitary | 1 | 0.05% |
| Alcyonacea- gorgonian | 17 | 0.81% |
| Gorgonacea | 1 | 0.05% |
| Nicella sp. | 7 | 0.33% |
| Telesto sp./Carijoa sp. | 9 | 0.43% |
| Cnidaria non-coral | 7 | 0.33% |
| Hydroidolina | 7 | 0.33% |
| Annelida | 72 | 3.43% |
| Annelida | 37 | 1.76% |
| Filograna sp. | 3 | 0.14% |
| Serpulidae | 32 | 1.53% |
| Mollusca | 1 | 0.05% |
| Gastropoda | 1 | 0.05% |
| Arthropoda | 3 | 0.14% |
| Majidae | 1 | 0.05% |
| Paguridae | 2 | 0.10% |
| Echinodermata | 2 | 0.10% |
| Asteroidea | 1 | 0.05% |
| Paracolochirus mysticus | 1 | 0.05% |
| Chordata | 4 | 0.19% |
| Fish | 4 | 0.19% |
| Other organism | 1 | 0.05% |
| Bare soft bottom substrate | 934 | 44.52% |
| Bare hard bottom substrate | 993 | 47.33% |
| Bare hard bottom substrate | 993 | 47.33% |
| Bare rock- pavement boulder ledge | 990 | 47.19% |
| Bare rubble- rock | 3 | 0.14% |
| **Grand Total** | **2098** | **100.00%** |

**Dive Site:** ROV 14-09; South Carolina, Outside Northern South Carolina MPA, 170 m Iceberg Scar, UNCW Dive 59

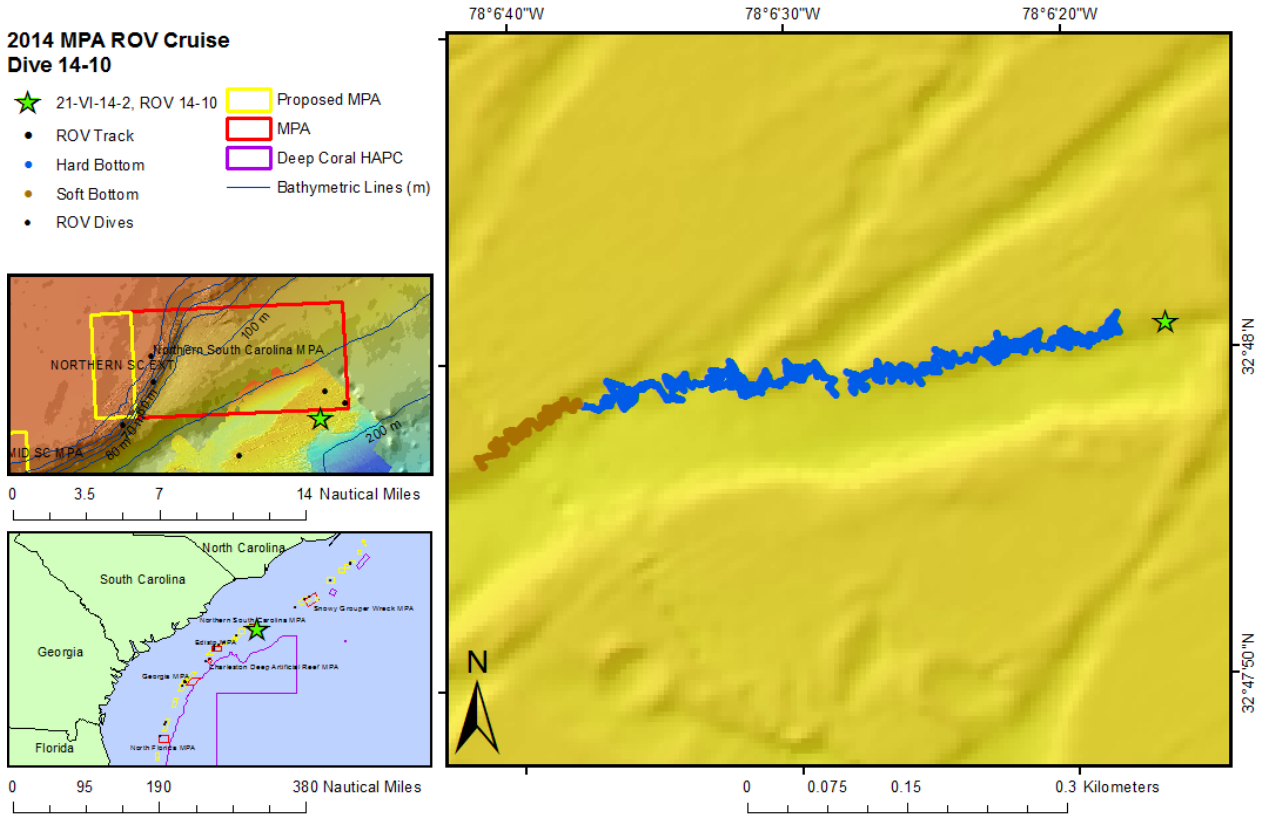
**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-09.

| Scientific Name | Common Name | Density |
|---|---|---|
| *Anthias nicholsi* | yellowfin bass | 0.0050 |
| Anthiinae | anthiid | 0.0119 |
| *Antigonia capros* | deepbody boarfish | 0.0107 |
| *Caulolatilus microps* | blueline tilefish | 0.0001 |
| *Decodon puellaris* | red hogfish | 0.0003 |
| *Gephyroberyx darwinii* | big roughy | 0.0005 |
| *Halichoeres* sp. | wrasse | 0.0002 |
| *Hemanthias vivanus* | red barbier | 0.0009 |
| Holocentridae | squirrelfish | 0.0001 |
| *Hyporthodus niveatus* | snowy grouper | 0.0013 |
| *Laemonema* sp. | mora cod | 0.0003 |
| *Muraena retifera* | reticulate moray eel | 0.0001 |
| *Pagrus pagrus* | red porgy | 0.0012 |
| *Pareques iwamotoi* | blackbar drum | 0.0003 |
| *Plectranthias garrupellus* | apricot bass | 0.0002 |
| *Pronotogrammus martinicensis* | roughtongue bass | 0.0004 |
| Scorpaenidae | scorpionfish | 0.0003 |
| *Seriola rivoliana* | almaco jack | 0.0001 |
| *Seriola* sp. | amberjack | 0.0106 |
| *Synagrops* sp. | synagrops sea bass | 0.0003 |

**Dive Site:** ROV 14-10; South Carolina, Outside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 60

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

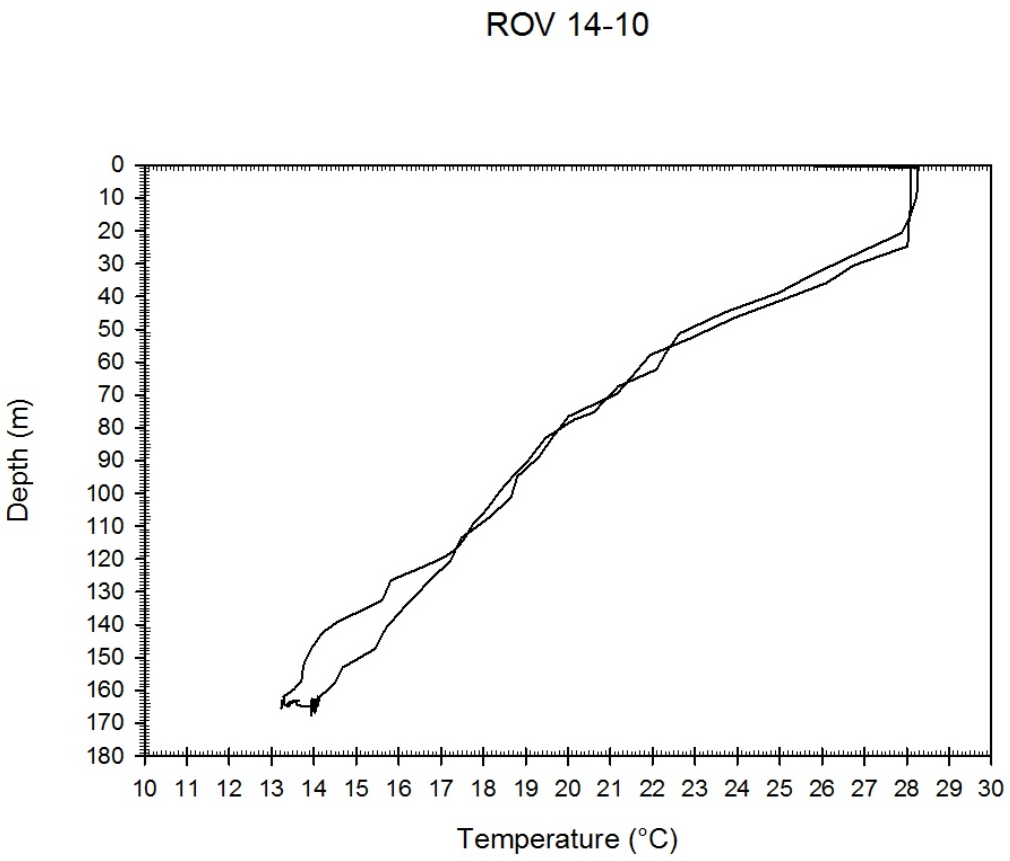
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Sedberry_OEBlock2_5m_UTM17N_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/21/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 104 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-10; South Carolina, Outside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 60

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -163 | **Total Transect Length (km):** | 0.62 |
| **Maximum Bottom Depth (m):** | -168 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 11:04 | **On Bottom (Lat/Long):** | 32.8°N; -78.11°W |
| **Off Bottom (Time- EDT):** | 12:17 | **Off Bottom (Lat/Long):** | 32.8°N; -78.11°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-10; South Carolina, Outside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 60

**Dive Imagery:**

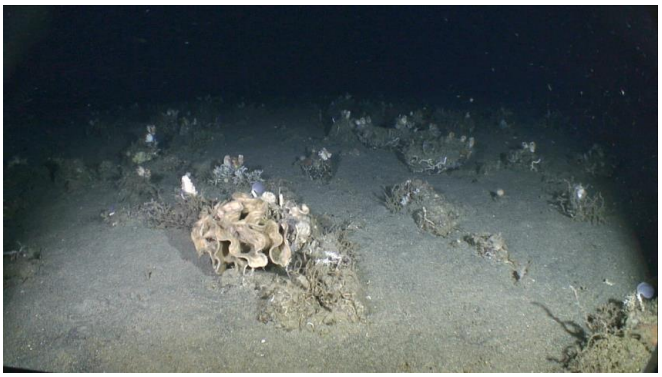


**Figure 1:** -164.4 m
*Leiodermatium* rest on scattered rocks

**Figure 2:** -164.4 m
Unidentified cream colored sponge

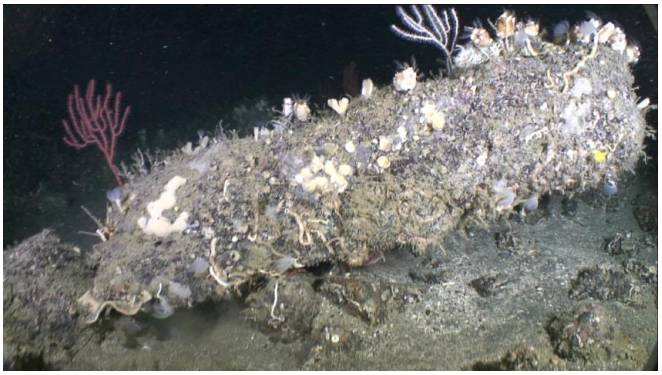


**Figure 3:** -165.4 m
Large rock outcrop with typical macrobiota

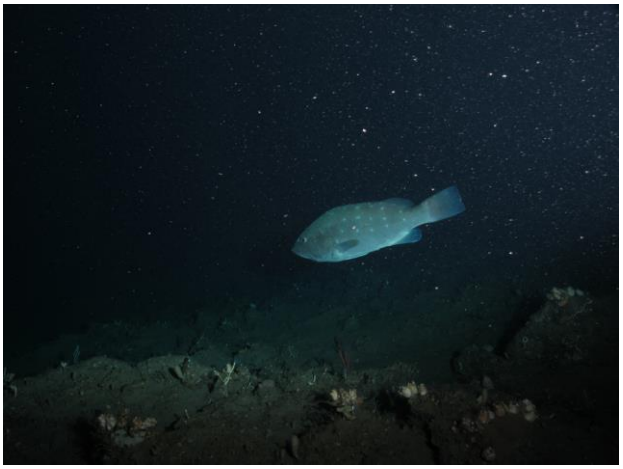


**Figure 4:** -166 m
Snowy grouper

**Dive Site:** ROV 14-10; South Carolina, Outside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 60

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-10, UNCW Mohawk ROV Dive 60; Site #- 21-VI-14-2. Target Site - South Carolina, Outside Northern South Carolina MPA, 165 m Iceberg Scar. Ground-truth multibeam sonar of site (Sedberry_OEBlock2_5m_UTM17N_MB_Grid). Conduct video/photo transect east across the iceberg scar.

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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Tracking little bit scattered throughout dive.

Site Description/Habitat/Biota:
Northern side of iceberg scar, smooth sediment with scattered rock boulders (20-40 cm wide/tall). Loads of Paracolochirus mysticus and tilefish. Crossed two intersecting iceberg scars during the transect; the bases of which were sediment. Between the two scars at the intersection was a large jumble of piled 2-3 m boulders with overhangs. There was a large amount of Paracolochirus mysticus throughout the dive and patches of Leiodermatium, and one carrier shell sighted.

**Dive Site:** ROV 14-10; South Carolina, Outside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 60

**CPCe Percent Cover Analysis:**

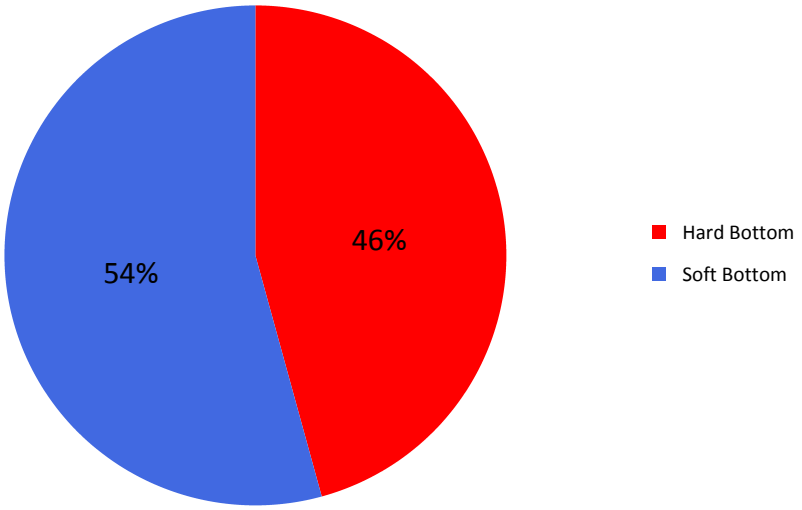
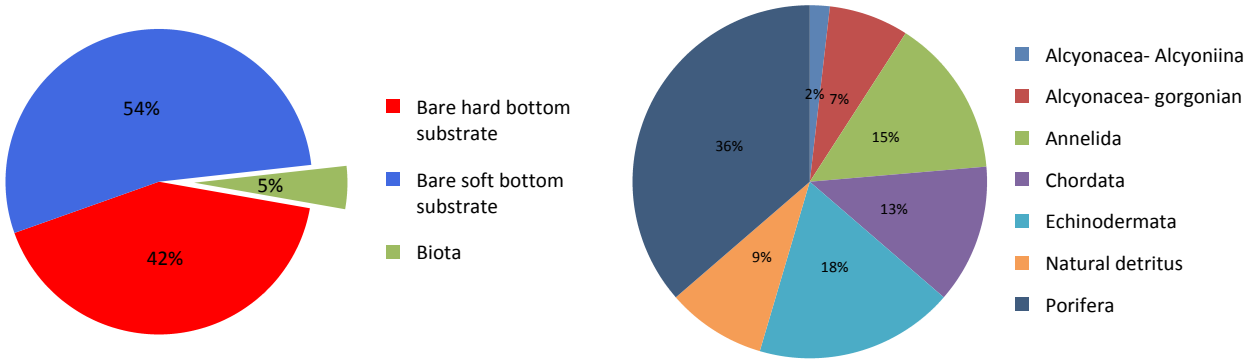



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-10. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-10.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-10; South Carolina, Outside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 60

**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 14-10.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 55 | 4.55% |
| Porifera | 20 | 1.65% |
| Demospongiae | 6 | 0.50% |
| Demospongiae- MPA03 | 2 | 0.17% |
| Farrea sp. | 1 | 0.08% |
| Leiodermatium sp. | 11 | 0.91% |
| Alcyonacea- Alcyoniina | 1 | 0.08% |
| Alcyonacea | 1 | 0.08% |
| Alcyonacea- gorgonian | 4 | 0.33% |
| Gorgonacea | 1 | 0.08% |
| Nicella sp. | 1 | 0.08% |
| Telesto sp./Carijoa sp. | 2 | 0.17% |
| Annelida | 8 | 0.66% |
| Annelida | 5 | 0.41% |
| Serpulidae | 3 | 0.25% |
| Echinodermata | 10 | 0.83% |
| Paracolochirus mysticus | 10 | 0.83% |
| Chordata | 7 | 0.58% |
| Fish | 7 | 0.58% |
| Natural detritus | 5 | 0.41% |
| Bare soft bottom substrate | 649 | 53.68% |
| Bare hard bottom substrate | 505 | 41.77% |
| Bare hard bottom substrate | 505 | 41.77% |
| Bare rock- pavement boulder ledge | 505 | 41.77% |
| **Grand Total** | **1209** | **100.00%** |

**Dive Site:** ROV 14-10; South Carolina, Outside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 60

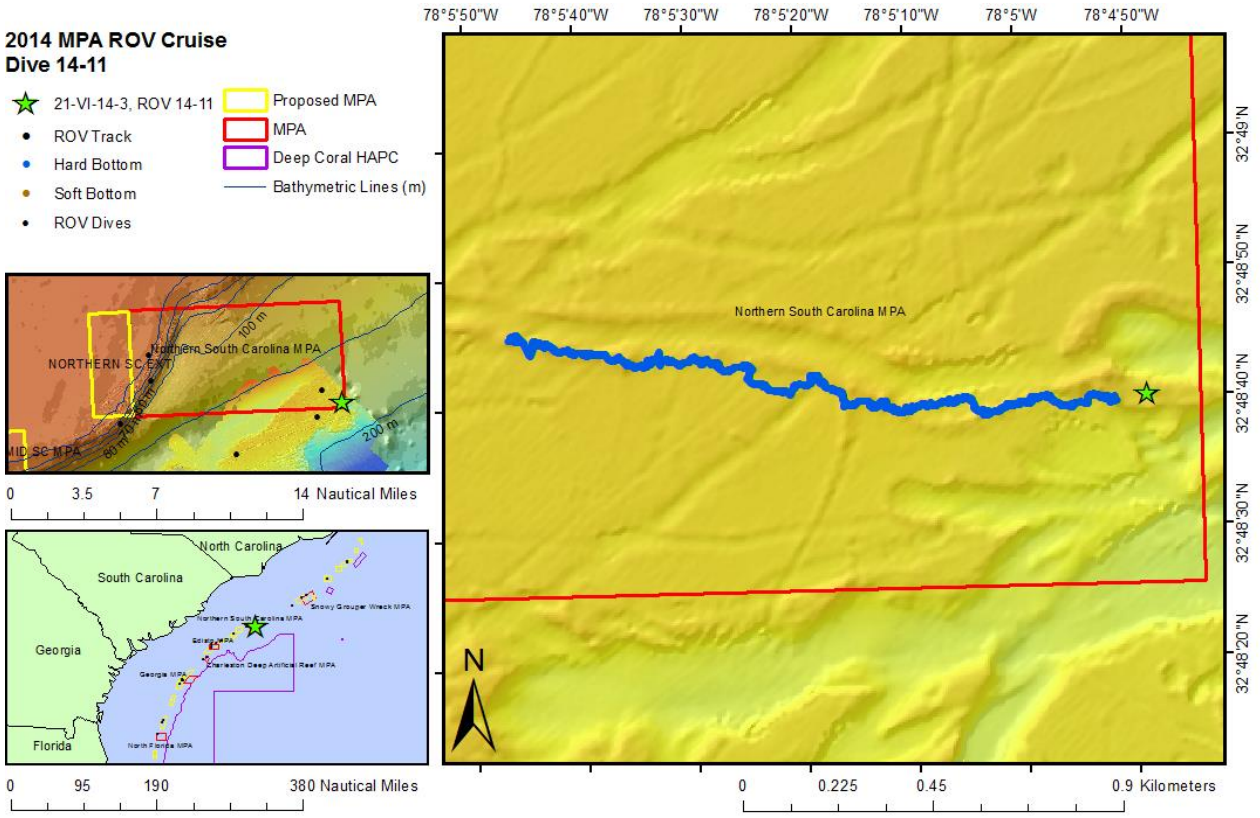
**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-10.

| Scientific Name | Common Name | Density |
|---|---|---|
| *Anthias nicholsi* | yellowfin bass | 0.0052 |
| Anthiinae | anthiid | 0.0116 |
| *Antigonia capros* | deepbody boarfish | 0.0024 |
| *Caulolatilus microps* | blueline tilefish | 0.0004 |
| *Decodon puellaris* | red hogfish | 0.0026 |
| *Gephyroberyx darwinii* | big roughy | 0.0011 |
| *Hemanthias vivanus* | red barbier | 0.0014 |
| *Hyporthodus niveatus* | snowy grouper | 0.0014 |
| *Laemonema* sp. | mora cod | 0.0004 |
| *Macrorhamphosus scolopax* | longspine snipefish | 0.0003 |
| *Ostichthys trachypoma* | bigeye soldierfish | 0.0002 |
| *Pagrus pagrus* | red porgy | 0.0012 |
| *Pareques iwamotoi* | blackbar drum | 0.0006 |
| *Plectranthias garrupellus* | apricot bass | 0.0005 |
| *Pristigenys alta* | short bigeye | 0.0003 |
| *Prognathodes aya* | bank butterflyfish | 0.0003 |
| Scorpaenidae | scorpionfish | 0.0019 |
| *Seriola* sp. | amberjack | 0.0003 |

**Dive Site:** ROV 14-11; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 61

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

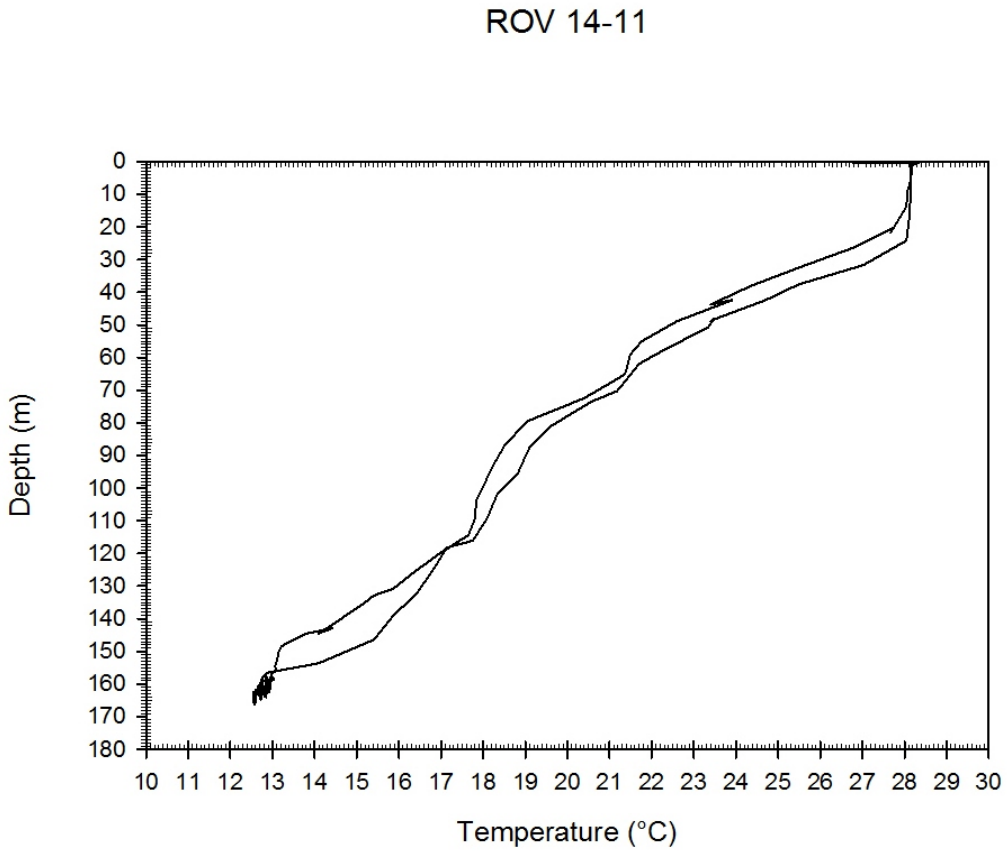
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Sedberry_OEBlock2_5m_UTM17N_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/21/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 117 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-11; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 61

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -156 | **Total Transect Length (km):** | 1.45 |
| **Maximum Bottom Depth (m):** | -168 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 13:21 | **On Bottom (Lat/Long):** | 32.81°N; -78.08°W |
| **Off Bottom (Time- EDT):** | 14:54 | **Off Bottom (Lat/Long):** | 32.81°N; -78.1°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-11; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 61

**Dive Imagery:**

**Figure 1:** -165.8 m
Majid spider crab

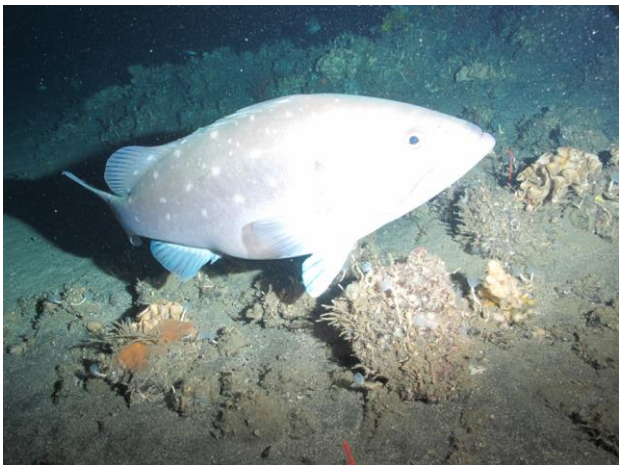


**Figure 2:** -165.8 m
Snowy grouper examines the ROV

**Figure 3:** -163.1 m
Snowy grouper

**Figure 4:** -162.1 m
Snowy grouper and other fish?

**Dive Site:** ROV 14-11; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 61

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-11, UNCW Mohawk ROV Dive 61; Site #- 21-VI-14-3. Target Site - South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar. Ground-truth multibeam sonar of site (Sedberry_OEBlock2_5m_UTM17N_MB_Grid). Conduct video/photo transect east across the iceberg scar.

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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image.

Site Description/Habitat/Biota:
Transect along southern side of southern iceberg scar. South of the scar was sediment in 166 m with <10% rock rubble (10 cm). The edge of the scar were large rock boulders 1-4 m tall and wide and covered in Leiodermatium. Parts had large > 3 m tall slabs with undercuts. Snowy groupers common near larger outcrops. The rugosity, slope and size of the boulders increased in the corners where 2 scars intersect. Observed >50 blueline tilefish, Leiodermatium, Paracolochirus mysticus, >20 snowy groupers, and majid crabs.

**Dive Site:** ROV 14-11; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 61

**CPCe Percent Cover Analysis:**

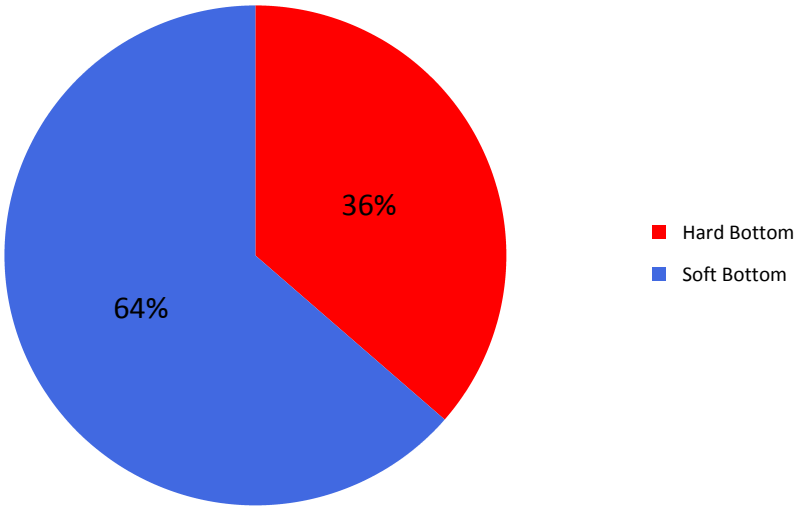
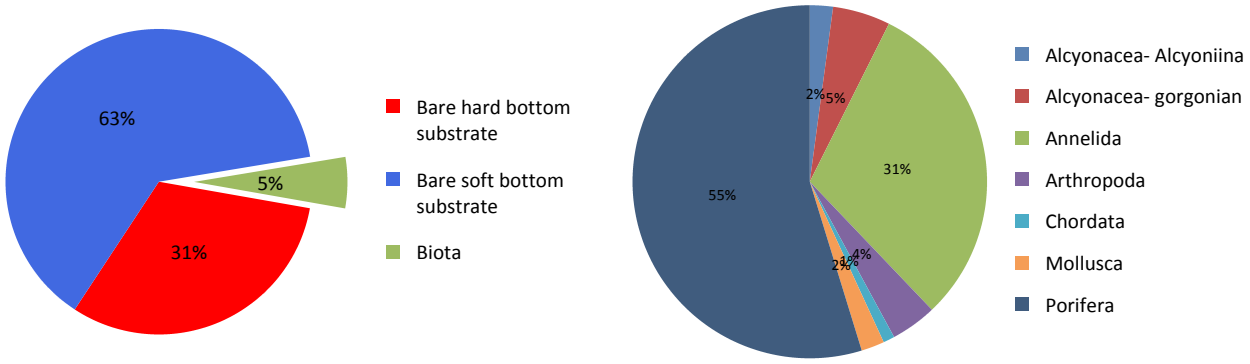



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-11. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-11.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-11; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 61

**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 14-11.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 95 | 5.39% |
| Porifera | 52 | 2.95% |
| Corallistidae | 2 | 0.11% |
| Demospongiae | 14 | 0.80% |
| Farrea sp. | 2 | 0.11% |
| Leiodermatium sp. | 34 | 1.93% |
| Alcyonacea- Alcyoniina | 2 | 0.11% |
| Alcyonacea | 2 | 0.11% |
| Alcyonacea- gorgonian | 5 | 0.28% |
| Nicella sp. | 4 | 0.23% |
| Telesto sp./Carijoa sp. | 1 | 0.06% |
| Annelida | 29 | 1.65% |
| Annelida | 8 | 0.45% |
| Serpulidae | 21 | 1.19% |
| Mollusca | 2 | 0.11% |
| Perotrochus amabilis | 2 | 0.11% |
| Arthropoda | 4 | 0.23% |
| Majidae | 2 | 0.11% |
| Paguridae | 2 | 0.11% |
| Chordata | 1 | 0.06% |
| Fish | 1 | 0.06% |
| Bare soft bottom substrate | 1112 | 63.15% |
| Bare hard bottom substrate | 554 | 31.46% |
| Bare hard bottom substrate | 554 | 31.46% |
| Bare rock- pavement boulder ledge | 551 | 31.29% |
| Bare rubble- rock | 3 | 0.17% |
| **Grand Total** | **1761** | **100.00%** |

**Dive Site:** ROV 14-11; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar, UNCW Dive 61

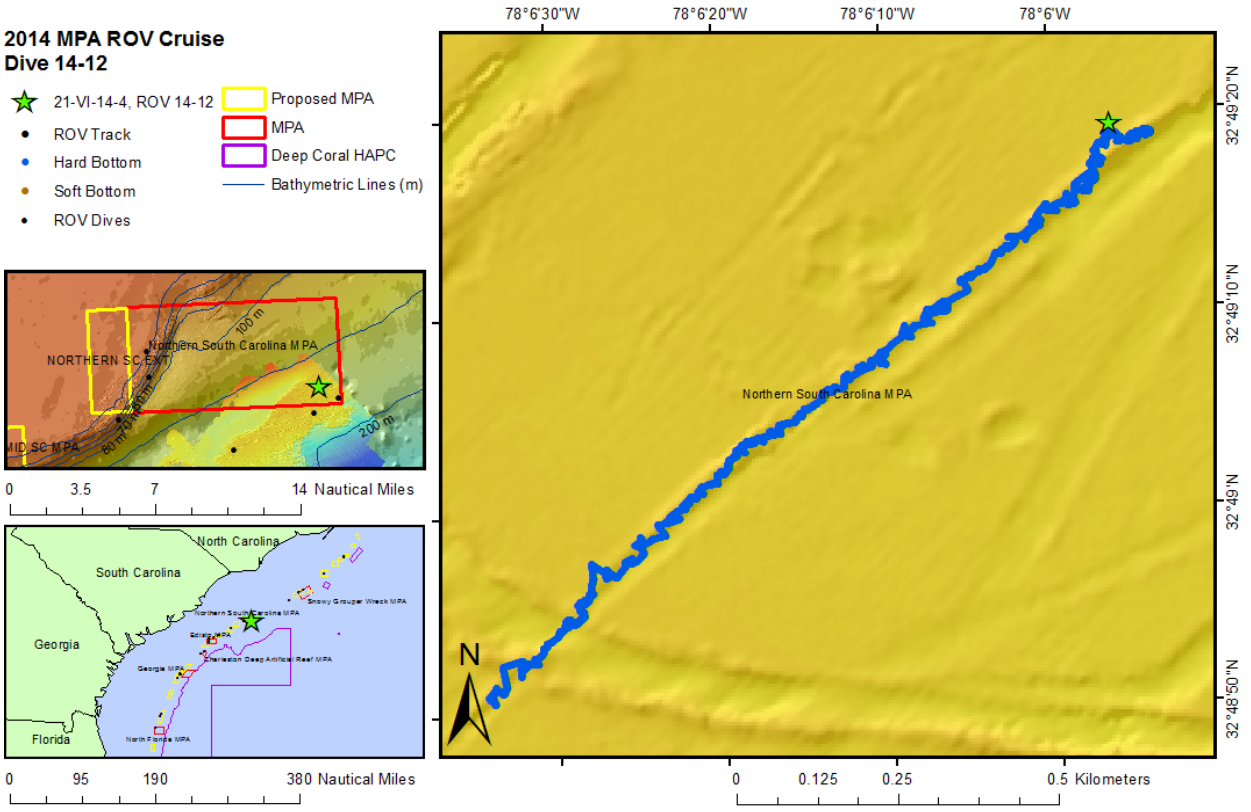
**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-11.

| Scientific Name | Common Name | Density |
|---|---|---|
| *Anthias nicholsi* | yellowfin bass | 0.0109 |
| Anthiinae | anthiid | 0.0786 |
| *Antigonia capros* | deepbody boarfish | 0.0200 |
| *Caulolatilus microps* | blueline tilefish | 0.0017 |
| *Decodon puellaris* | red hogfish | 0.0017 |
| *Gephyroberyx darwinii* | big roughy | 0.0015 |
| *Hemanthias vivanus* | red barbier | 0.0023 |
| Holocentridae | squirrelfish | 0.0006 |
| *Hyporthodus niveatus* | snowy grouper | 0.0015 |
| *Jeboehklia gladifer* | bladefin bass | 0.0002 |
| *Laemonema* sp. | mora cod | 0.0005 |
| *Macrorhamphosus scolopax* | longspine snipefish | 0.0003 |
| *Muraena retifera* | reticulate moray eel | 0.0002 |
| Muraenidae | moray eel | 0.0002 |
| *Ostichthys trachypoma* | bigeye soldierfish | 0.0003 |
| *Pagrus pagrus* | red porgy | 0.0027 |
| *Pareques iwamotoi* | blackbar drum | 0.0010 |
| *Plectranthias garrupellus* | apricot bass | 0.0010 |
| *Pristigenys alta* | short bigeye | 0.0002 |
| *Pronotogrammus martinicensis* | roughtongue bass | 0.0002 |
| Scorpaenidae | scorpionfish | 0.0018 |
| *Serranus notospilus* | saddle bass | 0.0002 |

**Dive Site:** ROV 14-12; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar SW/NE, UNCW Dive 62

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

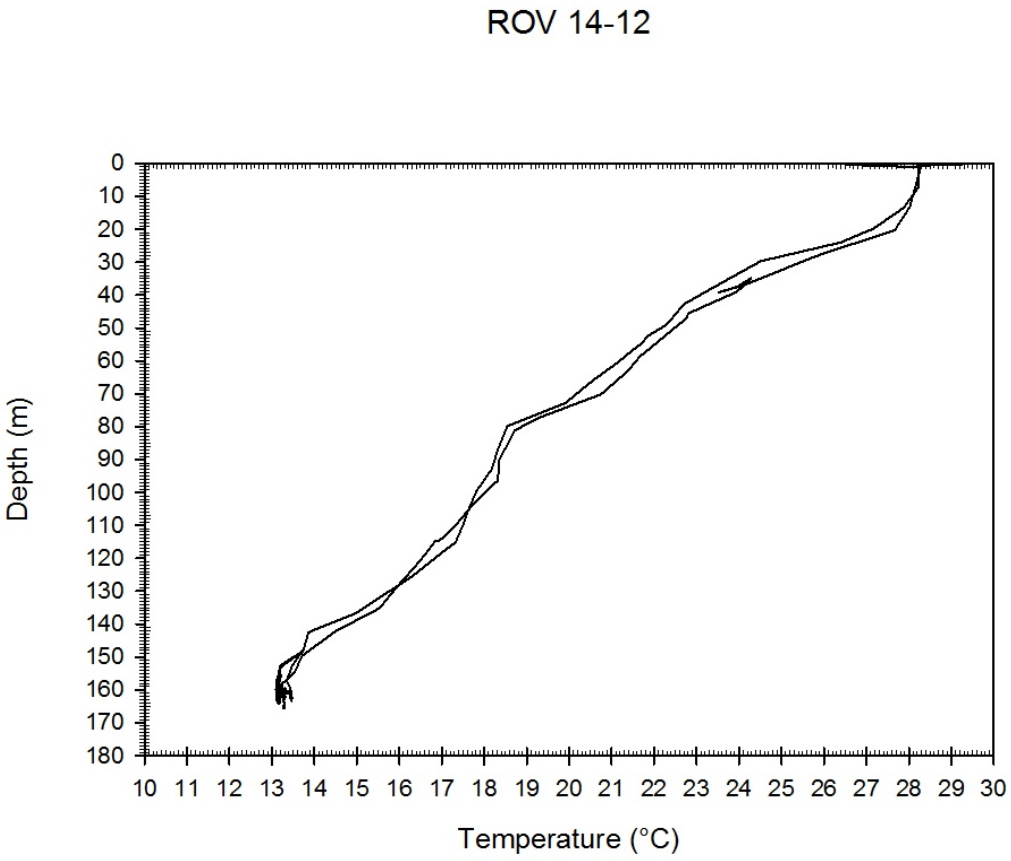
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Sedberry_OEBlock2_5m_UTM17N_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/21/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 85 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-12; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar SW/NE, UNCW Dive 62

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -149 | **Total Transect Length (km):** | 1.30 |
| **Maximum Bottom Depth (m):** | -166 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 15:52 | **On Bottom (Lat/Long):** | 32.82°N; -78.1°W |
| **Off Bottom (Time- EDT):** | 17:23 | **Off Bottom (Lat/Long):** | 32.81°N; -78.11°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-12; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar SW/NE, UNCW Dive 62

**Dive Imagery:**

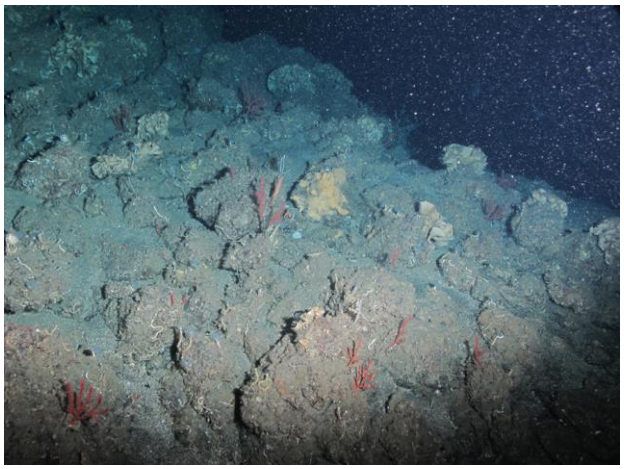


**Figure 1:** -163.1 m
*Leiodermatium* and *Nicella* gorgonians on rocky bottom

**Figure 2:** -163.1 m
A pair of snowy groupers


**Figure 3:** -161.7 m
Fresh human debris and a bore fish

**Figure 4:** -161.1 m
Snowy groupers take refuge next to a large boulder

**Dive Site:** ROV 14-12; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar SW/NE, UNCW Dive 62

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-12, UNCW Mohawk ROV Dive 62; Site #- 21-VI-14-4. Target Site - South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar SW/NE. Ground-truth multibeam sonar of site (Sedberry_OEBlock2_5m_UTM17N_MB_Grid). Conduct video/photo transect east across the iceberg scar.

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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image.

Site Description/Habitat/Biota:
SW to NE scar - transected the northern side. Started dive trying to head NE but the current was too strong; changed heading to SW and were able to make way. The ridge was rough rock boulders ranging from 10-20 cm up to 3 m wide and tall. The ridge slopes to the SE and NW ending abruptly in sediment. The exposed boulders were also surrounded by flat sediment between, with high abundance of fauna but low species richness. Leiodermatium and Paracolochirus mysticus were common to abundant; Nicella gorgonians were also common. The top of the ledge is 161 m, sand is about 162-163 m deep.

**Dive Site:** ROV 14-12; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar SW/NE, UNCW Dive 62

**CPCe Percent Cover Analysis:**

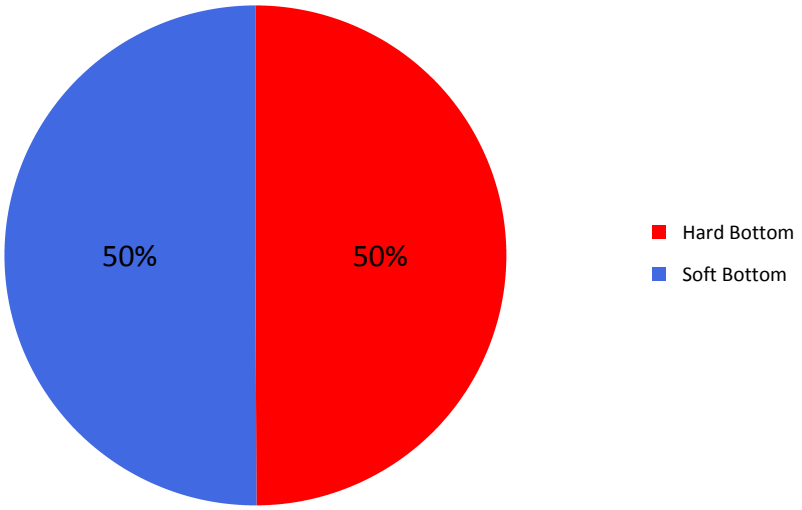
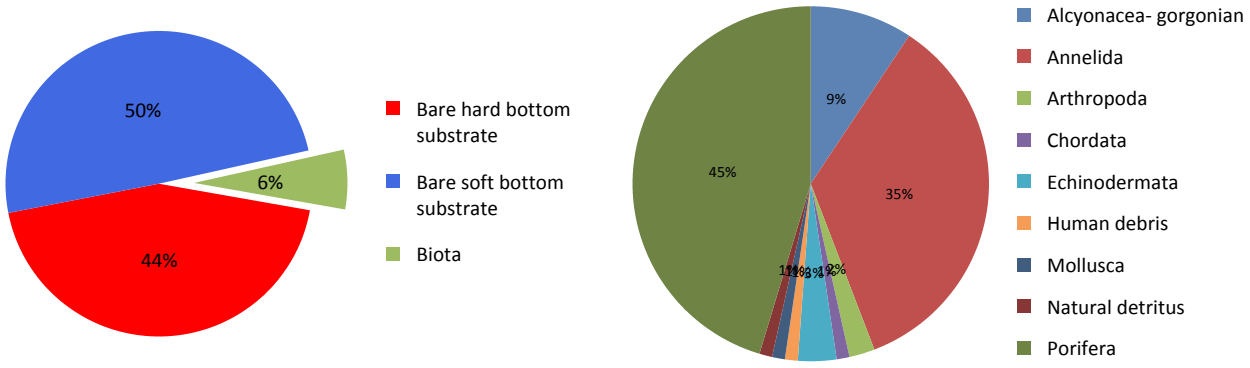



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-12. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-12.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-12; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar SW/NE, UNCW Dive 62

**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 14-12.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 85 | 6.21% |
| Porifera | 39 | 2.85% |
| Corallistidae | 1 | 0.07% |
| Demospongiae | 8 | 0.58% |
| Demospongiae- MPA03 | 1 | 0.07% |
| Leiodermatium sp. | 29 | 2.12% |
| Alcyonacea- gorgonian | 8 | 0.58% |
| Gorgonacea | 1 | 0.07% |
| Nicella sp. | 7 | 0.51% |
| Annelida | 30 | 2.19% |
| Annelida | 1 | 0.07% |
| Serpulidae | 29 | 2.12% |
| Mollusca | 1 | 0.07% |
| Gastropoda | 1 | 0.07% |
| Arthropoda | 2 | 0.15% |
| Paguridae | 2 | 0.15% |
| Echinodermata | 3 | 0.22% |
| Holothuria lentigenosa enodis | 2 | 0.15% |
| Paracolochirus mysticus | 1 | 0.07% |
| Chordata | 1 | 0.07% |
| Fish | 1 | 0.07% |
| Natural detritus | 1 | 0.07% |
| Human debris | 1 | 0.07% |
| Human debris | 1 | 0.07% |
| Fishing gear/line/long line | 1 | 0.07% |
| Bare soft bottom substrate | 678 | 49.56% |
| Bare hard bottom substrate | 604 | 44.15% |
| Bare hard bottom substrate | 604 | 44.15% |
| Bare rock- pavement boulder ledge | 603 | 44.08% |
| Bare rubble- rock | 1 | 0.07% |
| **Grand Total** | **1368** | **100.00%** |

**Dive Site:** ROV 14-12; South Carolina, Inside Northern South Carolina MPA, 165 m Iceberg Scar SW/NE, UNCW Dive 62

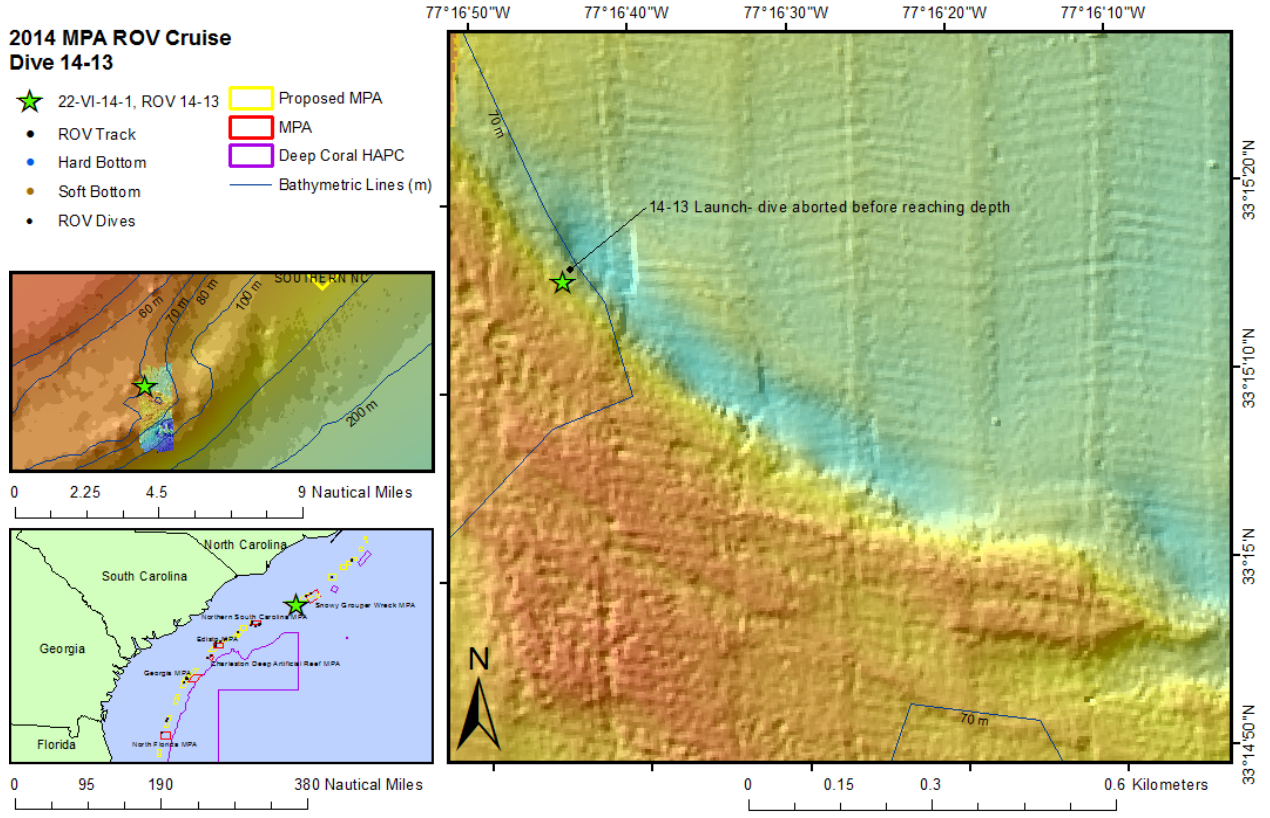
**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-12.

| Scientific Name | Common Name | Density |
|---|---|---|
| *Anthias nicholsi* | yellowfin bass | 0.0007 |
| Anthiinae | anthiid | 0.0083 |
| *Antigonia capros* | deepbody boarfish | 0.0087 |
| Bothidae | flounder | 0.0000 |
| *Caulolatilus microps* | blueline tilefish | 0.0001 |
| *Decodon puellaris* | red hogfish | 0.0002 |
| *Gephyroberyx darwinii* | big roughy | 0.0003 |
| *Halichoeres* sp. | wrasse | 0.0001 |
| *Hemanthias vivanus* | red barbier | 0.0015 |
| Holocentridae | squirrelfish | 0.0001 |
| *Hyporthodus niveatus* | snowy grouper | 0.0003 |
| *Laemonema* sp. | mora cod | 0.0001 |
| *Macrorhamphosus scolopax* | longspine snipefish | 0.0004 |
| *Ostichthys trachypoma* | bigeye soldierfish | 0.0001 |
| *Pagrus pagrus* | red porgy | 0.0007 |
| *Pareques iwamotoi* | blackbar drum | 0.0004 |
| *Plectranthias garrupellus* | apricot bass | 0.0002 |
| *Priacanthus arenatus* | bigeye | 0.0000 |
| *Pristigenys alta* | short bigeye | 0.0000 |
| *Prognathodes aya* | bank butterflyfish | 0.0001 |
| *Prognathodes guyanensis* | french butterflyfish | 0.0001 |
| *Pronotogrammus martinicensis* | roughtongue bass | 0.0002 |
| Scorpaenidae | scorpionfish | 0.0002 |
| *Serranus notospilus* | saddle bass | 0.0000 |

**Dive Site:** ROV 14-13; North Carolina, Outside Snowy Grouper Wreck MPA, 85 m NW/SE Ridge, UNCW Dive 63

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Pisces_2013_SouthernNCMPA_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/22/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 0 |
| **DVD:** | 1 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-13; North Carolina, Outside Snowy Grouper Wreck MPA, 85 m NW/SE Ridge, UNCW Dive 63

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | | **Total Transect Length (km):** | 0.50 |
| **Maximum Bottom Depth (m):** | | **Surface Current (kn):** | 3 |
| **On Bottom (Time- EDT):** | 10:24 | **On Bottom (Lat/Long):** | 33.25°N; -77.28°W |
| **Off Bottom (Time- EDT):** | 10:55 | **Off Bottom (Lat/Long):** | 33.25°N; -77.27°W |

**Physical Environment:**

**Dive Site:** ROV 14-13; North Carolina, Outside Snowy Grouper Wreck MPA, 85 m NW/SE Ridge, UNCW Dive 63

**Dive Imagery:**

**Figure 1:**
No images taken

**Figure 2:**
No images taken

**Dive Site:** ROV 14-13; North Carolina, Outside Snowy Grouper Wreck MPA, 85 m NW/SE Ridge, UNCW Dive 63

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-13, UNCW Mohawk ROV Dive 63; Site #- 22-VI-14-1. North Carolina, Outside Snowy Grouper Wreck MPA, 85 m NW/SE Ridge. Ground-truth multibeam sonar of site (Pisces_2013 _SouthernNCMPA_MB_Grid). Conduct video/photo transect on NW-SE 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Live logged the dive track 14-13.

Site Description/Habitat/Biota:
Planned dive on southern end of this MB map along the 3 finger plateaus. Due to strong current to the north; we got to 60 m and called the dive. Never got to the bottom.

**Dive Site:** ROV 14-13; North Carolina, Outside Snowy Grouper Wreck MPA, 85 m NW/SE Ridge, UNCW Dive 63

**Percent Cover of Benthic Macro-Biota and Substrate:**

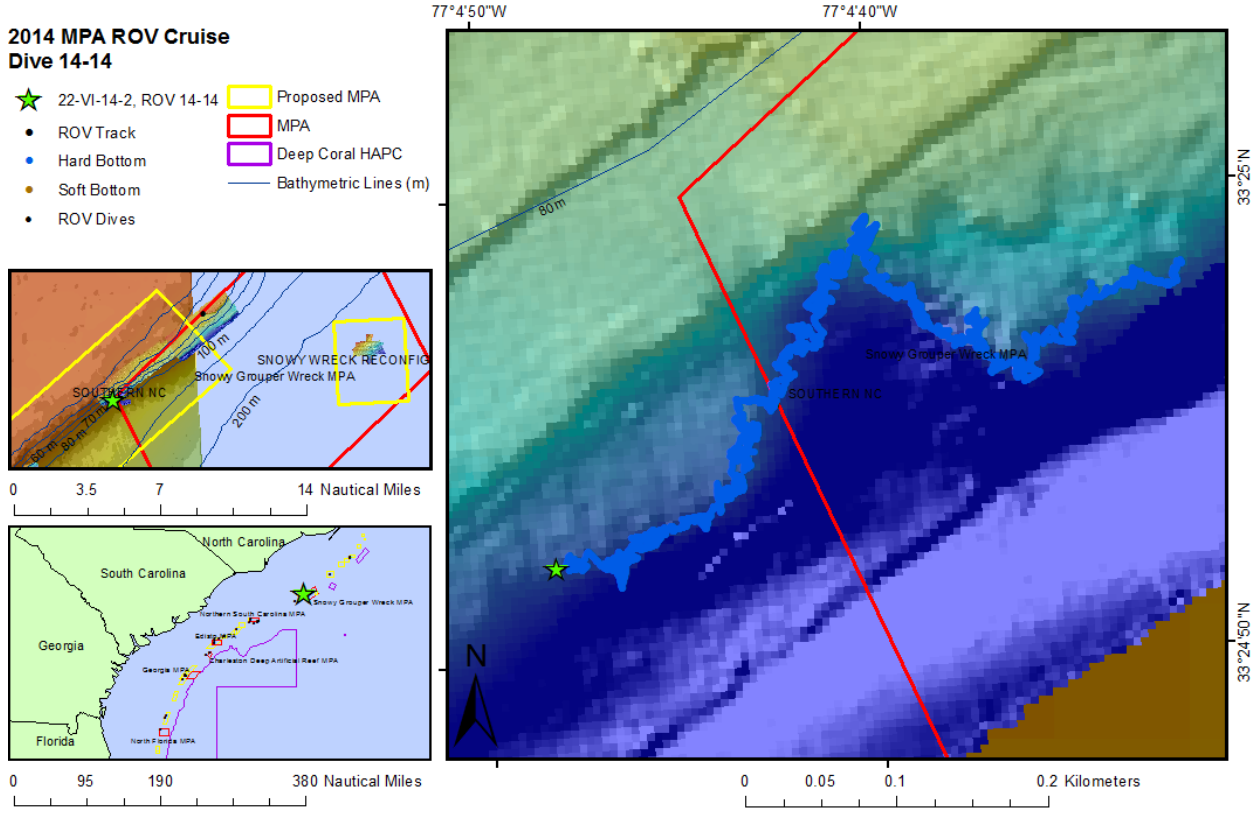
No CPCe Analysis was completed for ROV 14-13.

**Density of Fish:**

No Density of fish was completed for ROV 14-13.

**Dive Site:** ROV 14-14; North Carolina, Outside/Inside Snowy Grouper Wreck MPA, NW Corner- 100 m Ridge, UNCW Dive 64

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

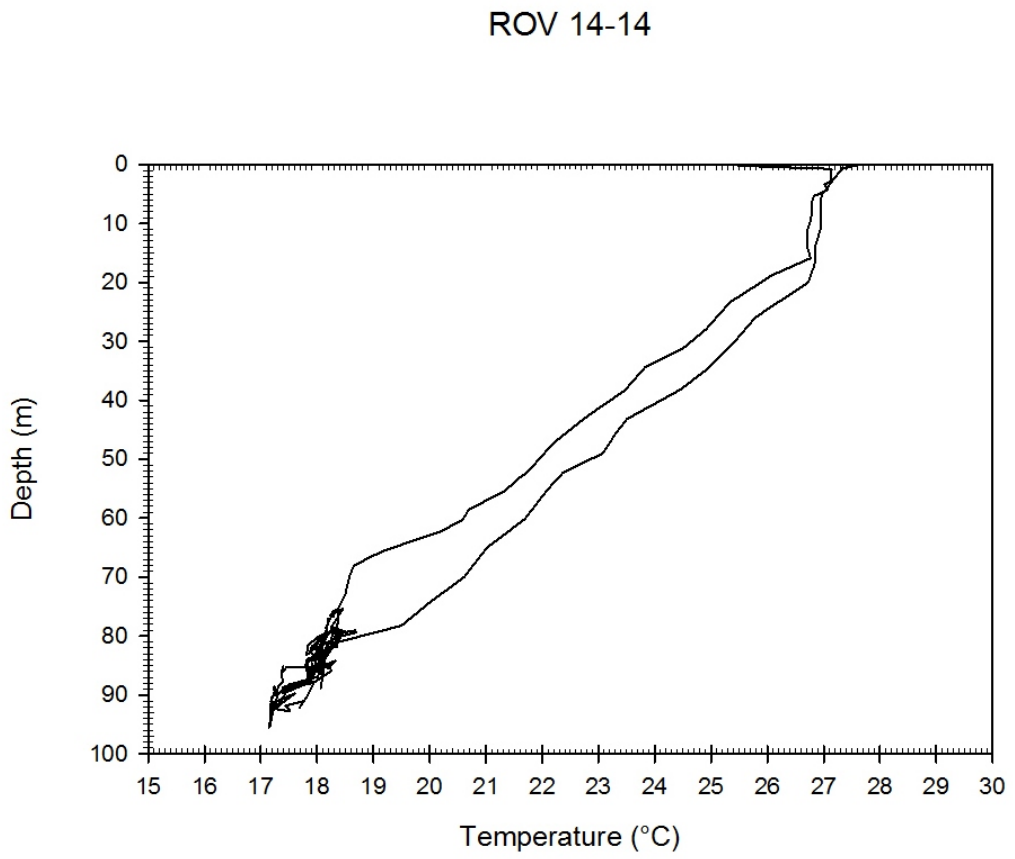
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Pisces_2012_SnowyWreckMPA_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/22/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 110 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-14; North Carolina, Outside/Inside Snowy Grouper Wreck MPA, NW Corner- 100 m Ridge, UNCW Dive 64

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -76 | **Total Transect Length (km):** | 0.47 |
| **Maximum Bottom Depth (m):** | -96 | **Surface Current (kn):** | 0.25 |
| **On Bottom (Time- EDT):** | 13:51 | **On Bottom (Lat/Long):** | 33.41°N; -77.08°W |
| **Off Bottom (Time- EDT):** | 15:09 | **Off Bottom (Lat/Long):** | 33.42°N; -77.08°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-14; North Carolina, Outside/Inside Snowy Grouper Wreck MPA, NW Corner- 100 m Ridge, UNCW Dive 64

**Dive Imagery:**

**Figure 1:** -86.1 m
Soapfish under a small boulder

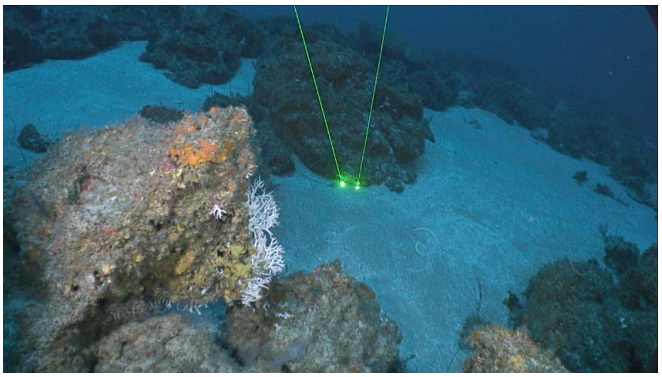


**Figure 2:** -86.1 m
*Oculina* grows on the edge of boulder

**Figure 3:** -83 m
White *Muricea* and brown algae

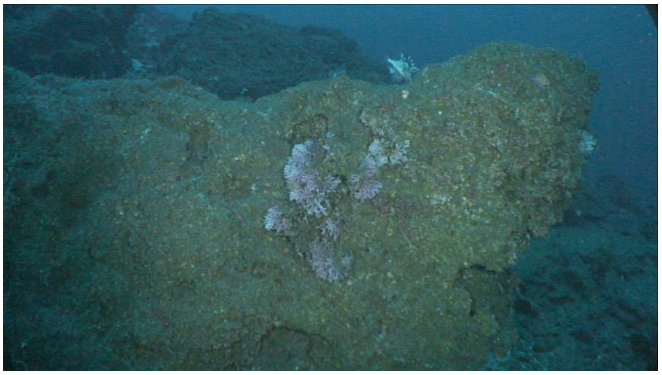


**Figure 4:** -90.8 m
Pink *Oculina* colonies grow on rocks

**Dive Site:** ROV 14-14; North Carolina, Outside/Inside Snowy Grouper Wreck MPA, NW Corner- 100 m Ridge, UNCW Dive 64

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-14, UNCW Mohawk ROV Dive 64; Site #- 22-VI-14-2. Target Site - North Carolina, Outside/Inside Snowy Grouper Wreck MPA, NW Corner- 100 m Ridge. Ground-truth multibeam sonar of site (Pisces_2012 _SnowyWreckMPA_MB_Grid). Conduct video/photo transect on NW corner- deep 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Live logged the dive track 14-14.

Site Description/Habitat/Biota:
Transected across a 80 m deep ledge on a slope. The top of the ledge was buried rock boulders which become exposed along the slope. The boulders were >1-2 m wide/tall and rough surfaced. There was smooth/rippled/barren sediment between. The slope entering the MPA is 10 to 40 deg with larger exposed boulders at the top ledge and small scattered 10-20 cm rubble along the slope. The sediment was smooth and barren. Larger (40 cm) Oculina varicosa corals were spotted towards the beginning of the dive (10 + individuals total). The "bowl" cut out in the MB has large boulders/rock outcrops at the top ledge with pavement on the top plateau and rock/ boulders along the slope. 83-95 m depth range.

**Dive Site:** ROV 14-14; North Carolina, Outside/Inside Snowy Grouper Wreck MPA, NW Corner- 100 m Ridge, UNCW Dive 64

**CPCe Percent Cover Analysis:**

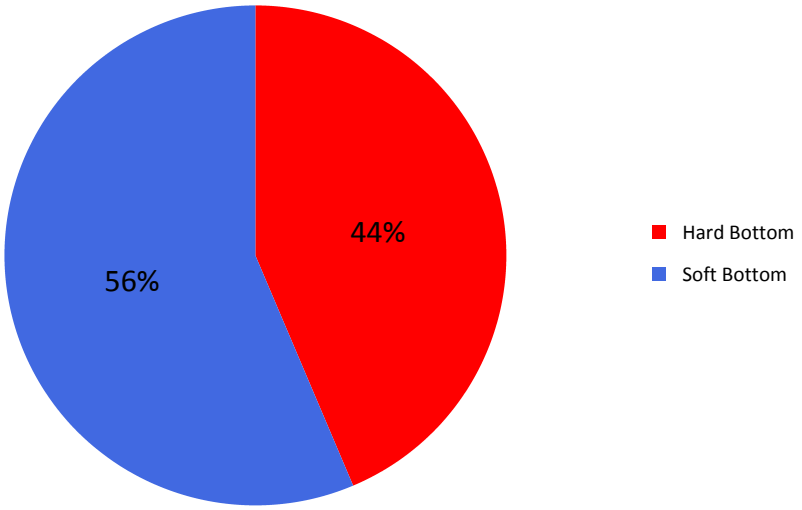
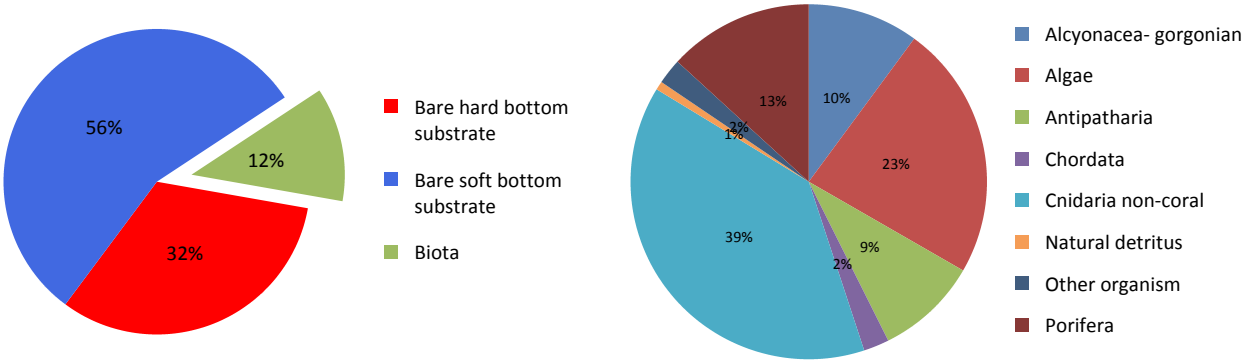



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-14. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-14.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-14; North Carolina, Outside/Inside Snowy Grouper Wreck MPA, NW Corner- 100 m Ridge, UNCW Dive 64

**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 14-14.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 129 | 12.08% |
| Algae | 30 | 2.81% |
| Chlorophyta | 1 | 0.09% |
| Corallinales/crustose coralline | 12 | 1.12% |
| Phaeophyta | 13 | 1.22% |
| Rhodophyta | 4 | 0.37% |
| Porifera | 17 | 1.59% |
| Demospongiae | 3 | 0.28% |
| Spirastrellidae | 14 | 1.31% |
| Alcyonacea- gorgonian | 13 | 1.22% |
| Ellisella sp. | 1 | 0.09% |
| Gorgonacea | 4 | 0.37% |
| Telesto sp./Carijoa sp. | 8 | 0.75% |
| Antipatharia | 12 | 1.12% |
| Antipatharia atlantica | 2 | 0.19% |
| Stichopathes lutkeni | 5 | 0.47% |
| Tanacetipathes barbadensis | 5 | 0.47% |
| Cnidaria non-coral | 50 | 4.68% |
| Hydroidolina | 50 | 4.68% |
| Chordata | 3 | 0.28% |
| Fish | 3 | 0.28% |
| Other organism | 3 | 0.28% |
| Natural detritus | 1 | 0.09% |
| Bare soft bottom substrate | 593 | 55.52% |
| Bare hard bottom substrate | 346 | 32.40% |
| Bare hard bottom substrate | 346 | 32.40% |
| Bare rock- pavement boulder ledge | 329 | 30.81% |
| Bare rubble- rock | 17 | 1.59% |
| **Grand Total** | **1068** | **100.00%** |

**Dive Site:** ROV 14-14; North Carolina, Outside/Inside Snowy Grouper Wreck MPA, NW Corner- 100 m Ridge, UNCW Dive 64

**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-14.

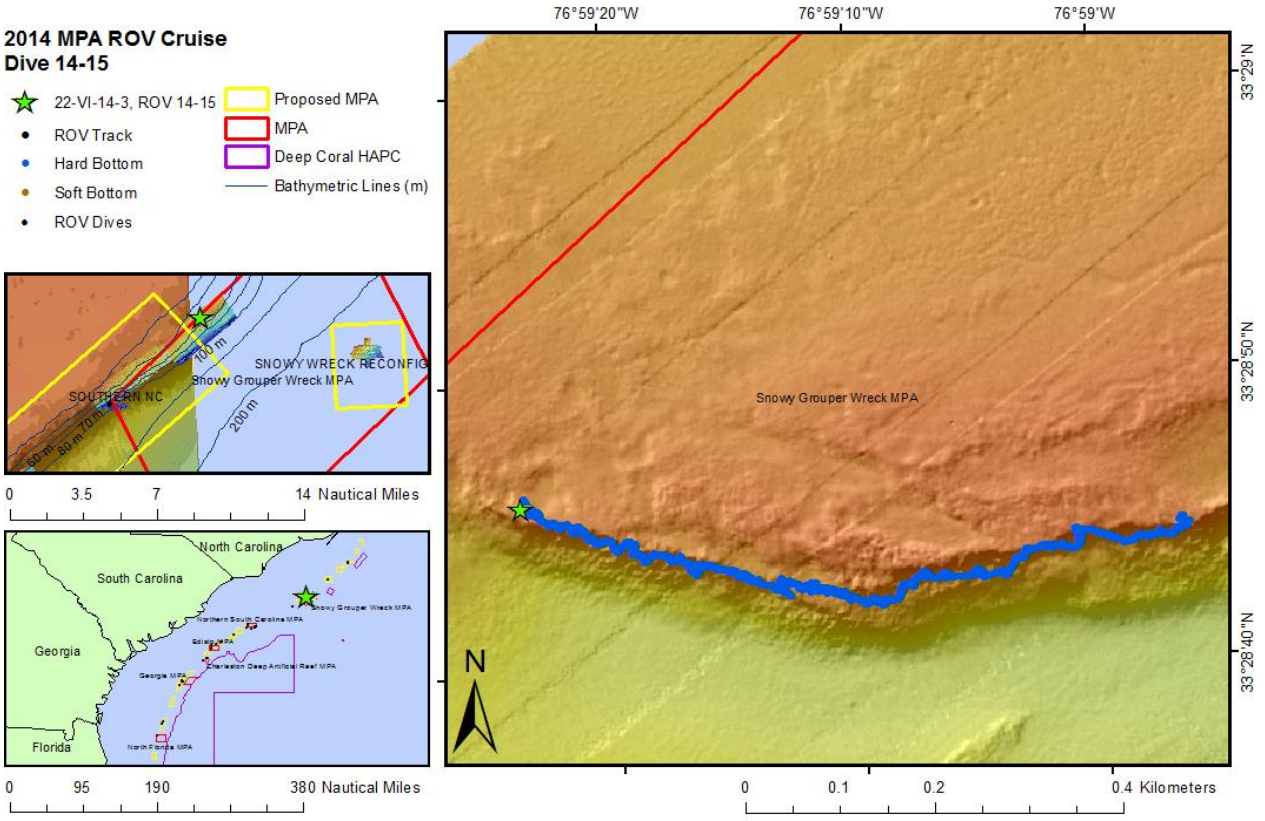
| Scientific Name | Common Name | Density |
|---|---|---|
| *Acanthurus* sp. | doctorfish | 0.0001 |
| Anthiinae | anthiid | 0.0330 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0019 |
| *Calamus* sp. | porgy | 0.0003 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0010 |
| Carangidae | jack | 0.0005 |
| *Cephalopholis cruentata* | graysby | 0.0002 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0002 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0024 |
| *Chromis cyaneus* | blue chromis | 0.0010 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0001 |
| *Chromis insolata* | sunshinefish | 0.0001 |
| *Chromis scotti* | purple reeffish | 0.0004 |
| *Decodon puellaris* | red hogfish | 0.0001 |
| *Epinephelus adscensionis* | rock hind | 0.0001 |
| *Epinephelus drummondhayi* | speckled hind | 0.0002 |
| *Equetus lanceolatus* | jack-knife fish | 0.0002 |
| *Haemulon aurolineatum* | tomtate | 0.0037 |
| *Halichoeres* sp. | wrasse | 0.0037 |
| *Holacanthus bermudensis* | blue angelfish | 0.0001 |
| *Holacanthus tricolor* | rock beauty | 0.0001 |
| Holocentridae | squirrelfish | 0.0003 |
| *Lachnolaimus maximus* | hogfish | 0.0002 |
| *Liopropoma eukrines* | wrasse bass | 0.0002 |
| *Muraena retifera* | reticulate moray eel | 0.0001 |
| *Mycteroperca phenax* | scamp | 0.0005 |
| *Pagrus pagrus* | red porgy | 0.0010 |
| *Paranthias furcifer* | creole-fish | 0.0005 |
| *Pareques umbrosus* | cubbyu | 0.0029 |
| *Plectrypops retrospinis* | cardinal soldierfish | 0.0002 |
| *Priacanthus arenatus* | bigeye | 0.0010 |
| *Pristigenys alta* | short bigeye | 0.0004 |
| *Prognathodes aya* | bank butterflyfish | 0.0004 |
| *Prognathodes guyanensis* | french butterflyfish | 0.0001 |
| *Pronotogrammus martinicensis* | roughtongue bass | 0.0374 |
| *Pterois volitans* | lionfish | 0.0012 |
| *Rhomboplites aurorubens* | vermilion snapper | 0.0029 |

**Dive Site:** ROV 14-14; North Carolina, Outside/Inside Snowy Grouper Wreck MPA, NW Corner- 100 m Ridge, UNCW Dive 64

| | | |
|---|---|---|
| *Rypticus saponaceus* | greater soapfish | 0.0005 |
| *Seriola dumerili* | greater amberjack | 0.0002 |
| *Seriola rivoliana* | almaco jack | 0.0016 |
| *Serranus annularis* | orangeback bass | 0.0002 |
| *Serranus chionaraia* | snow bass | 0.0001 |
| *Serranus phoebe* | tattler | 0.0004 |

**Dive Site:** ROV 14-15; North Carolina, Inside Snowy Grouper Wreck MPA, Edge of 72 m Plateau, UNCW Dive 65

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

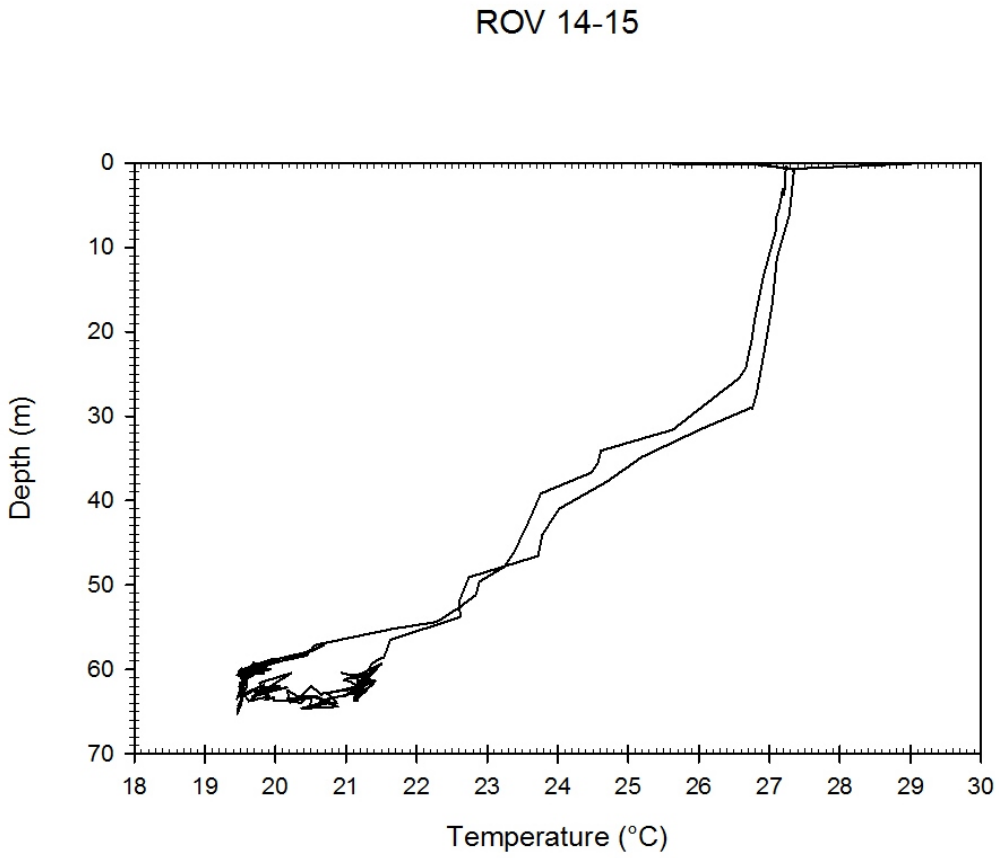
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | NancyFoster_14_08_MPA_NC_SnowyWreck_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/22/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 70 |
| **DVD:** | 1 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-15; North Carolina, Inside Snowy Grouper Wreck MPA, Edge of 72 m Plateau, UNCW Dive 65

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -48 | **Total Transect Length (km):** | 0.70 |
| **Maximum Bottom Depth (m):** | -66 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 16:42 | **On Bottom (Lat/Long):** | 33.48°N; -76.99°W |
| **Off Bottom (Time- EDT):** | 17:43 | **Off Bottom (Lat/Long):** | 33.48°N; -76.98°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-15; North Carolina, Inside Snowy Grouper Wreck MPA, Edge of 72 m Plateau, UNCW Dive 65

**Dive Imagery:**

**Figure 1:** -63.9 m
Soapfish and a lionfish

**Figure 2:** -63.9 m
*Agelas* sponge

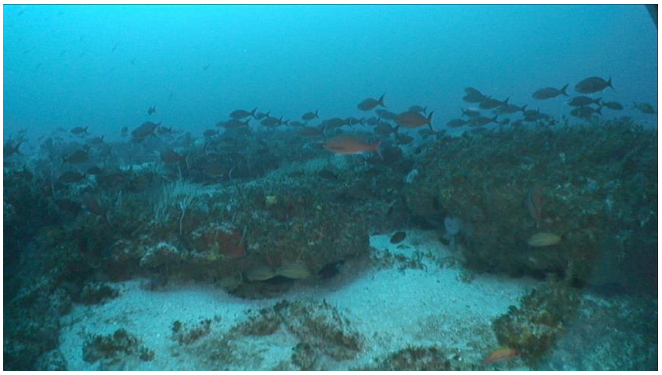


**Figure 3:** -62.5 m
Schools of fish hover over large rock boulders

**Figure 4:** -62 m
*Stichopathes* and the tail of a soapfish on hard bottom

**Dive Site:** ROV 14-15; North Carolina, Inside Snowy Grouper Wreck MPA, Edge of 72 m Plateau, UNCW Dive 65

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-15, UNCW Mohawk ROV Dive 65; Site #- 22-VI-14-3. Target Site - North Carolina, Inside Snowy Grouper Wreck MPA, Edge of 72 m Plateau. Ground-truth multibeam sonar of site (NancyFoster_14_08 _MPA_NC_SnowyWreck_Grid). Conduct video/photo along 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-15.

Site Description/Habitat/Biota:
Transected top ridge of slope. Bottom was large boulders and cobble, with rough surface, covered in green or brown algae, and smooth barren sediment between. The top of the plateau was flatter pavement like hardbottom, the rim of the slope had more relief, 1-2 up to 3 m in parts. 80% hardbottom exposed. The slope was 10-30 degrees sloping to the south. After the dog-leg, the top of the ridge was 3 m tall rock outcrops with undercut ledges and the slope was rock cobble/rubble and small boulders on a 10-20 deg slope. The rocks were 100% covered in mostly algae and fauna: Stichopathes, hydroids (3+ species), Diodogorgia, Oculina, Agelas sponges common, Swiftia, Tanacetipathes, and white mesh fan black corals.

**Dive Site:** ROV 14-15; North Carolina, Inside Snowy Grouper Wreck MPA, Edge of 72 m Plateau, UNCW Dive 65

**CPCe Percent Cover Analysis:**

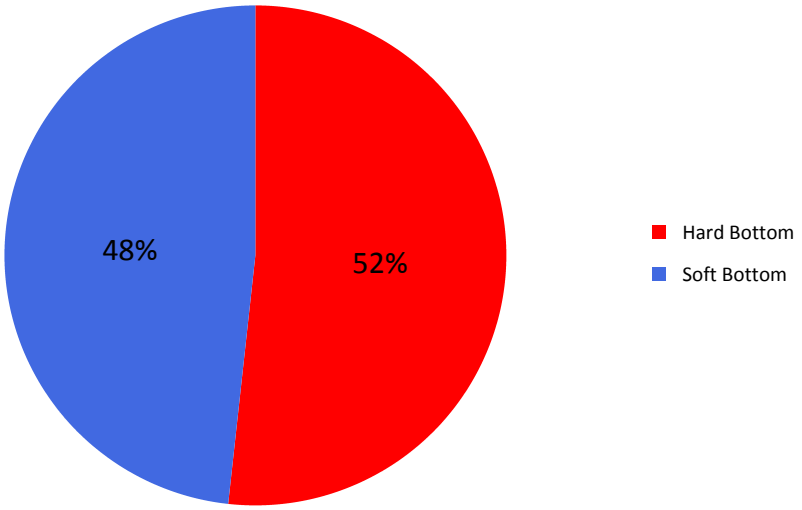
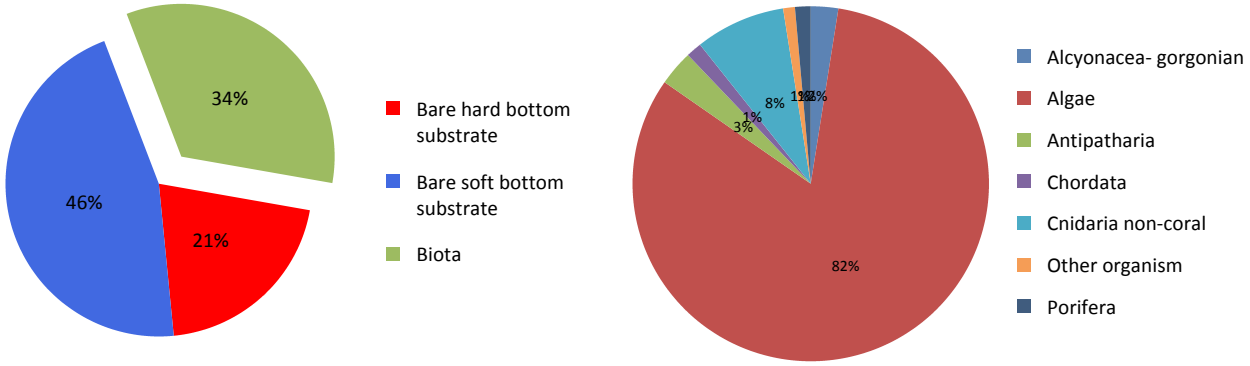



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-15. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-15.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-15; North Carolina, Inside Snowy Grouper Wreck MPA, Edge of 72 m Plateau, UNCW Dive 65

**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 14-15.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 281 | 33.57% |
| Algae | 231 | 27.60% |
| Chlorophyta | 4 | 0.48% |
| Corallinales/crustose coralline | 12 | 1.43% |
| Cyanophyta | 7 | 0.84% |
| Phaeophyta | 152 | 18.16% |
| Rhodophyta | 56 | 6.69% |
| Porifera | 4 | 0.48% |
| Demospongiae | 1 | 0.12% |
| Demospongiae- ze tan starlet | 1 | 0.12% |
| Spirastrellidae | 2 | 0.24% |
| Alcyonacea- gorgonian | 7 | 0.84% |
| Gorgonacea | 3 | 0.36% |
| Muricea sp. | 1 | 0.12% |
| Nicella sp. | 3 | 0.36% |
| Antipatharia | 9 | 1.08% |
| Antipatharia | 1 | 0.12% |
| Stichopathes lutkeni | 3 | 0.36% |
| Tanacetipathes barbadensis | 5 | 0.60% |
| Cnidaria non-coral | 23 | 2.75% |
| Hydroidolina | 23 | 2.75% |
| Chordata | 4 | 0.48% |
| Fish | 4 | 0.48% |
| Other organism | 3 | 0.36% |
| Bare soft bottom substrate | 383 | 45.76% |
| Bare hard bottom substrate | 173 | 20.67% |
| Bare hard bottom substrate | 173 | 20.67% |
| Bare rock- pavement boulder ledge | 162 | 19.35% |
| Bare rubble- rock | 11 | 1.31% |
| **Grand Total** | **837** | **100.00%** |

**Dive Site:** ROV 14-15; North Carolina, Inside Snowy Grouper Wreck MPA, Edge of 72 m Plateau, UNCW Dive 65

**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-15.

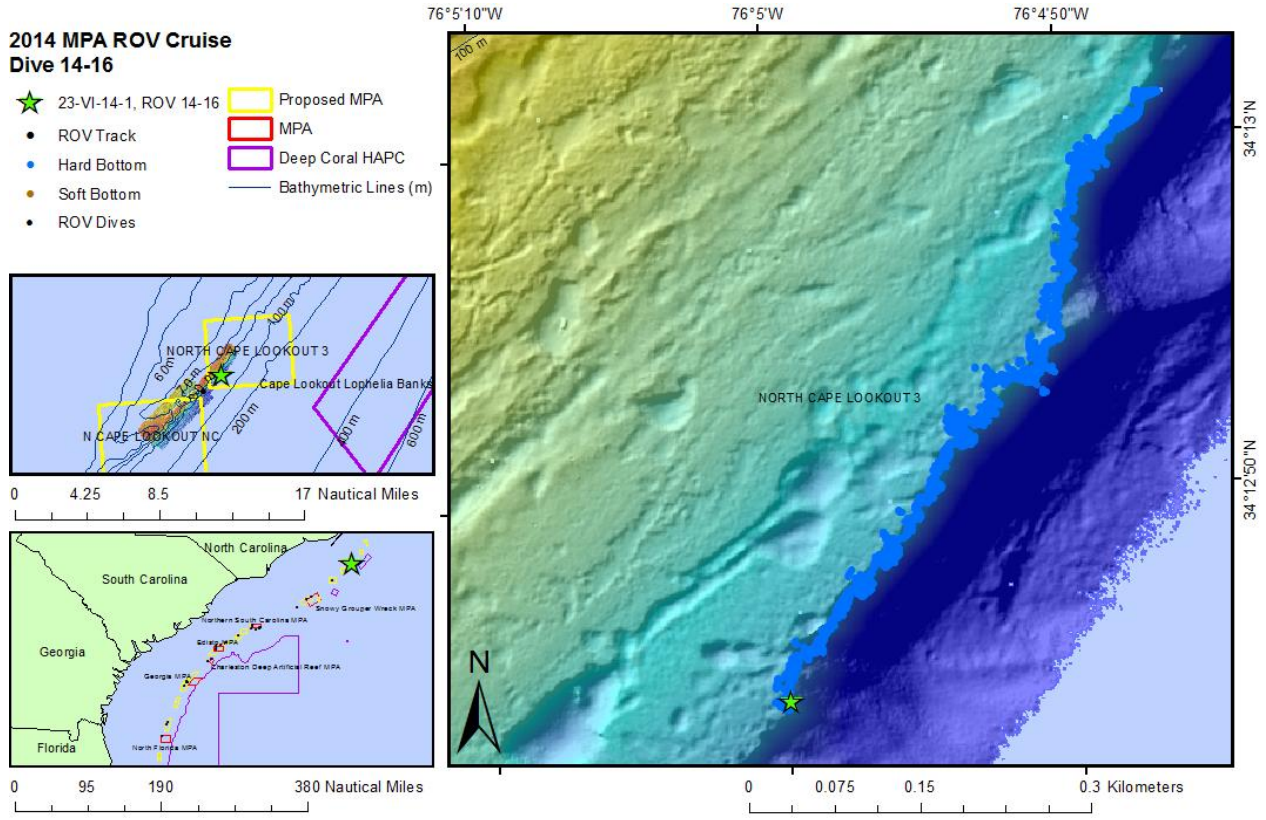
| Scientific Name | Common Name | Density |
|---|---|---|
| *Acanthurus* sp. | doctorfish | 0.0034 |
| *Balistes capriscus* | grey triggerfish | 0.0002 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0069 |
| *Calamus* sp. | porgy | 0.0015 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0104 |
| *Centropyge argi* | cherubfish | 0.0003 |
| *Cephalopholis cruentata* | graysby | 0.0008 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0007 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0086 |
| *Chromis cyaneus* | blue chromis | 0.0039 |
| *Chromis insolata* | sunshinefish | 0.0096 |
| *Chromis scotti* | purple reeffish | 0.0027 |
| *Chromis* sp. | damselfish | 0.0033 |
| *Clepticus parrai* | creole wrasse | 0.0051 |
| *Epinephelus adscensionis* | rock hind | 0.0003 |
| *Epinephelus morio* | red grouper | 0.0001 |
| *Haemulon aurolineatum* | tomtate | 0.0212 |
| *Haemulon striatum* | striped grunt | 0.0035 |
| *Halichoeres garnoti* | yellowhead wrasse | 0.0045 |
| *Halichoeres* sp. | wrasse | 0.0032 |
| *Holacanthus bermudensis* | blue angelfish | 0.0009 |
| *Holacanthus tricolor* | rock beauty | 0.0023 |
| Holocentridae | squirrelfish | 0.0086 |
| *Lachnolaimus maximus* | hogfish | 0.0003 |
| *Lutjanus buccanella* | blackfin snapper | 0.0021 |
| *Mycteroperca microlepis* | gag grouper | 0.0005 |
| *Mycteroperca phenax* | scamp | 0.0029 |
| *Mycteroperca* sp. | grouper | 0.0001 |
| *Myripristis jacobus* | blackbar soldierfish | 0.0005 |
| *Paranthias furcifer* | creole-fish | 0.0243 |
| *Pareques umbrosus* | cubbyu | 0.0106 |
| *Priacanthus arenatus* | bigeye | 0.0133 |
| *Prognathodes aculeatus* | longsnout butterflyfish | 0.0001 |
| *Pseudupeneus maculatus* | spotted goatfish | 0.0023 |
| *Pterois volitans* | lionfish | 0.0033 |
| *Rypticus saponaceus* | greater soapfish | 0.0013 |
| Scorpaenidae | scorpionfish | 0.0002 |

**Dive Site:** ROV 14-15; North Carolina, Inside Snowy Grouper Wreck MPA, Edge of 72 m Plateau, UNCW Dive 65

| | | |
|---|---|---|
| *Seriola dumerili* | greater amberjack | 0.0003 |
| *Seriola rivoliana* | almaco jack | 0.0029 |
| Serranidae | sea bass | 0.0001 |
| *Serranus annularis* | orangeback bass | 0.0001 |
| *Sparisoma atomarium* | greenblotch parrotfish | 0.0003 |
| *Stegastes partitus* | bicolor damselfish | 0.0005 |

**Dive Site:** ROV 14-16; North Carolina, Inside Proposed North Cape Lookout 3, 110 m Ledge, UNCW Dive 66

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

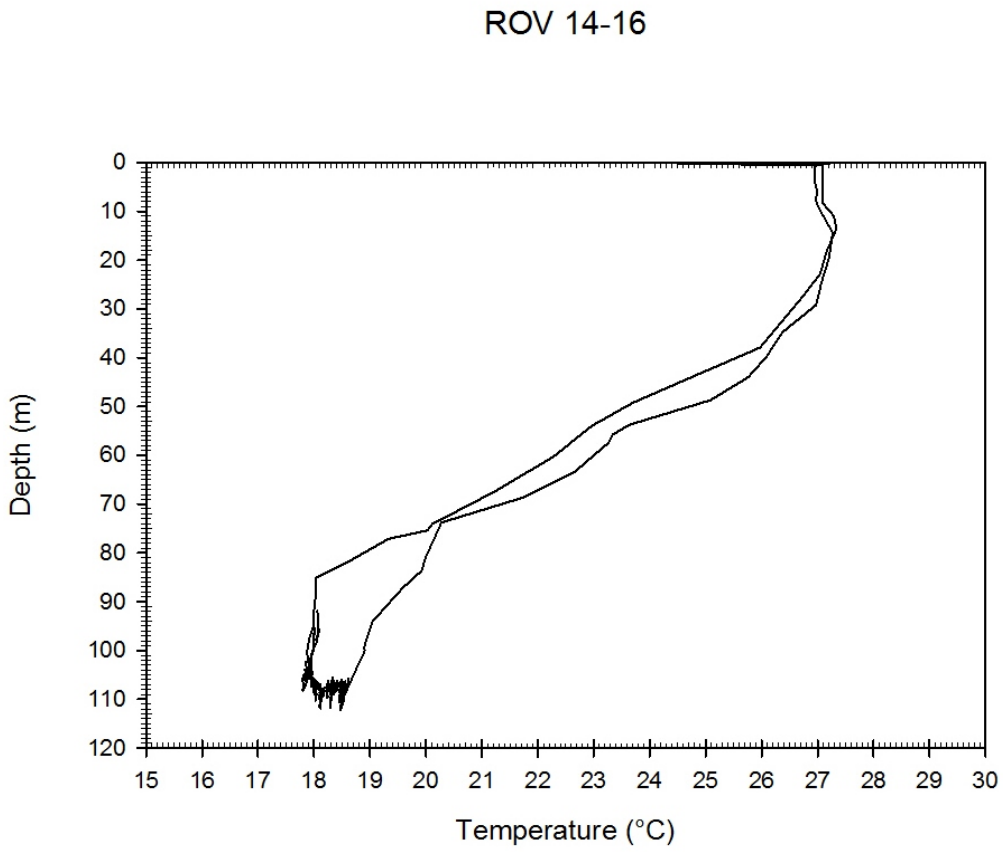
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | NancyFoster_2014_NCapeLookout_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/23/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 146 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-16; North Carolina, Inside Proposed North Cape Lookout 3, 110 m Ledge, UNCW Dive 66

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -92 | **Total Transect Length (km):** | 0.62 |
| **Maximum Bottom Depth (m):** | -113 | **Surface Current (kn):** | 0.5 |
| **On Bottom (Time- EDT):** | 8:29 | **On Bottom (Lat/Long):** | 34.21°N; -76.08°W |
| **Off Bottom (Time- EDT):** | 10:08 | **Off Bottom (Lat/Long):** | 34.22°N; -76.08°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-16; North Carolina, Inside Proposed North Cape Lookout 3, 110 m Ledge, UNCW Dive 66

**Dive Imagery:**

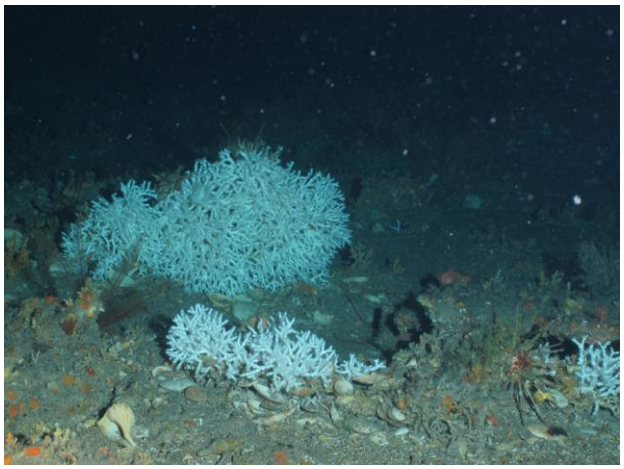


**Figure 1:** -109.4 m
*Oculina* colonies grow on the pavement

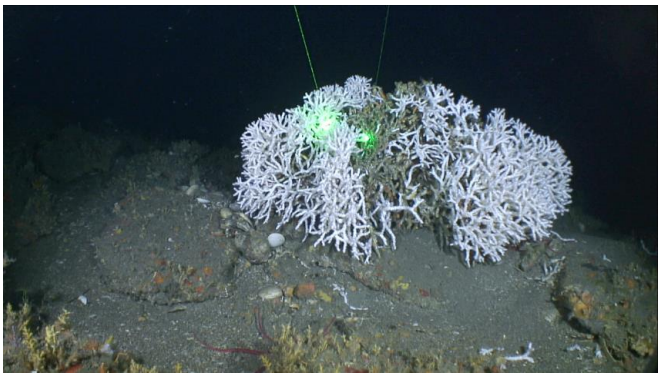


**Figure 2:** -109.4 m
*Oculina* colonies grow on the pavement

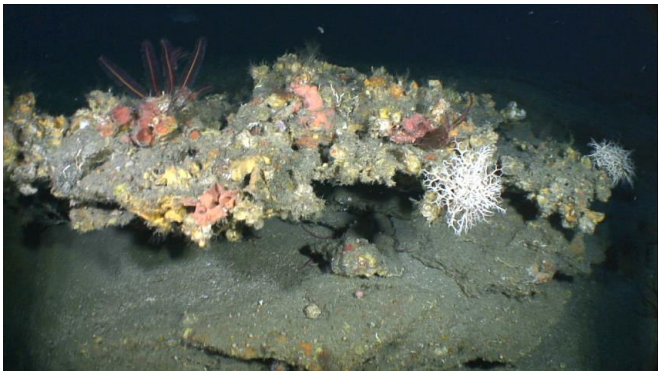


**Figure 3:** -107.3 m
Large rock outcrop covered in typical epifauna for this site

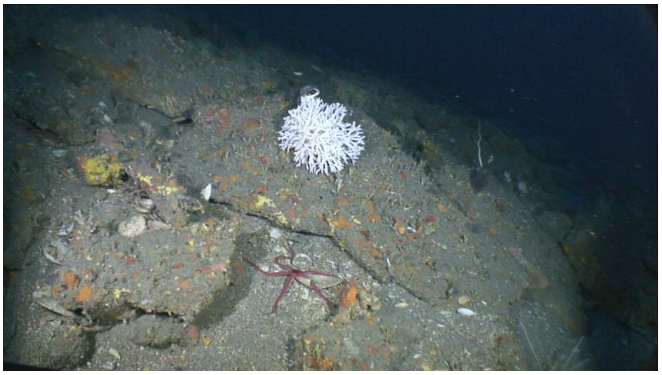


**Figure 4:** -108.1 m
*Oculina* on rocks

**Dive Site:** ROV 14-16; North Carolina, Inside Proposed North Cape Lookout 3, 110 m Ledge, UNCW Dive 66

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-16, UNCW Mohawk ROV Dive 66; Site #- 23-VI-14-1. Target Site - North Carolina, Inside Proposed North Cape Lookout 3, 110 m Ledge. Ground-truth multibeam sonar of site (NancyFoster_2014 _NCapeLookout_Grid). Conduct video/photo along top of NE-SW 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-16.

Site Description/Habitat/Biota:
Landed on the bottom right next to a 40 cm Oculina colony. Top ledge running west is pavement and chunks of pavement; 0 deg slope, little relief (<.25 m). The edge of the slope toward the east is a sudden drop with a sharp edge, the rocks become jumped piles of slabs and boulders and cobble down the 40-60 deg slope to the east. Lots of overhangs, and holes for small fish. Oculina was common, mostly healthy, and most all at least 10 cm wide (41 counted) a few with standing dead corals. Rocks were covered in Pycnodonte enodis? bivalves, and encrusting sponges.

**Dive Site:** ROV 14-16; North Carolina, Inside Proposed North Cape Lookout 3, 110 m Ledge, UNCW Dive 66

**CPCe Percent Cover Analysis:**

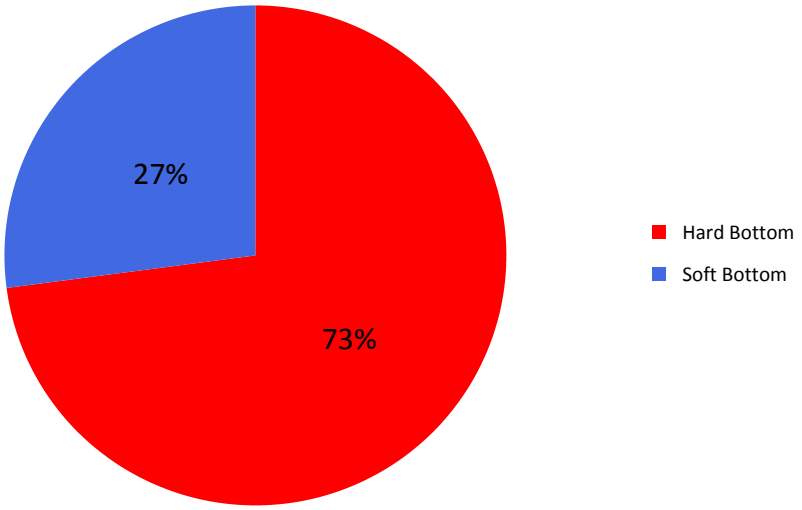
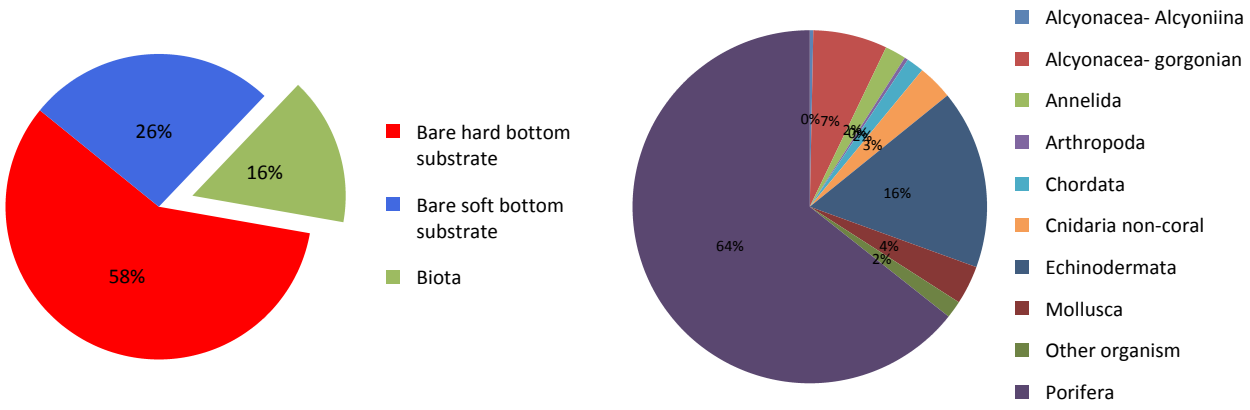



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-16. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-16.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-16; North Carolina, Inside Proposed North Cape Lookout 3, 110 m Ledge, UNCW Dive 66

**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 14-16.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 311 | 15.68% |
| Porifera | 200 | 10.09% |
| Demospongiae | 42 | 2.12% |
| Ircinia sp. | 1 | 0.05% |
| Spirastrellidae | 157 | 7.92% |
| Alcyonacea- Alcyoniina | 1 | 0.05% |
| Alcyonacea | 1 | 0.05% |
| Alcyonacea- gorgonian | 21 | 1.06% |
| Diodogorgia sp. | 1 | 0.05% |
| Gorgonacea | 4 | 0.20% |
| Telesto sp./Carijoa sp. | 16 | 0.81% |
| Cnidaria non-coral | 10 | 0.50% |
| Hydroidolina | 10 | 0.50% |
| Annelida | 6 | 0.30% |
| Sabellidae | 4 | 0.20% |
| Serpulidae | 2 | 0.10% |
| Mollusca | 11 | 0.55% |
| Bivalvia | 11 | 0.55% |
| Arthropoda | 1 | 0.05% |
| Stenorhynchus seticornis | 1 | 0.05% |
| Echinodermata | 51 | 2.57% |
| Asteroidea | 1 | 0.05% |
| Centrostephanus longispinus | 3 | 0.15% |
| Cidaroidea | 3 | 0.15% |
| Comactinia meridionalis | 28 | 1.41% |
| Crinoidea | 2 | 0.10% |
| Gorgonocephalidae | 2 | 0.10% |
| Ophioderma devaneyi | 12 | 0.61% |
| Chordata | 5 | 0.25% |
| Fish | 5 | 0.25% |
| Other organism | 5 | 0.25% |
| Bare soft bottom substrate | 520 | 26.22% |
| Bare hard bottom substrate | 1152 | 58.09% |
| Bare hard bottom substrate | 1152 | 58.09% |
| Bare rock- pavement boulder ledge | 1072 | 54.06% |

**Dive Site:** ROV 14-16; North Carolina, Inside Proposed North Cape Lookout 3, 110 m Ledge, UNCW Dive 66

| | | |
|---|---|---|
| Bare rubble- rock | 80 | 4.03% |
| **Grand Total** | **1983** | **100.00%** |

**Dive Site:** ROV 14-16; North Carolina, Inside Proposed North Cape Lookout 3, 110 m Ledge, UNCW Dive 66

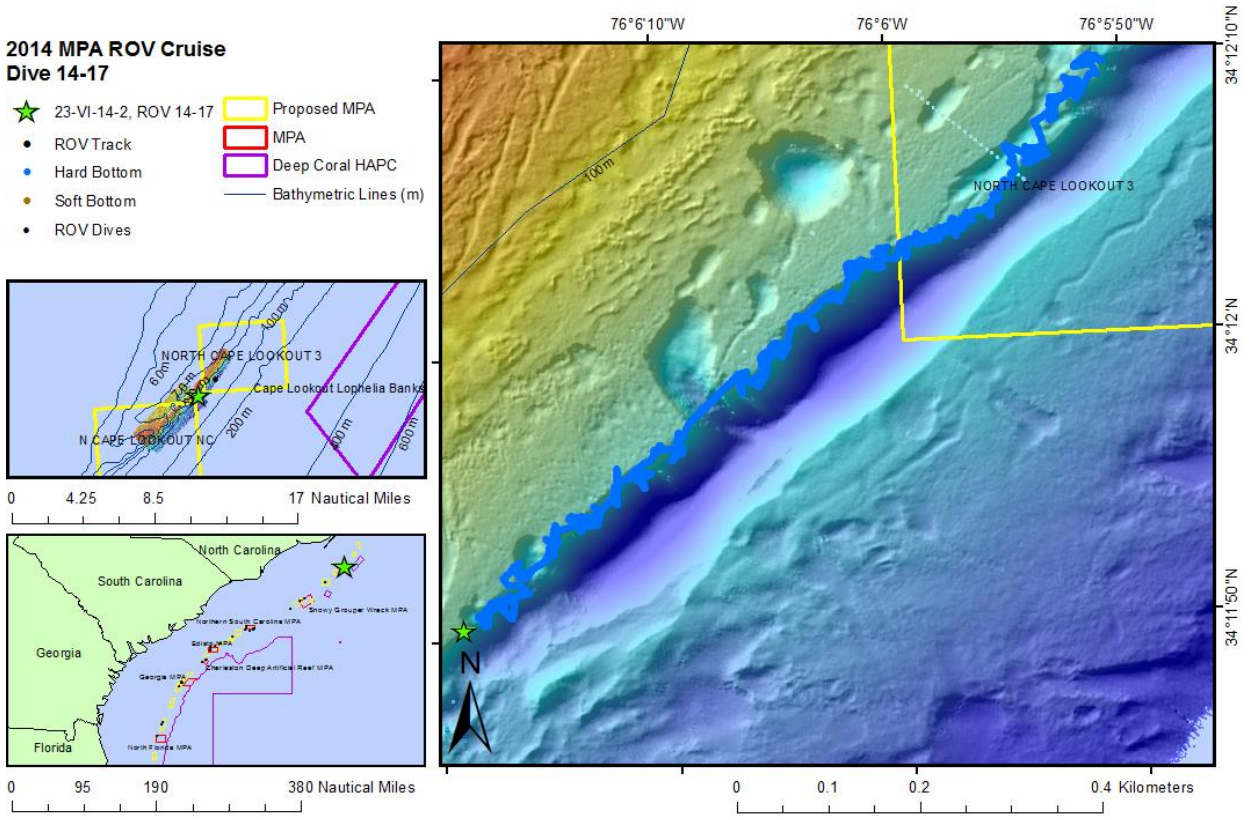
**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-16.

| Scientific Name | Common Name | Density |
|---|---|---|
| Anthiinae | anthiid | 0.0871 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0001 |
| *Centropristis ocyurus* | bank sea bass | 0.0001 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0005 |
| *Decodon puellaris* | red hogfish | 0.0004 |
| *Halichoeres* sp. | wrasse | 0.0078 |
| *Hemanthias vivanus* | red barbier | 0.0060 |
| Holocentridae | squirrelfish | 0.0001 |
| *Hyporthodus niveatus* | snowy grouper | 0.0002 |
| *Liopropoma eukrines* | wrasse bass | 0.0012 |
| *Mycteroperca phenax* | scamp | 0.0007 |
| *Pagrus pagrus* | red porgy | 0.0014 |
| *Pareques iwamotoi* | blackbar drum | 0.0067 |
| *Pareques umbrosus* | cubbyu | 0.0011 |
| *Plectranthias garrupellus* | apricot bass | 0.0009 |
| *Plectrypops retrospinis* | cardinal soldierfish | 0.0008 |
| *Pristigenys alta* | short bigeye | 0.0011 |
| *Prognathodes aya* | bank butterflyfish | 0.0025 |
| *Pronotogrammus martinicensis* | roughtongue bass | 0.0337 |
| *Pterois volitans* | lionfish | 0.0003 |
| Scorpaenidae | scorpionfish | 0.0034 |
| *Seriola fasciata* | lesser amberjack | 0.0001 |
| *Seriola rivoliana* | almaco jack | 0.0002 |
| *Serranus phoebe* | tattler | 0.0005 |

**Dive Site:** ROV 14-17; North Carolina, Outside/Inside Proposed North Cape Lookout 3, Edge of 104 m Ravine, UNCW Dive 67

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

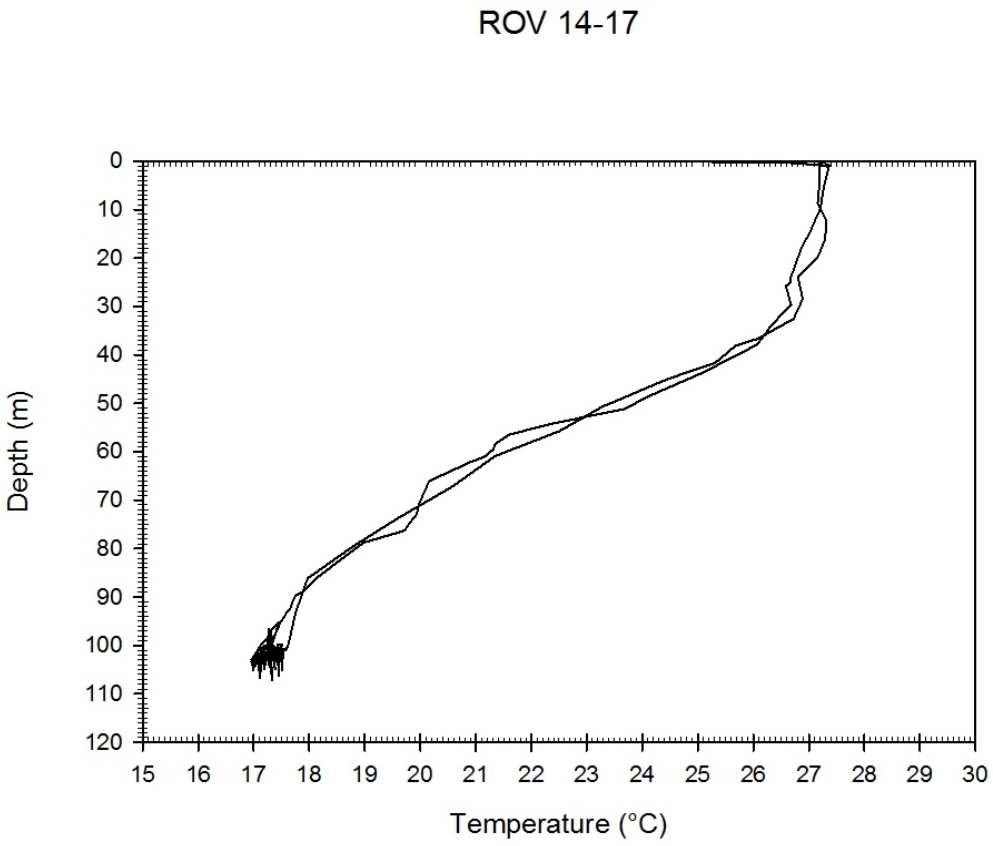
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | NancyFoster_14_08_MPA_Devilshole_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/23/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 90 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-17; North Carolina, Outside/Inside Proposed North Cape Lookout 3, Edge of 104 m Ravine, UNCW Dive 67

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -95 | **Total Transect Length (km):** | 0.89 |
| **Maximum Bottom Depth (m):** | -108 | **Surface Current (kn):** | 0.5 |
| **On Bottom (Time- EDT):** | 11:17 | **On Bottom (Lat/Long):** | 34.2°N; -76.11°W |
| **Off Bottom (Time- EDT):** | 12:39 | **Off Bottom (Lat/Long):** | 34.2°N; -76.1°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-17; North Carolina, Outside/Inside Proposed North Cape Lookout 3, Edge of 104 m Ravine, UNCW Dive 67

**Dive Imagery:**

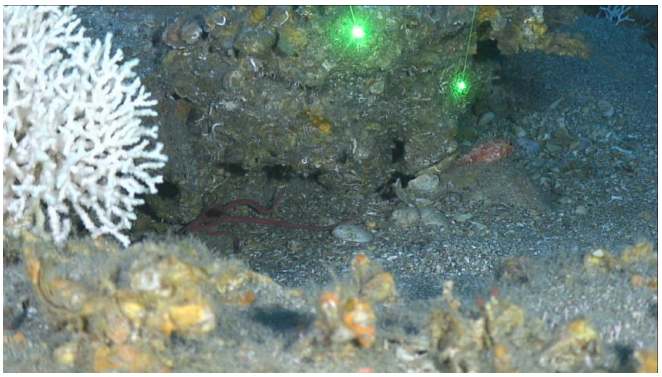


**Figure 1:** -108 m
*Oculina* and *Ophioderma*

**Figure 2:** -108 m
Antipatharian fans

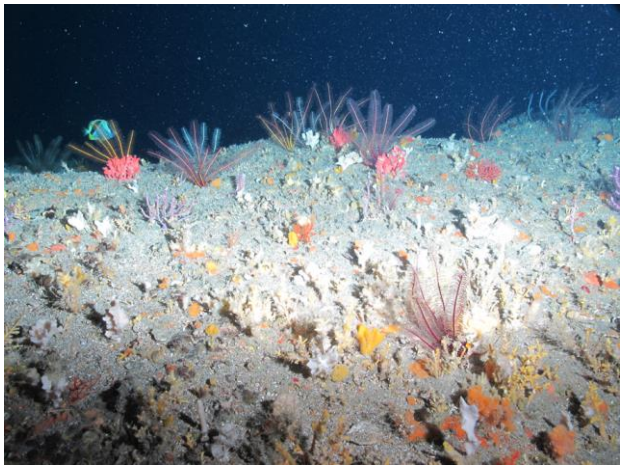


**Figure 3:** -102.8 m
Comatulid crinoids and butterflyfish on a rounded rocky bottom

**Figure 4:** -102.6 m
Scamp grouper over rocky bottom

**Dive Site:** ROV 14-17; North Carolina, Outside/Inside Proposed North Cape Lookout 3, Edge of 104 m Ravine, UNCW Dive 67

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-17, UNCW Mohawk ROV Dive 67; Site #- 23-VI-14-2. Target Site - North Carolina, Outside/Inside Proposed North Cape Lookout 3, Edge of 104 m Ravine. Ground-truth multibeam sonar of site (NancyFoster_14_08_MPA_Devilshole_Grid). Conduct video/photo along top of NE-SW 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-17.

Site Description/Habitat/Biota:
NW side of ravine outside of the proposed MPA. The top of the ledge was flat pavement with some broken slabs. The site is 30-50 deg to the SE. The pavement has broken from the plateau and is sliding down the slope. Pieces of the rim are still puzzle-pieced together and become more separated downslope. Many live Oculina colonies sighted, crinoids are common; no macro-sponges or gorgonians. Crossed two divot areas during the dive, both sloping hills with similar bottom to the eastern slope.

**Dive Site:** ROV 14-17; North Carolina, Outside/Inside Proposed North Cape Lookout 3, Edge of 104 m Ravine, UNCW Dive 67

**CPCe Percent Cover Analysis:**

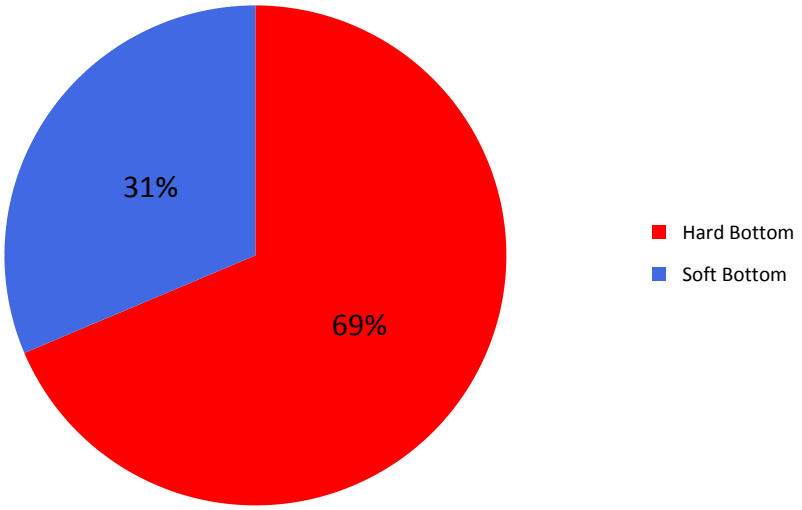
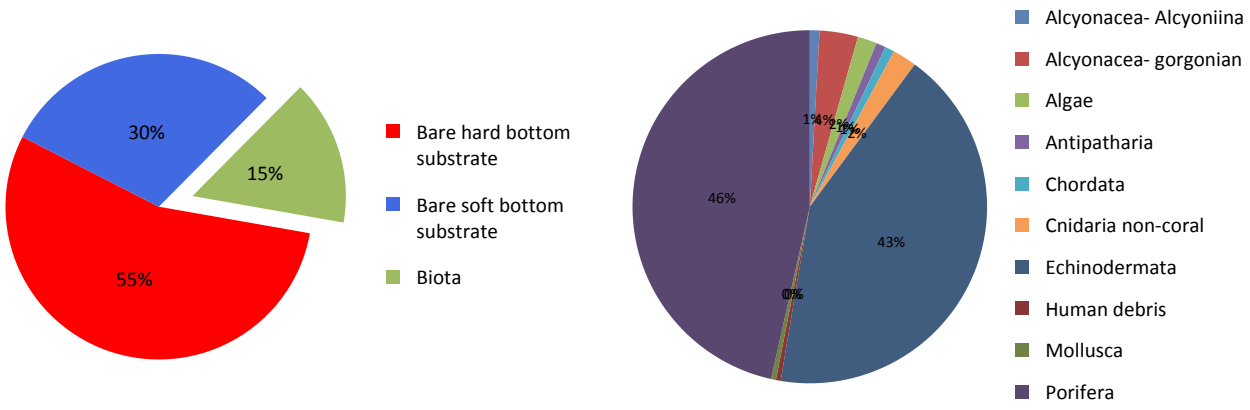



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-17. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-17.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-17; North Carolina, Outside/Inside Proposed North Cape Lookout 3, Edge of 104 m Ravine, UNCW Dive 67

**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 14-17.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 227 | 15.32% |
| Algae | 4 | 0.27% |
| Cyanophyta | 4 | 0.27% |
| Porifera | 106 | 7.15% |
| Demospongiae | 29 | 1.96% |
| Spirastrellidae | 77 | 5.20% |
| Alcyonacea- Alcyoniina | 2 | 0.13% |
| Anthomastus sp. | 2 | 0.13% |
| Alcyonacea- gorgonian | 8 | 0.54% |
| Diodogorgia sp. | 1 | 0.07% |
| Gorgonacea | 1 | 0.07% |
| Telesto sp./Carijoa sp. | 6 | 0.40% |
| Antipatharia | 2 | 0.13% |
| Tanacetipathes barbadensis | 2 | 0.13% |
| Cnidaria non-coral | 5 | 0.34% |
| Corallimorpharia | 1 | 0.07% |
| Hydroidolina | 4 | 0.27% |
| Mollusca | 1 | 0.07% |
| Bivalvia | 1 | 0.07% |
| Echinodermata | 97 | 6.55% |
| Cidaroidea | 2 | 0.13% |
| Comactinia meridionalis | 62 | 4.18% |
| Crinoidea | 20 | 1.35% |
| Davidaster sp. | 8 | 0.54% |
| Ophioderma devaneyi | 5 | 0.34% |
| Chordata | 2 | 0.13% |
| Fish | 2 | 0.13% |
| Human debris | 1 | 0.07% |
| Human debris | 1 | 0.07% |
| Fishing gear/line/long line | 1 | 0.07% |
| Bare soft bottom substrate | 442 | 29.82% |
| Bare hard bottom substrate | 812 | 54.79% |
| Bare hard bottom substrate | 812 | 54.79% |
| Bare rock- pavement boulder ledge | 745 | 50.27% |
| Bare rubble- rock | 67 | 4.52% |
| **Grand Total** | **1482** | **100.00%** |

**Dive Site:** ROV 14-17; North Carolina, Outside/Inside Proposed North Cape Lookout 3, Edge of 104 m Ravine, UNCW Dive 67

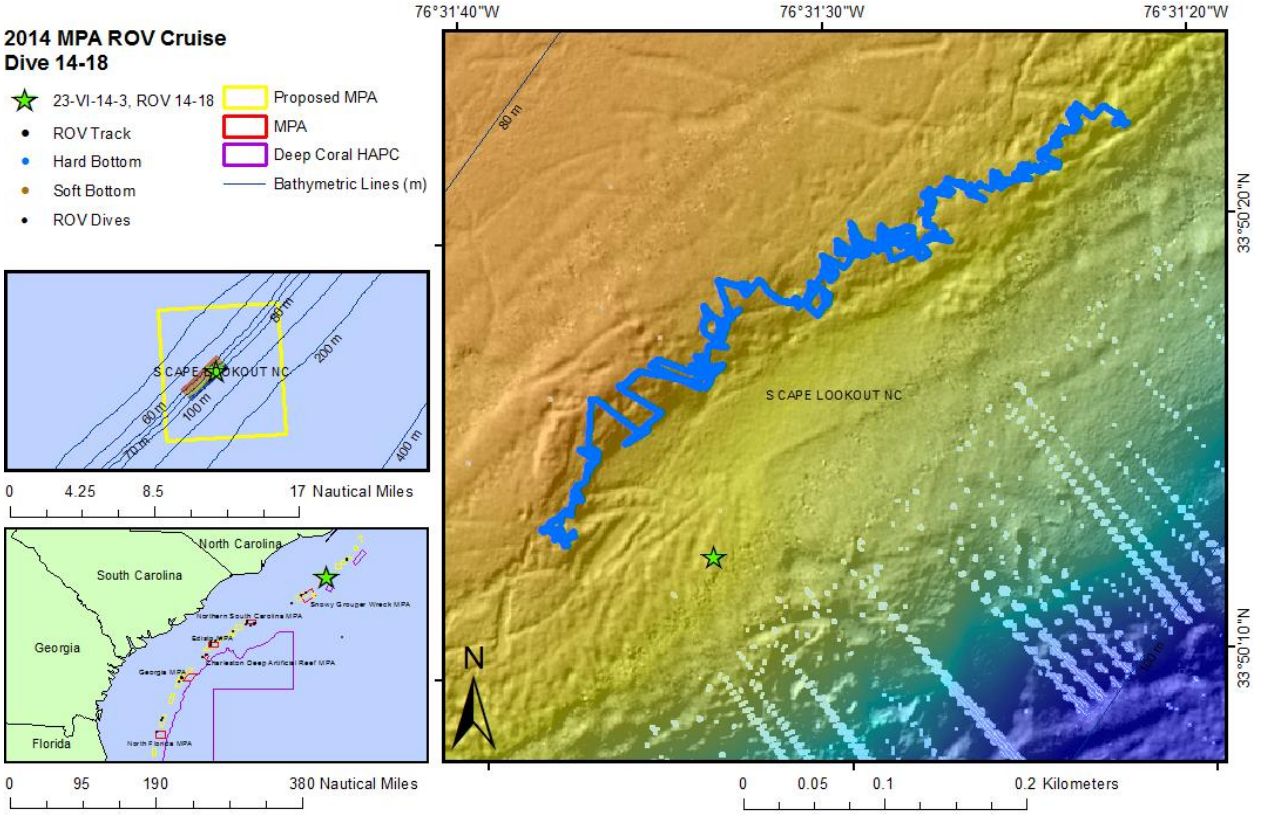
**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-17.

| Scientific Name | Common Name | Density |
|---|---|---|
| Anthiinae | anthiid | 0.0062 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0001 |
| *Centropristis ocyurus* | bank sea bass | 0.0000 |
| *aCentropristis* sp. | sea bass | 0.0000 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0001 |
| *Decodon puellaris* | red hogfish | 0.0000 |
| *Equetus lanceolatus* | jack-knife fish | 0.0001 |
| *Halichoeres bivitattus* | greenband wrasse | 0.0000 |
| *Halichoeres* sp. | wrasse | 0.0010 |
| *Hemanthias vivanus* | red barbier | 0.0003 |
| Holocentridae | squirrelfish | 0.0000 |
| *Liopropoma eukrines* | wrasse bass | 0.0001 |
| *Mycteroperca phenax* | scamp | 0.0001 |
| *Pagrus pagrus* | red porgy | 0.0000 |
| *Pareques iwamotoi* | blackbar drum | 0.0005 |
| *Pareques* sp. | drum | 0.0006 |
| *Pareques umbrosus* | cubbyu | 0.0001 |
| *Plectranthias garrupellus* | apricot bass | 0.0000 |
| *Plectrypops retrospinis* | cardinal soldierfish | 0.0001 |
| *Pristigenys alta* | short bigeye | 0.0000 |
| *Prognathodes aya* | bank butterflyfish | 0.0004 |
| *Pronotogrammus martinicensis* | roughtongue bass | 0.0046 |
| *Pterois volitans* | lionfish | 0.0001 |
| Scorpaenidae | scorpionfish | 0.0001 |
| *Seriola dumerili* | greater amberjack | 0.0001 |
| *Seriola rivoliana* | almaco jack | 0.0001 |
| *Seriola* sp. | amberjack | 0.0001 |
| *Serranus notospilus* | saddle bass | 0.0000 |
| *Serranus phoebe* | tattler | 0.0000 |

**Dive Site:** ROV 14-18; North Carolina, Inside Proposed South Cape Lookout NC, Edge of 104 m Ravine, UNCW Dive 68

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

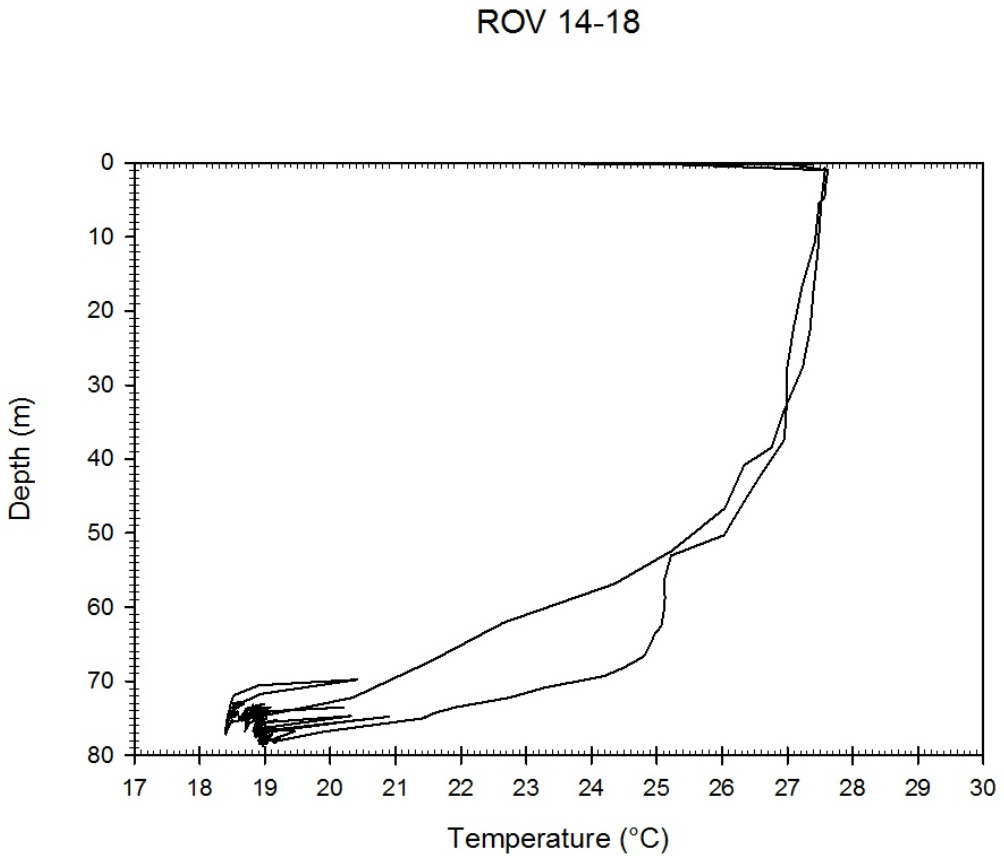
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | NancyFoster_14_08_MPA_NC_CapeLookout_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/23/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 50 |
| **DVD:** | 1 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-18; North Carolina, Inside Proposed South Cape Lookout NC, Edge of 104 m Ravine, UNCW Dive 68

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -70 | **Total Transect Length (km):** | 0.48 |
| **Maximum Bottom Depth (m):** | -79 | **Surface Current (kn):** | 0.3 |
| **On Bottom (Time- EDT):** | 16:32 | **On Bottom (Lat/Long):** | 33.84°N; -76.53°W |
| **Off Bottom (Time- EDT):** | 17:32 | **Off Bottom (Lat/Long):** | 33.84°N; -76.52°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-18; North Carolina, Inside Proposed South Cape Lookout NC, Edge of 104 m Ravine, UNCW Dive 68

**Dive Imagery:**

**Figure 1:** -77.2 m
*Cinachyra* sponge

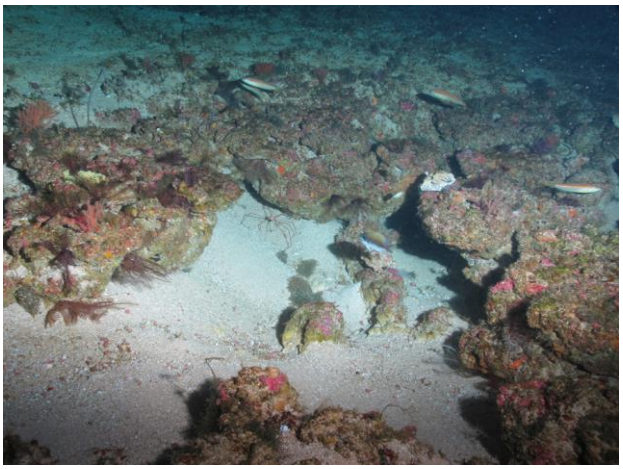


**Figure 2:** -77.2 m
Rock outcrop

**Figure 3:** -77.6 m
Lionfish and bigeye

**Figure 4:** -78.8 m
Rock beauty, lionfish and squirrelfish

**Dive Site:** ROV 14-18; North Carolina, Inside Proposed South Cape Lookout NC, Edge of 104 m Ravine, UNCW Dive 68

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-18, UNCW Mohawk ROV Dive 68; Site #- 23-VI-14-3. Target Site - North Carolina, Inside Proposed South Cape Lookout NC, Edge of 104 m Ravine. Ground-truth multibeam sonar of site (NancyFoster_14_08_MPA_NC_CapeLookout_Grid). Conduct video/photo along top of NE-SW 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. The current was strong out of the NNW and 1+ knot. Difficulty station keeping and therefore taking still upshots. Logged the dive track 14-18.

Site Description/Habitat/Biota:
Transected SW to NE along feature/slope on MB. Flat, rubble, 80-90% cover (the rubble may actually be hard rock boulders that are filled in with sand - based on a few overhangs). Mostly featureless except the occasional exposed rock overhang and burrows. Hard bottom was covered in algal mats, peyssonnelioid, Didemnidae, hydroids, Stichopathes, Aiolochroia crassa, and Cinachyrella? Very common; sand tilefish and burrows sighted; 1 graysby grouper and 10 lionfish.

**Dive Site:** ROV 14-18; North Carolina, Inside Proposed South Cape Lookout NC, Edge of 104 m Ravine, UNCW Dive 68

**CPCe Percent Cover Analysis:**

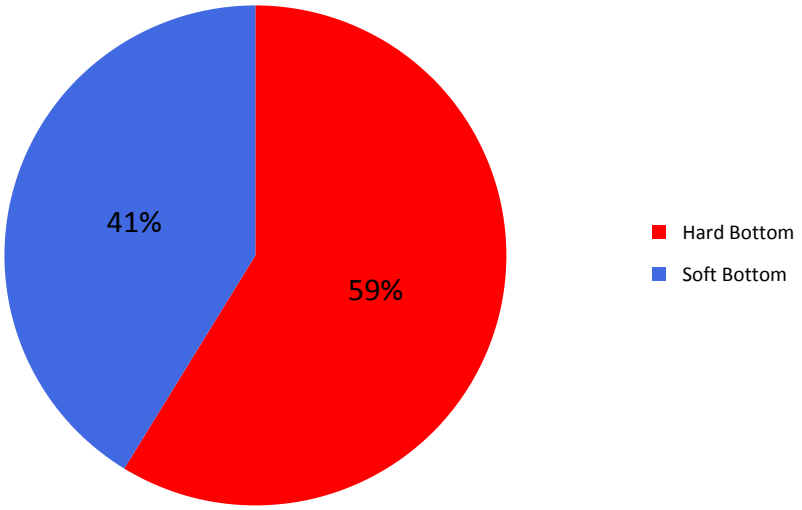
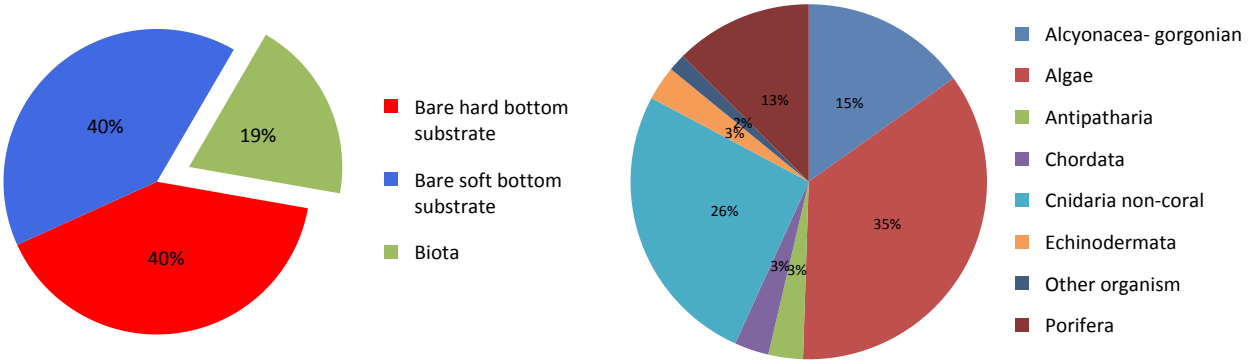



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-18. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-18.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-18; North Carolina, Inside Proposed South Cape Lookout NC, Edge of 104 m Ravine, UNCW Dive 68

**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 14-18.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 192 | 19.41% |
| Algae | 68 | 6.88% |
| Corallinales/crustose coralline | 47 | 4.75% |
| Cyanophyta | 14 | 1.42% |
| Phaeophyta | 3 | 0.30% |
| Rhodophyta | 4 | 0.40% |
| Porifera | 24 | 2.43% |
| Aiolochroia crassa | 1 | 0.10% |
| Demospongiae | 16 | 1.62% |
| Spirastrellidae | 7 | 0.71% |
| Alcyonacea- gorgonian | 29 | 2.93% |
| Diodogorgia sp. | 1 | 0.10% |
| Ellisella sp. | 1 | 0.10% |
| Ellisellidae | 3 | 0.30% |
| Gorgonacea | 6 | 0.61% |
| Nicella sp. | 18 | 1.82% |
| Antipatharia | 6 | 0.61% |
| Antipatharia | 1 | 0.10% |
| Stichopathes lutkeni | 5 | 0.51% |
| Cnidaria non-coral | 50 | 5.06% |
| Hydroidolina | 50 | 5.06% |
| Echinodermata | 6 | 0.61% |
| Comactinia meridionalis | 5 | 0.51% |
| Crinoidea | 1 | 0.10% |
| Chordata | 6 | 0.61% |
| Ascidiacea | 1 | 0.10% |
| Fish | 5 | 0.51% |
| Other organism | 3 | 0.30% |
| Bare soft bottom substrate | 397 | 40.14% |
| Bare hard bottom substrate | 400 | 40.44% |
| Bare hard bottom substrate | 400 | 40.44% |
| Bare rock- pavement boulder ledge | 375 | 37.92% |
| Bare rubble- rock | 25 | 2.53% |
| **Grand Total** | **989** | **100.00%** |

**Dive Site:** ROV 14-18; North Carolina, Inside Proposed South Cape Lookout NC, Edge of 104 m Ravine, UNCW Dive 68

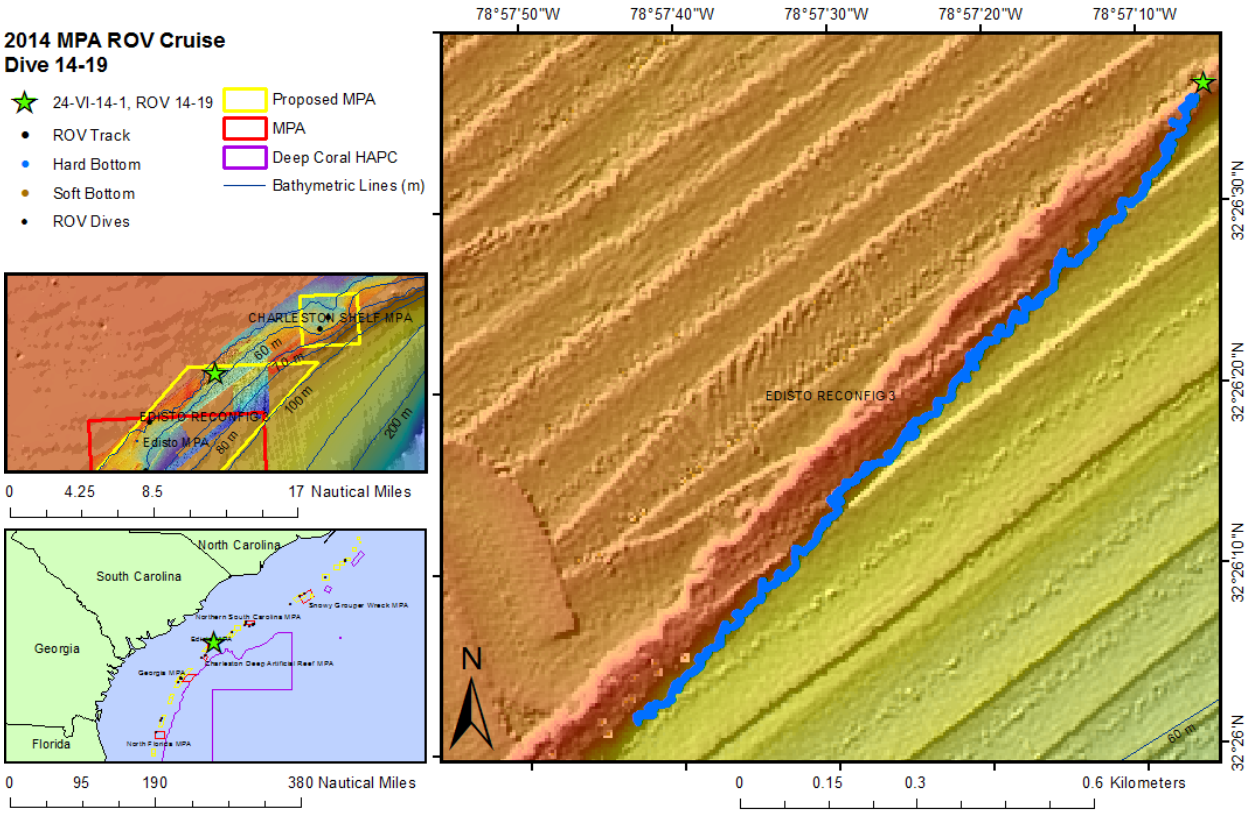
**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-18.

| Scientific Name | Common Name | Density |
|---|---|---|
| *Acanthurus* sp. | doctorfish | 0.0012 |
| *Apogon pseudomaculatus* | twospot cardinalfish | 0.0002 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0007 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0032 |
| *Cephalopholis cruentata* | graysby | 0.0002 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0007 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0020 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0005 |
| *Chromis insolata* | sunshinefish | 0.0013 |
| *Chromis* sp. | damselfish | 0.0050 |
| *Halichoeres bivitattus* | greenband wrasse | 0.0007 |
| *Halichoeres* sp. | wrasse | 0.0036 |
| *Holacanthus bermudensis* | blue angelfish | 0.0010 |
| *Holacanthus tricolor* | rock beauty | 0.0008 |
| Holocentridae | squirrelfish | 0.0022 |
| *Malacanthus plumieri* | sand tilefish | 0.0004 |
| Muraenidae | moray eel | 0.0002 |
| *Paranthias furcifer* | creole-fish | 0.0002 |
| *Pomacanthus paru* | french angelfish | 0.0005 |
| *Priacanthus arenatus* | bigeye | 0.0002 |
| *Pristigenys alta* | short bigeye | 0.0025 |
| *Pterois volitans* | lionfish | 0.0010 |
| *Seriola* sp. | amberjack | 0.0003 |
| *Serranus phoebe* | tattler | 0.0011 |

**Dive Site:** ROV 14-19; South Carolina, Inside Proposed Edisto Reconfig 3, 52 m Ridge, UNCW Dive 69

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 11/4/2014 |

## Dive Overview:

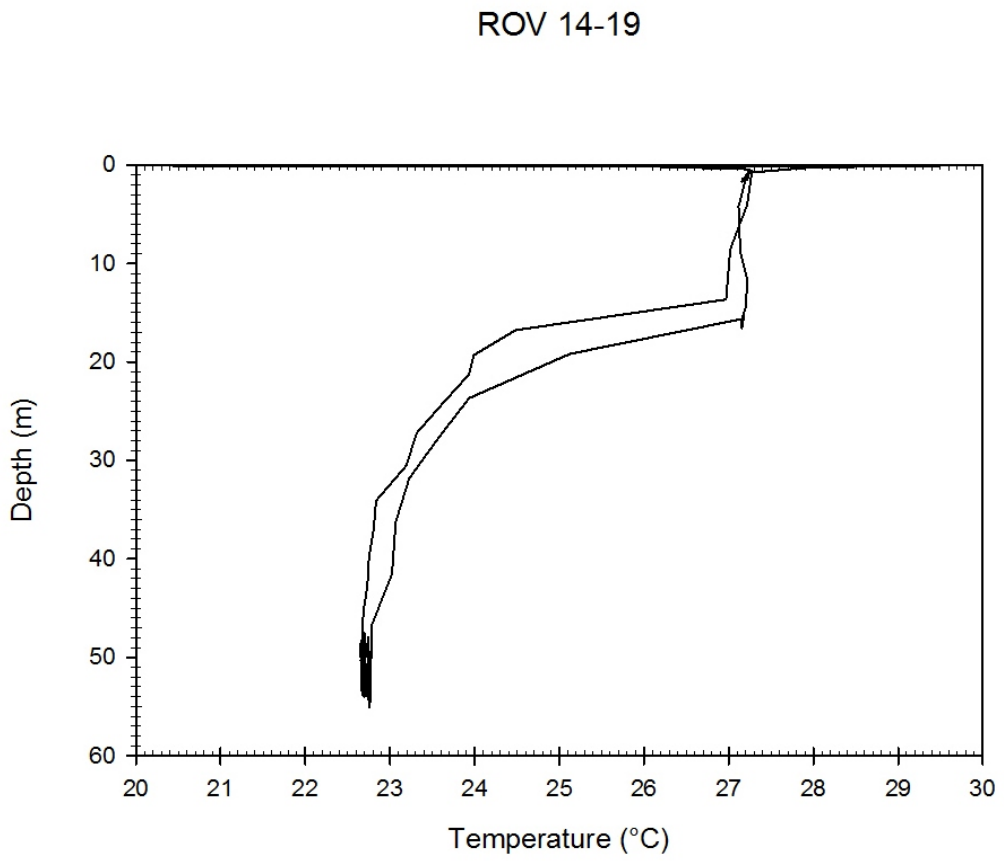
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Pisces_2012_EdistoMPA_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/24/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 169 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-19; South Carolina, Inside Proposed Edisto Reconfig 3, 52 m Ridge, UNCW Dive 69

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -47 | **Total Transect Length (km):** | 1.43 |
| **Maximum Bottom Depth (m):** | -55 | **Surface Current (kn):** | 0 |
| **On Bottom (Time- EDT):** | 8:12 | **On Bottom (Lat/Long):** | 32.44°N; -78.95°W |
| **Off Bottom (Time- EDT):** | 10:14 | **Off Bottom (Lat/Long):** | 32.43°N; -78.96°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-19; South Carolina, Inside Proposed Edisto Reconfig 3, 52 m Ridge, UNCW Dive 69

**Dive Imagery:**

**Figure 1:** -51 m
*Swiftia exserta*

**Figure 2:** -51 m
*Swiftia exserta*

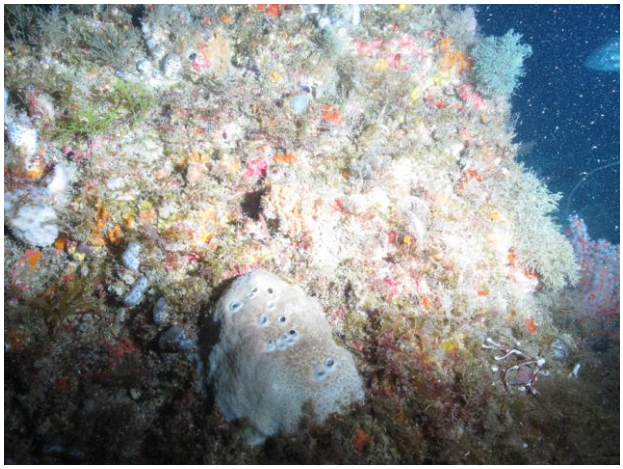


**Figure 3:** -53.3 m
Unidentified tan-starlet sponge

**Figure 4:** -52.7 m
*Stichopathes* and cubbyu

**Dive Site:** ROV 14-19; South Carolina, Inside Proposed Edisto Reconfig 3, 52 m Ridge, UNCW Dive 69

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-19, UNCW Mohawk ROV Dive 69; Site #- 23-VI-14-3. Target Site - South Carolina, Inside Proposed Edisto Reconfig 3, 52 m Ridge. Ground-truth multibeam sonar of site (Pisces_2012 _EdistoMPA_MB_Grid). Conduct video/photo along top of NE-SW 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-19.

Site Description/Habitat/Biota:
Landed on a low relief ridge ( 1 m) and transected SW along the ridge in the MB. Bottom quickly became high-relief, sloping to the E-SE. Boulders are large 2-3+ m wide and tall in jumbled piles. All exposed hard bottom was 100% covered in fauna and mostly Dictyota-like green colored algae. Loads of large Swiftia (50+ cm wide) and Diodogorgia (10 cm), Antipatharia (grey mesh fans), one hard coral (O. varicosa, 10 cm, pink), hydroids, loggerhead turtle, cornetfish doing a courting dance (9:59) and 45+ lionfish. Depth 54-55 m in the sand and 50 m on the top of the ledge. The ledge ended abruptly in the sand on the east.

**Dive Site:** ROV 14-19; South Carolina, Inside Proposed Edisto Reconfig 3, 52 m Ridge, UNCW Dive 69

**CPCe Percent Cover Analysis:**

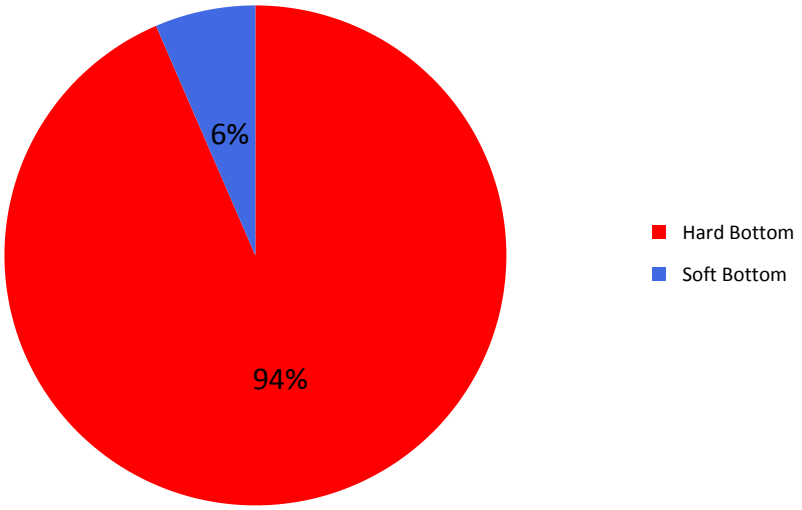
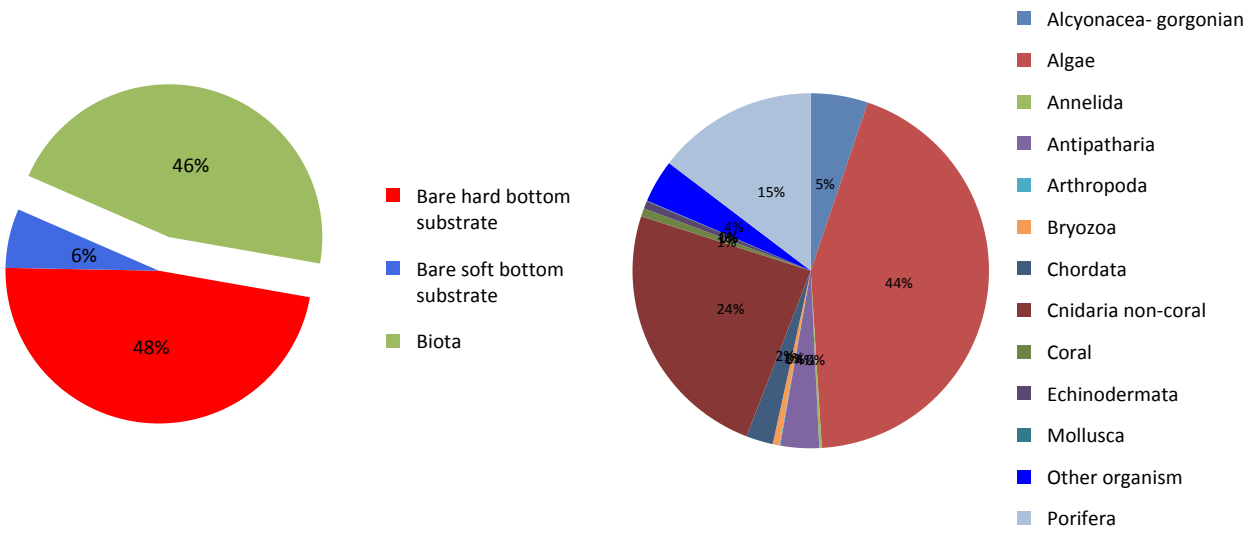



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-19. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-19.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-19; South Carolina, Inside Proposed Edisto Reconfig 3, 52 m Ridge, UNCW Dive 69

**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 -19.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 1312 | 46.21% |
| Algae | 575 | 20.25% |
| Chlorophyta | 2 | 0.07% |
| Corallinales/crustose coralline | 136 | 4.79% |
| Cyanophyta | 9 | 0.32% |
| Phaeophyta | 225 | 7.93% |
| Rhodophyta | 203 | 7.15% |
| Porifera | 192 | 6.76% |
| Aiolochroia crassa | 6 | 0.21% |
| Auletta sp. | 1 | 0.04% |
| Cinachyra sp./Cinachyrella sp. | 1 | 0.04% |
| Clathria sp. | 1 | 0.04% |
| Demospongiae | 64 | 2.25% |
| Demospongiae- ze tan starlet | 16 | 0.56% |
| Dictyoceratida | 3 | 0.11% |
| Geodia sp. | 5 | 0.18% |
| Ircinia sp. | 7 | 0.25% |
| Niphates sp. | 1 | 0.04% |
| Poecilosclerida | 1 | 0.04% |
| Spirastrellidae | 86 | 3.03% |
| Coral | 10 | 0.35% |
| Oculina varicosa | 1 | 0.04% |
| Scleractinia solitary | 9 | 0.32% |
| Alcyonacea- gorgonian | 68 | 2.40% |
| Diodogorgia sp. | 38 | 1.34% |
| Ellisella sp. | 3 | 0.11% |
| Ellisellidae | 6 | 0.21% |
| Gorgonacea | 7 | 0.25% |
| Nicella sp. | 10 | 0.35% |
| Telesto sp./Carijoa sp. | 1 | 0.04% |
| Swiftia exserta | 3 | 0.11% |
| Antipatharia | 46 | 1.62% |
| Antipatharia | 5 | 0.18% |
| Antipatharia atlantica | 7 | 0.25% |
| Antipathes sp. A | 1 | 0.04% |

**Dive Site:** ROV 14-19; South Carolina, Inside Proposed Edisto Reconfig 3, 52 m Ridge, UNCW Dive 69

| | | |
|---|---|---|
| Stichopathes lutkeni | 27 | 0.95% |
| Tanacetipathes barbadensis | 6 | 0.21% |
| Cnidaria non-coral | 316 | 11.13% |
| Hydroidolina | 316 | 11.13% |
| Annelida | 3 | 0.11% |
| Filograna sp. | 2 | 0.07% |
| Spirobranchus gigantea | 1 | 0.04% |
| Mollusca | 1 | 0.04% |
| Bivalvia | 1 | 0.04% |
| Arthropoda | 1 | 0.04% |
| Decapoda | 1 | 0.04% |
| Bryozoa | 8 | 0.28% |
| Schizoporella sp. | 8 | 0.28% |
| Echinodermata | 9 | 0.32% |
| Comactinia meridionalis | 8 | 0.28% |
| Crinoidea | 1 | 0.04% |
| Chordata | 32 | 1.13% |
| Ascidiacea | 22 | 0.77% |
| Didemnidae | 2 | 0.07% |
| Fish | 8 | 0.28% |
| Other organism | 51 | 1.80% |
| Bare soft bottom substrate | 178 | 6.27% |
| Bare hard bottom substrate | 1349 | 47.52% |
| Bare hard bottom substrate | 1349 | 47.52% |
| Bare rock- pavement boulder ledge | 1283 | 45.19% |
| Bare rubble- rock | 66 | 2.32% |
| **Grand Total** | **2839** | **100.00%** |

**Dive Site:** ROV 14-19; South Carolina, Inside Proposed Edisto Reconfig 3, 52 m Ridge, UNCW Dive 69

**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-19.

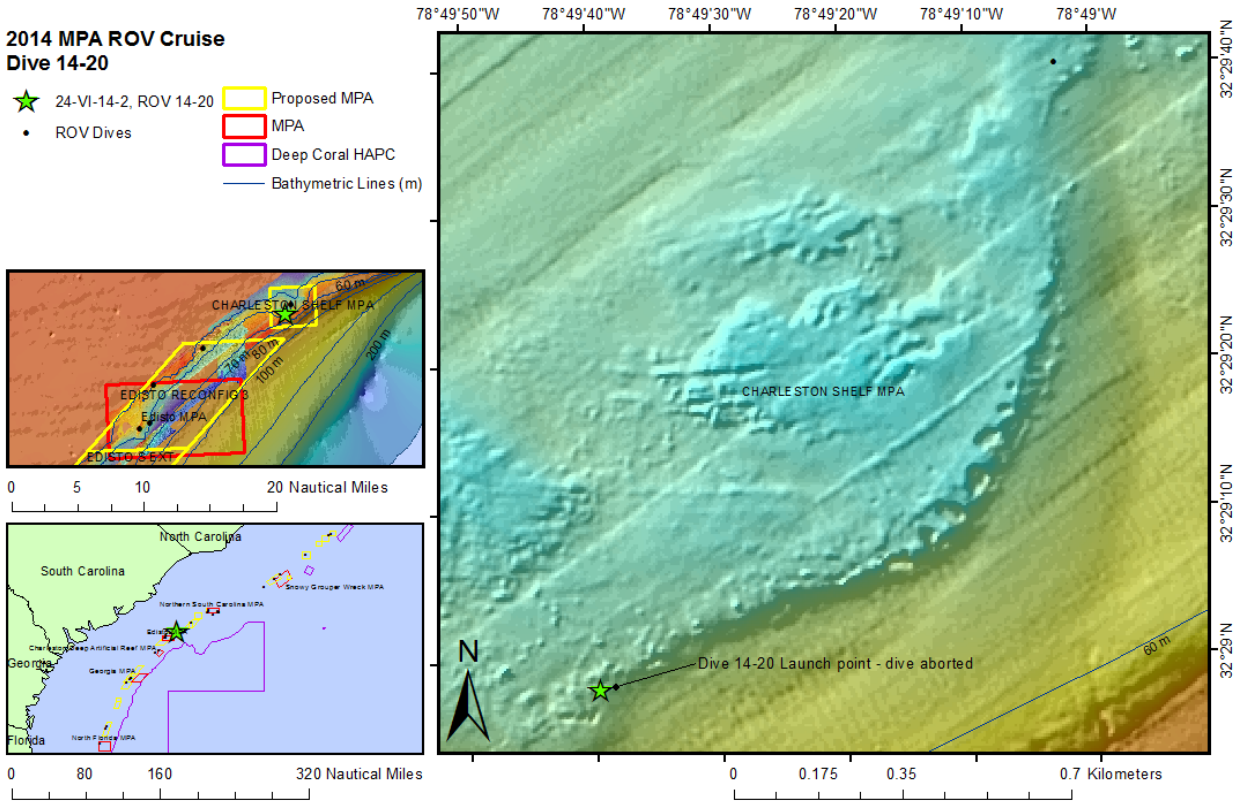
| Scientific Name | Common Name | Density |
|---|---|---|
| *Acanthurus* sp. | doctorfish | 0.0011 |
| *Aluterus scriptus* | scrawled filefish | 0.0145 |
| *Apogon pseudomaculatus* | twospot cardinalfish | 0.0006 |
| *Aulostomus maculatus* | trumpetfish | 0.0005 |
| *Balistes capriscus* | grey triggerfish | 0.0009 |
| *Balistes* sp. | triggerfish | 0.0005 |
| *Balistes vetula* | queen triggerfish | 0.0013 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0181 |
| *Calamus* sp. | porgy | 0.0042 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0210 |
| *Caranx bartholomaei* | yellow jack | 0.0025 |
| *Centropyge argi* | cherubfish | 0.0003 |
| *Cephalopholis cruentata* | graysby | 0.0017 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0019 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0150 |
| Chaetodontidae | butterflyfish | 0.0019 |
| *Chromis cyaneus* | blue chromis | 0.0051 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0050 |
| *Chromis insolata* | sunshinefish | 0.0368 |
| *Chromis scotti* | purple reeffish | 0.0604 |
| *Chromis* sp. | damselfish | 0.0224 |
| *Diplodus holbrooki* | spottail pinfish | 0.0023 |
| *Fistularia petimba* | red cornetfish | 0.0003 |
| *Fistularia tabacaria* | bluespotted cornetfish | 0.0013 |
| *Haemulon aurolineatum* | tomtate | 0.2320 |
| *Haemulon striatum* | striped grunt | 0.0454 |
| *Halichoeres garnoti* | yellowhead wrasse | 0.0006 |
| *Halichoeres* sp. | wrasse | 0.0090 |
| *Holacanthus bermudensis* | blue angelfish | 0.0100 |
| *Holacanthus tricolor* | rock beauty | 0.0003 |
| Holocentridae | squirrelfish | 0.0029 |
| *Lachnolaimus maximus* | hogfish | 0.0006 |
| *Lactophrys quadricornis* | scrawled cowfish | 0.0003 |
| *Lactophrys* sp. | cowfish | 0.0006 |
| *Liopropoma eukrines* | wrasse bass | 0.0004 |
| *Monacanthus hispidus* | planehead filefish | 0.0006 |
| *Monacanthus* sp. | filefish | 0.0003 |

**Dive Site:** ROV 14-19; South Carolina, Inside Proposed Edisto Reconfig 3, 52 m Ridge, UNCW Dive 69

| | | |
|---|---|---|
| Muraenidae | moray eel | 0.0003 |
| *Mycteroperca microlepis* | gag grouper | 0.0003 |
| *Mycteroperca phenax* | scamp | 0.0021 |
| *Myripristis jacobus* | blackbar soldierfish | 0.0008 |
| *Pagrus pagrus* | red porgy | 0.0120 |
| *Paranthias furcifer* | creole-fish | 0.0013 |
| *Pareques umbrosus* | cubbyu | 0.0028 |
| *Pomacanthus arcuatus* | grey angelfish | 0.0003 |
| *Priacanthus arenatus* | bigeye | 0.0003 |
| *Pristigenys alta* | short bigeye | 0.0010 |
| *Prognathodes aculeatus* | longsnout butterflyfish | 0.0003 |
| *Prognathodes aya* | bank butterflyfish | 0.0017 |
| *Pseudupeneus maculatus* | spotted goatfish | 0.0045 |
| *Pterois volitans* | lionfish | 0.0042 |
| *Rhomboplites aurorubens* | vermilion snapper | 0.0459 |
| Scorpaenidae | scorpionfish | 0.0003 |
| *Seriola dumerili* | greater amberjack | 0.0005 |
| *Seriola rivoliana* | almaco jack | 0.0011 |
| *Seriola* sp. | amberjack | 0.0004 |
| *Serranus annularis* | orangeback bass | 0.0004 |
| *Serranus phoebe* | tattler | 0.0013 |
| *Serranus* sp. | sea bass | 0.0003 |
| *Serranus tigrinus* | harlequin bass | 0.0003 |
| Sparidae | porgy | 0.0010 |
| *Sparisoma atomarium* | greenblotch parrotfish | 0.0017 |
| *Sphoeroides spengleri* | bandtail puffer | 0.0005 |
| *Stegastes partitus* | bicolor damselfish | 0.0011 |
| Tetraodontidae | puffer | 0.0006 |

**Dive Site:** ROV 14-20; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 70

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 11/4/2014 |

## Dive Overview:

| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Pisces_2012_EdistoMPA_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/24/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 0 |
| **DVD:** | 1 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-20; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 70

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | | **Total Transect Length (km):** | 0.05 |
| **Maximum Bottom Depth (m):** | | **Surface Current (kn):** | 0.5 |
| **On Bottom (Time- EDT):** | 12:04 | **On Bottom (Lat/Long):** | 32.48°N; -78.83°W |
| **Off Bottom (Time- EDT):** | 12:10 | **Off Bottom (Lat/Long):** | 32.48°N; -78.83°W |

**Physical Environment:**

**Dive Site:** ROV 14-20; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 70

**Dive Imagery:**

**Figure 1:**
No images taken

**Figure 2:**
No images taken

**Dive Site:** ROV 14-20; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 70

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-20, UNCW Mohawk ROV Dive 70; Site #- 23-VI-14-3. Target Site - South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau. Ground-truth multibeam sonar of site (Pisces_2012 _EdistoMPA_MB_Grid). Conduct video/photo along top of S-N rounded (half circle) plateau slope.

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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-20.

Site Description/Habitat/Biota:
Reached bottom, current too strong to station keep. Pulled ROV and going to redeploy from the north side of Site.

**Dive Site:** ROV 14-20; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 70

**Percent Cover of Benthic Macro-Biota and Substrate:**

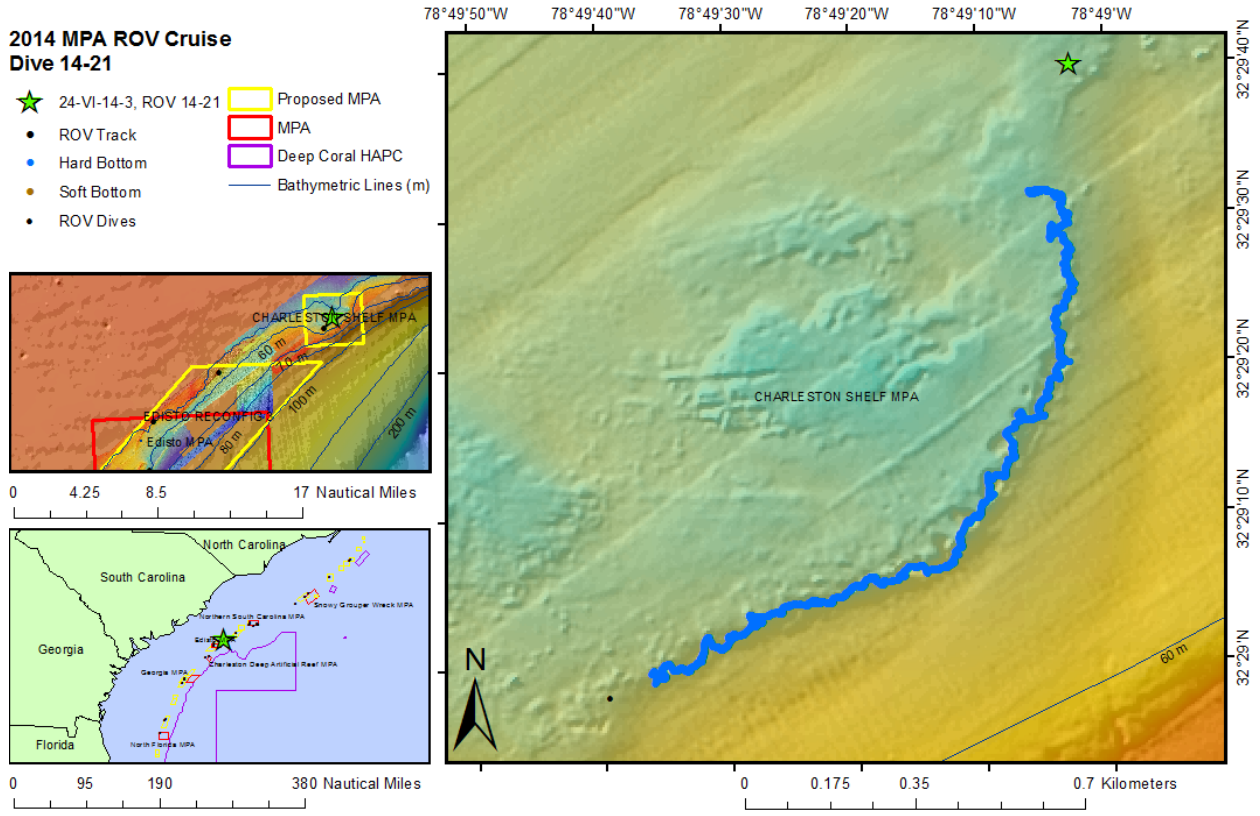
Table 2. No CPCe Analysis was completed for site ROV 14-20.

**Density of Fish:**

No Density of fish was completed for ROV 14-20.

**Dive Site:** ROV 14-21; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 71

## General Location and Dive Track:

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| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 11/4/2014 |

## Dive Overview:

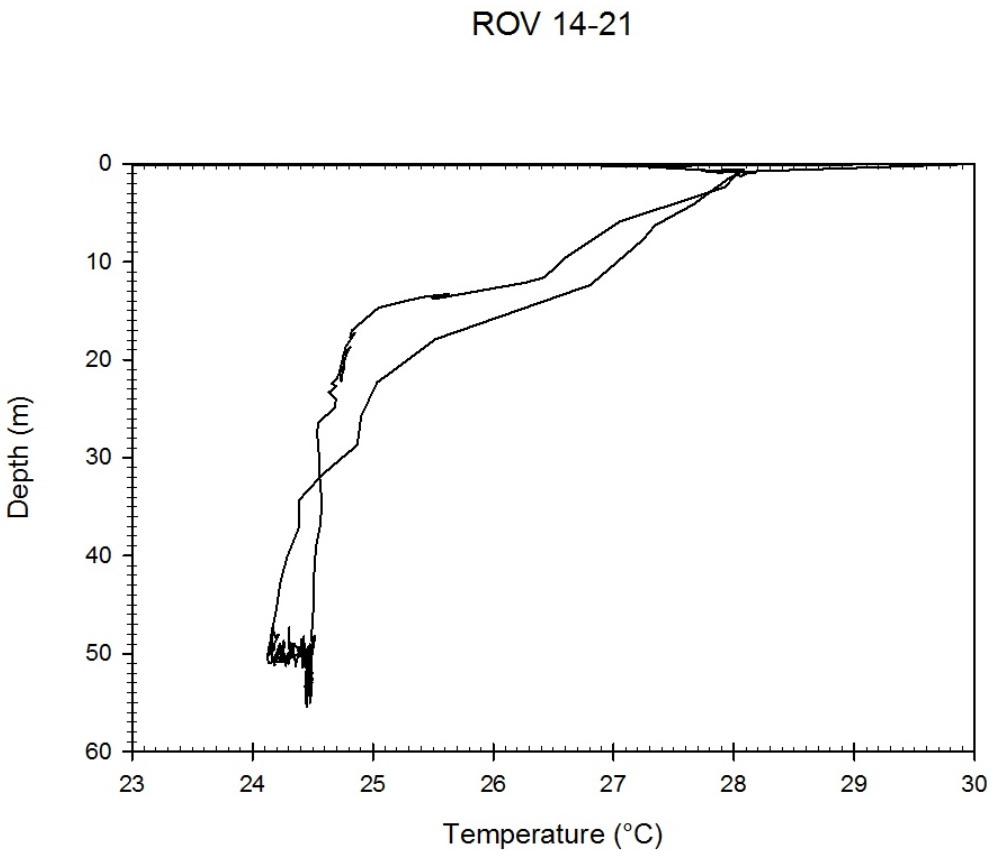
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Pisces_2012_EdistoMPA_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/24/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 90 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-21; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 71

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -48 | **Total Transect Length (km):** | 1.37 |
| **Maximum Bottom Depth (m):** | -56 | **Surface Current (kn):** | 0.5 |
| **On Bottom (Time- EDT):** | 13:35 | **On Bottom (Lat/Long):** | 32.49°N; -78.82°W |
| **Off Bottom (Time- EDT):** | 15:25 | **Off Bottom (Lat/Long):** | 32.48°N; -78.83°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-21; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 71

**Dive Imagery:**

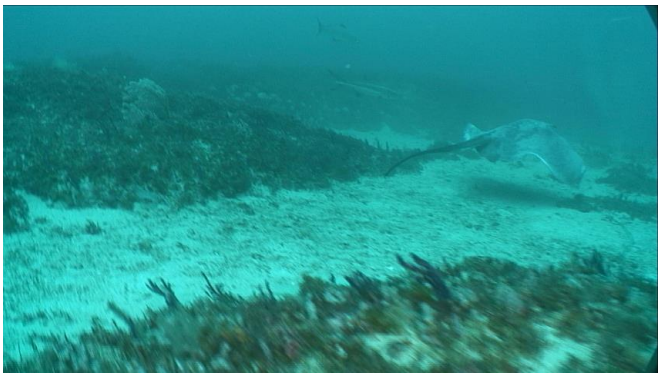


**Figure 1:** -54.5 m
A large stingray swims by

**Figure 2:** -54.5 m
*Telesto* (*Carijoa*), *Filograna* and macroalgae dominate the pavement

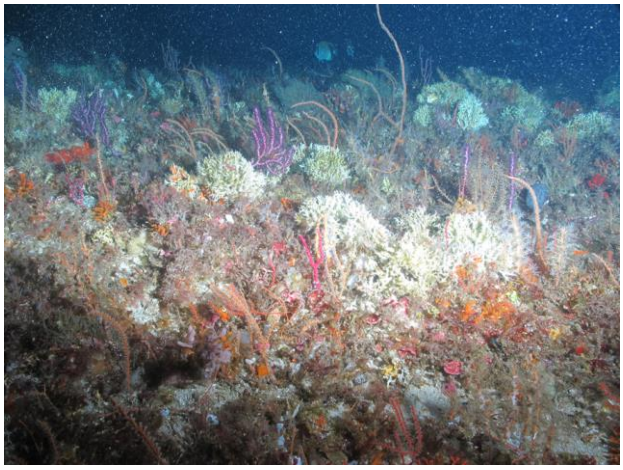


**Figure 3:** -55 m
*Telesto* (*Carijoa*), *Filograna*, *Diodogorgia*, *Ellisella* and macroalgae dominate the pavement

**Figure 4:** -55.2 m
Biotic rock pile

**Dive Site:** ROV 14-21; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 71

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-21, UNCW Mohawk ROV Dive 71; Site #- 23-VI-14-4. Target Site - South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau. Ground-truth multibeam sonar of site (Pisces_2012 _EdistoMPA_MB_Grid). Conduct video/photo along top of S-N rounded (half circle) plateau slope.

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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-21.

Site Description/Habitat/Biota:
Landed on north side of feature in the soft bottom. Bottom changed to sediment veneered pavement with a sand veneer cover. Reached the ridge at 1:56, Rounded elongated rock knolls with sediment on the east and west; 1 or so m relief. The ridge was large rock ledge, 3 m relief, with a sharp edge facing the east and dropping fast to sand. West side was 10 deg slope and pavement on top. There were parts with high relief, 4 m ledges, with vertical and undercut ledges to the base. Most hard bottom was covered with 100% fauna; Telesto, Swiftia and Stichopathes all common to abundant.

**Dive Site:** ROV 14-21; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 71

**CPCe Percent Cover Analysis:**

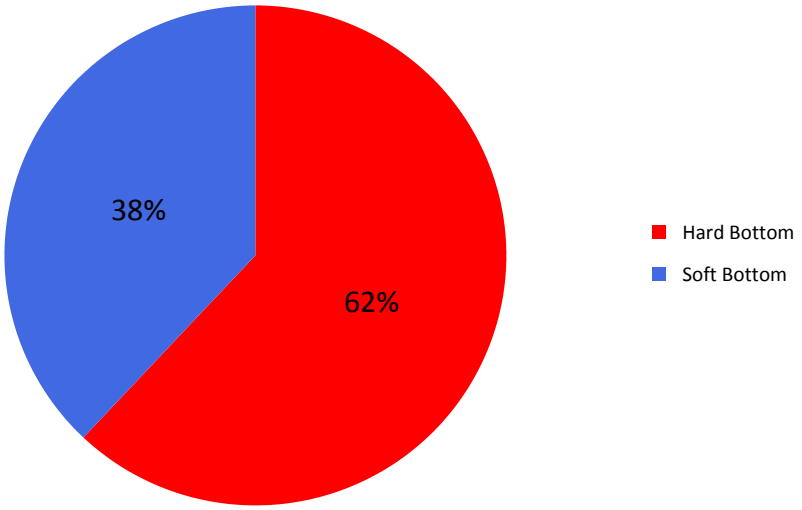
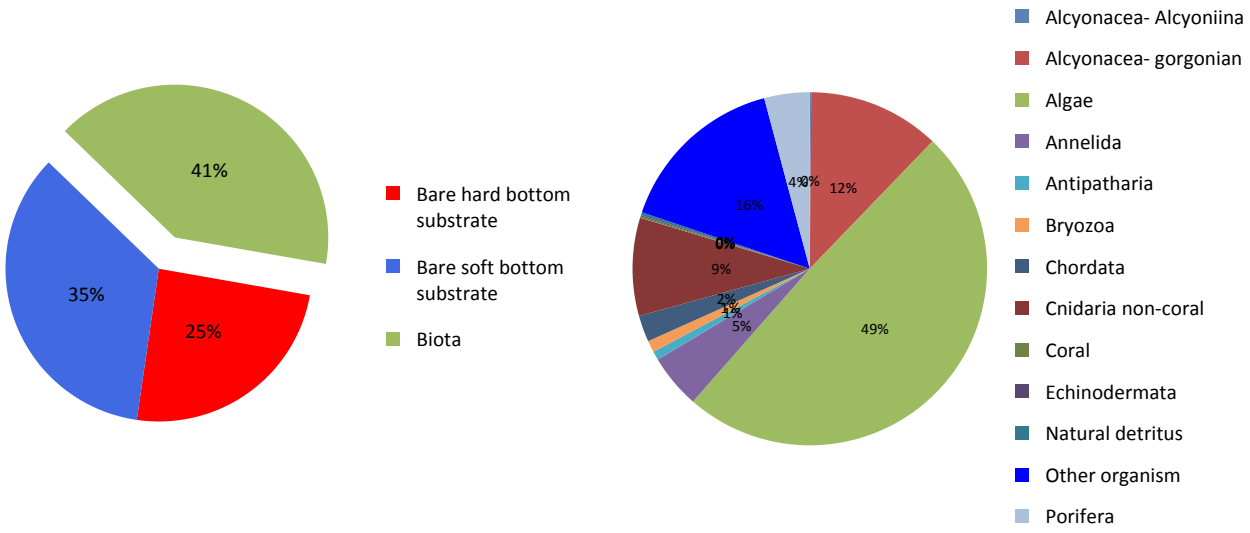



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-21. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-21.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-21; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 71

**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 14-21.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 747 | 40.53% |
| Algae | 368 | 19.97% |
| Chlorophyta | 9 | 0.49% |
| Corallinales/crustose coralline | 87 | 4.72% |
| Cyanophyta | 53 | 2.88% |
| Phaeophyta | 43 | 2.33% |
| Rhodophyta | 176 | 9.55% |
| Porifera | 31 | 1.68% |
| Aiolochroia crassa | 1 | 0.05% |
| Demospongiae | 22 | 1.19% |
| Demospongiae- ze tan starlet | 1 | 0.05% |
| Ircinia sp. | 1 | 0.05% |
| Niphates sp. | 1 | 0.05% |
| Spirastrellidae | 5 | 0.27% |
| Coral | 1 | 0.05% |
| Scleractinia solitary | 1 | 0.05% |
| Alcyonacea- Alcyoniina | 1 | 0.05% |
| Alcyonacea | 1 | 0.05% |
| Alcyonacea- gorgonian | 90 | 4.88% |
| Diodogorgia sp. | 23 | 1.25% |
| Ellisella sp. | 27 | 1.47% |
| Ellisellidae | 2 | 0.11% |
| Gorgonacea | 8 | 0.43% |
| Nicella sp. | 6 | 0.33% |
| Telesto sp./Carijoa sp. | 15 | 0.81% |
| Swiftia exserta | 9 | 0.49% |
| Antipatharia | 6 | 0.33% |
| Antipatharia | 2 | 0.11% |
| Stichopathes lutkeni | 4 | 0.22% |
| Cnidaria non-coral | 67 | 3.64% |
| Hydroidolina | 63 | 3.42% |
| Zoanthidae | 4 | 0.22% |
| Annelida | 37 | 2.01% |
| Filograna sp. | 37 | 2.01% |
| Bryozoa | 8 | 0.43% |

**Dive Site:** ROV 14-21; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 71

| | | |
|---|---|---|
| Schizoporella sp. | 8 | 0.43% |
| Echinodermata | 1 | 0.05% |
| Asteroidea | 1 | 0.05% |
| Chordata | 18 | 0.98% |
| Ascidiacea | 12 | 0.65% |
| Didemnidae | 2 | 0.11% |
| Fish | 4 | 0.22% |
| Other organism | 117 | 6.35% |
| Natural detritus | 2 | 0.11% |
| Bare soft bottom substrate | 644 | 34.94% |
| Bare hard bottom substrate | 452 | 24.53% |
| Bare hard bottom substrate | 452 | 24.53% |
| Bare rock- pavement boulder ledge | 402 | 21.81% |
| Bare rubble- rock | 50 | 2.71% |
| **Grand Total** | **1843** | **100.00%** |

**Dive Site:** ROV 14-21; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 71

**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-21.

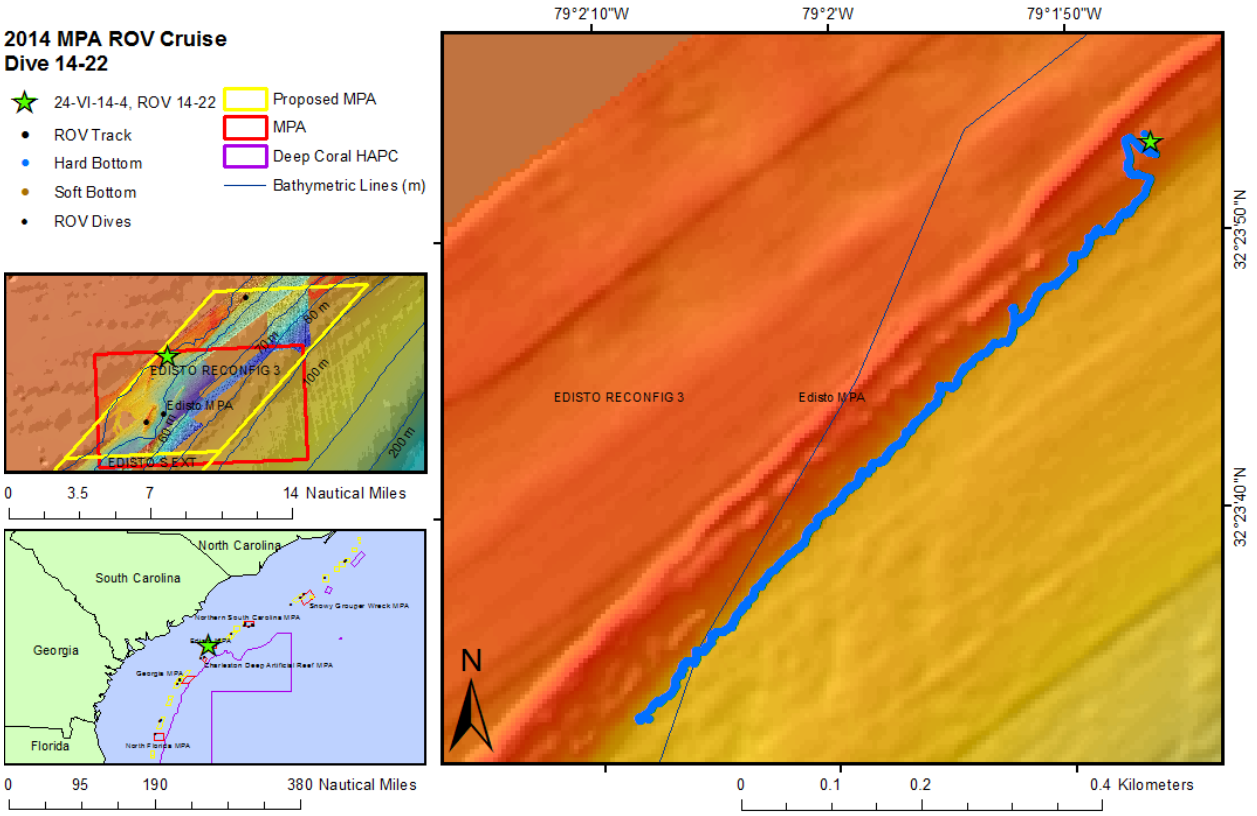
| Scientific Name | Common Name | Density |
|---|---|---|
| *Acanthurus* sp. | doctorfish | 0.0003 |
| *Aluterus scriptus* | scrawled filefish | 0.0001 |
| *Apogon* sp. | cardinalfish | 0.0001 |
| *Balistes capriscus* | grey triggerfish | 0.0003 |
| *Balistes* sp. | triggerfish | 0.0003 |
| *Balistes vetula* | queen triggerfish | 0.0003 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0042 |
| *Calamus* sp. | porgy | 0.0011 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0052 |
| *Centropyge argi* | cherubfish | 0.0005 |
| *Cephalopholis cruentata* | graysby | 0.0003 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0007 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0079 |
| Chaetodontidae | butterflyfish | 0.0010 |
| *Chilomycterus* sp. | burrfish | 0.0001 |
| *Chromis cyaneus* | blue chromis | 0.0012 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0033 |
| *Chromis insolata* | sunshinefish | 0.0049 |
| *Chromis scotti* | purple reeffish | 0.0020 |
| *Chromis* sp. | damselfish | 0.0073 |
| *Dasyatis* sp. | stingray | 0.0001 |
| *Epinephelus adscensionis* | rock hind | 0.0006 |
| Gobiidae | goby | 0.0017 |
| *Haemulon aurolineatum* | tomtate | 0.0406 |
| *Haemulon plumieri* | white grunt | 0.0001 |
| *Halichoeres garnoti* | yellowhead wrasse | 0.0009 |
| *Halichoeres* sp. | wrasse | 0.0187 |
| *Holacanthus bermudensis* | blue angelfish | 0.0023 |
| *Holacanthus tricolor* | rock beauty | 0.0003 |
| Holocentridae | squirrelfish | 0.0032 |
| *Lachnolaimus maximus* | hogfish | 0.0003 |
| *Lactophrys* sp. | cowfish | 0.0003 |
| *Liopropoma eukrines* | wrasse bass | 0.0003 |
| *Malacanthus plumieri* | sand tilefish | 0.0001 |
| *Monacanthus hispidus* | planehead filefish | 0.0001 |
| *Mycteroperca microlepis* | gag grouper | 0.0002 |
| *Mycteroperca phenax* | scamp | 0.0004 |

**Dive Site:** ROV 14-21; South Carolina, Inside Proposed Charleston Shelf MPA, Edge of 50 m Plateau, UNCW Dive 71

| | | |
|---|---|---|
| *Pagrus pagrus* | red porgy | 0.0012 |
| *Paranthias furcifer* | creole-fish | 0.0024 |
| *Pareques umbrosus* | cubbyu | 0.0129 |
| *Plectrypops retrospinis* | cardinal soldierfish | 0.0001 |
| *Pomacanthus paru* | french angelfish | 0.0001 |
| *Pomacanthus* sp. | angelfish | 0.0001 |
| *Pristigenys alta* | short bigeye | 0.0005 |
| *Prognathodes aculeatus* | longsnout butterflyfish | 0.0001 |
| *Prognathodes aya* | bank butterflyfish | 0.0020 |
| *Pseudupeneus maculatus* | spotted goatfish | 0.0001 |
| *Pterois volitans* | lionfish | 0.0009 |
| *Rachycentron canadum* | cobia | 0.0005 |
| *Seriola dumerili* | greater amberjack | 0.0006 |
| *Seriola rivoliana* | almaco jack | 0.0007 |
| *Seriola* sp. | amberjack | 0.0004 |
| *Serranus annularis* | orangeback bass | 0.0005 |
| *Serranus phoebe* | tattler | 0.0017 |
| *Sparisoma atomarium* | greenblotch parrotfish | 0.0005 |
| *Sphyraena barracuda* | barracuda | 0.0007 |
| *Stegastes partitus* | bicolor damselfish | 0.0003 |

**Dive Site:** ROV 14-22; South Carolina, Inside Edisto MPA, 47 m Ridge, UNCW Dive 72

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 11/4/2014 |

## Dive Overview:

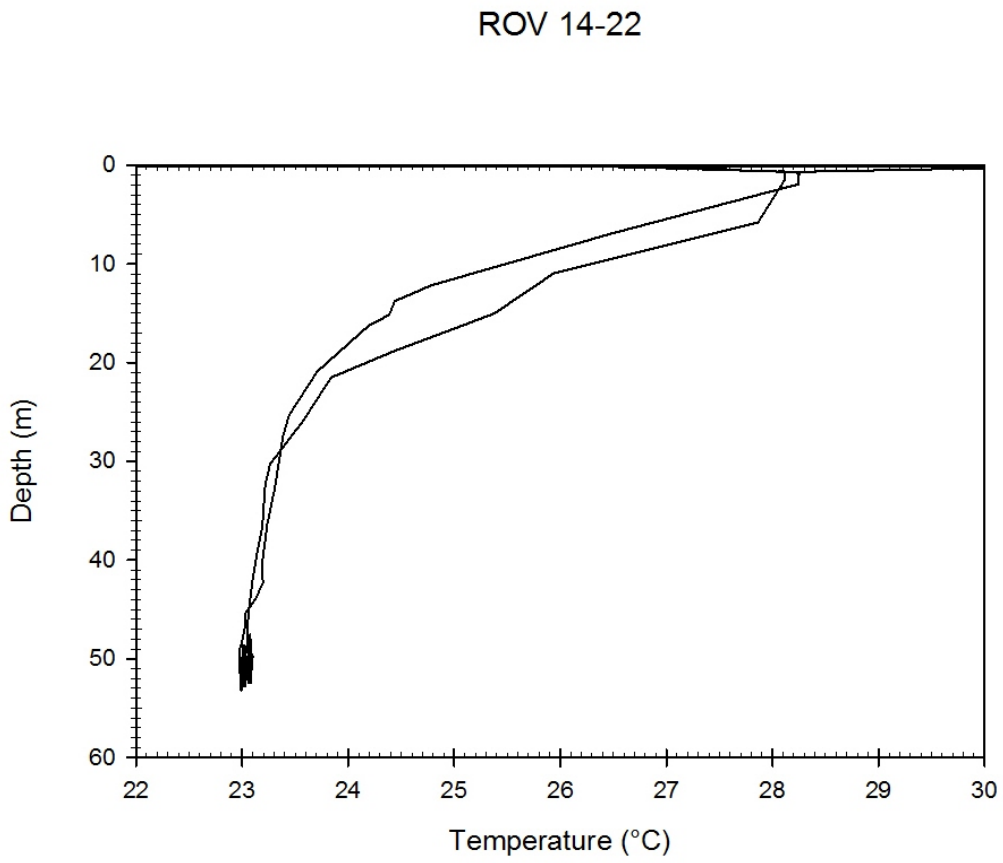
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Pisces_2012_EdistoMPA_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/24/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 130 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-22; South Carolina, Inside Edisto MPA, 47 m Ridge, UNCW Dive 72

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -48 | **Total Transect Length (km):** | 0.81 |
| **Maximum Bottom Depth (m):** | -54 | **Surface Current (kn):** | 1-2 |
| **On Bottom (Time- EDT):** | 17:21 | **On Bottom (Lat/Long):** | 32.4°N; -79.03°W |
| **Off Bottom (Time- EDT):** | 18:52 | **Off Bottom (Lat/Long):** | 32.39°N; -79.04°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-22; South Carolina, Inside Edisto MPA, 47 m Ridge, UNCW Dive 72

**Dive Imagery:**

**Figure 1:** -50.5 m
Blue angelfish and scorpionfish

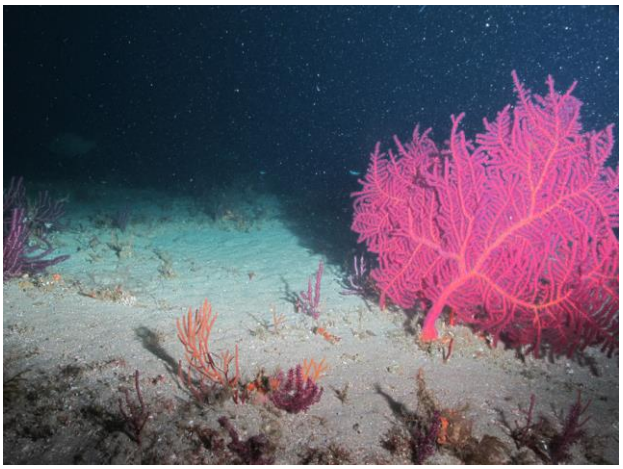


**Figure 2:** -50.5 m
*Muricea* gorgonian

**Figure 3:** -50.7 m
Scorpionfish

**Figure 4:** -52.1 m
Reef butterflyfish

**Dive Site:** ROV 14-22; South Carolina, Inside Edisto MPA, 47 m Ridge, UNCW Dive 72

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-22, UNCW Mohawk ROV Dive 72; Site #- 23-VI-14-4. Target Site - South Carolina, Inside Edisto MPA, 47 m Ridge. Ground-truth multibeam sonar of site (Pisces_2012_EdistoMPA_MB_Grid). Conduct video/photo along top of SW-NE rounded (half circle) 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-22.

Site Description/Habitat/Biota:
Exposed flat slabs with undercuts, 0.25-0.5 m thick and 2-3 m wide, with sediment veneered pavement, and sediment, The ledge became 4-5 m tall with thick slabs and rough surfaced boulders piled up. Lots of hidey holes and crevices. The ledge ended abruptly in sediment to the east. Skirted the base of the ridge (48.5 m to 52 m in sand). Hard bottom was 100 % covered in fauna: Diodogorgia, Aiolochroia crassa, hydroids (white fine), orange stalked Axinellida sponges, C. vaginalis, I. campana, Antipatharians, all common to abundant.

**Dive Site:** ROV 14-22; South Carolina, Inside Edisto MPA, 47 m Ridge, UNCW Dive 72

**CPCe Percent Cover Analysis:**

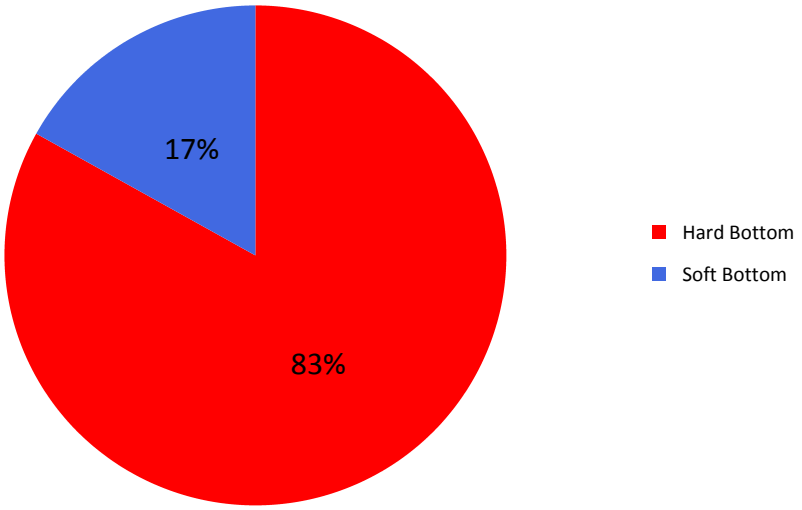
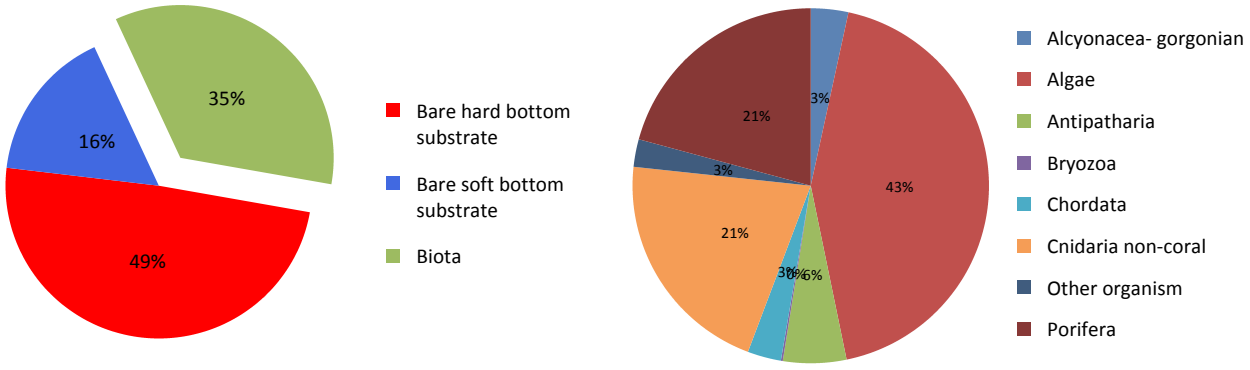



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-22. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-22.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-22; South Carolina, Inside Edisto MPA, 47 m Ridge, UNCW Dive 72

**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 14-22.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 558 | 34.68% |
| Algae | 242 | 15.04% |
| Chlorophyta | 3 | 0.19% |
| Corallinales/crustose coralline | 36 | 2.24% |
| Cyanophyta | 2 | 0.12% |
| Phaeophyta | 141 | 8.76% |
| Rhodophyta | 60 | 3.73% |
| Porifera | 116 | 7.21% |
| Aiolochroia crassa | 3 | 0.19% |
| Aplysina sp. | 1 | 0.06% |
| Callyspongia vaginalis | 1 | 0.06% |
| Clathria sp. | 1 | 0.06% |
| Demospongiae | 39 | 2.42% |
| Demospongiae- ze tan starlet | 18 | 1.12% |
| Dictyoceratida | 2 | 0.12% |
| Geodia sp. | 1 | 0.06% |
| Ircinia campana | 1 | 0.06% |
| Ircinia sp. | 3 | 0.19% |
| Niphates sp. | 1 | 0.06% |
| Scopalina sp. | 1 | 0.06% |
| Spirastrellidae | 44 | 2.73% |
| Alcyonacea- gorgonian | 19 | 1.18% |
| Diodogorgia sp. | 8 | 0.50% |
| Ellisella sp. | 1 | 0.06% |
| Ellisellidae | 6 | 0.37% |
| Gorgonacea | 2 | 0.12% |
| Muricea sp. | 1 | 0.06% |
| Nicella sp. | 1 | 0.06% |
| Antipatharia | 32 | 1.99% |
| Antipatharia | 23 | 1.43% |
| Stichopathes lutkeni | 5 | 0.31% |
| Tanacetipathes barbadensis | 4 | 0.25% |
| Cnidaria non-coral | 117 | 7.27% |
| Hydroidolina | 117 | 7.27% |
| Bryozoa | 1 | 0.06% |

**Dive Site:** ROV 14-22; South Carolina, Inside Edisto MPA, 47 m Ridge, UNCW Dive 72

| | | |
|---|---|---|
| Schizoporella sp. | 1 | 0.06% |
| Chordata | 17 | 1.06% |
| Ascidiacea | 5 | 0.31% |
| Didemnidae | 5 | 0.31% |
| Fish | 7 | 0.44% |
| Other organism | 14 | 0.87% |
| Bare soft bottom substrate | 261 | 16.22% |
| Bare hard bottom substrate | 790 | 49.10% |
| Bare hard bottom substrate | 790 | 49.10% |
| Bare rock- pavement boulder ledge | 750 | 46.61% |
| Bare rubble- rock | 40 | 2.49% |
| **Grand Total** | **1609** | **100.00%** |

**Dive Site:** ROV 14-22; South Carolina, Inside Edisto MPA, 47 m Ridge, UNCW Dive 72

**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-22.

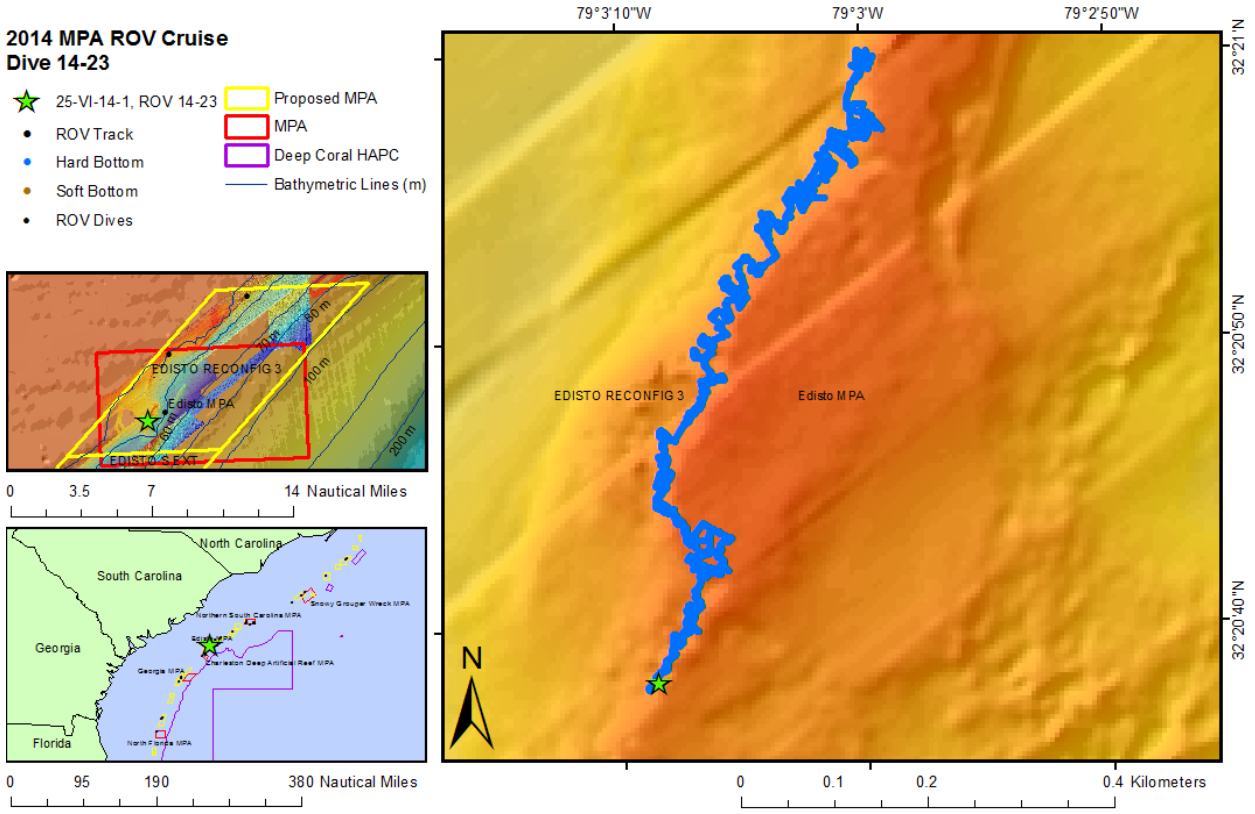
| Scientific Name | Common Name | Density |
|---|---|---|
| *Acanthurus* sp. | doctorfish | 0.0004 |
| *Apogon* sp. | cardinalfish | 0.0006 |
| *Balistes capriscus* | grey triggerfish | 0.0009 |
| *Balistes* sp. | triggerfish | 0.0007 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0168 |
| *Calamus* sp. | porgy | 0.0058 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0456 |
| *Caranx lugubris* | black jack | 0.0005 |
| *Caranx* sp. | jack | 0.0004 |
| *Centropristis ocyurus* | bank sea bass | 0.0008 |
| *Cephalopholis cruentata* | graysby | 0.0046 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0007 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0101 |
| Chaetodontidae | butterflyfish | 0.0007 |
| *Chromis cyaneus* | blue chromis | 0.0025 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0052 |
| *Chromis insolata* | sunshinefish | 0.0023 |
| *Chromis scotti* | purple reeffish | 0.0096 |
| *Chromis* sp. | damselfish | 0.0016 |
| *Diplodus holbrooki* | spottail pinfish | 0.0019 |
| *Fistularia* sp. | cornetfish | 0.0003 |
| *Fistularia tabacaria* | bluespotted cornetfish | 0.0005 |
| *Haemulon aurolineatum* | tomtate | 0.4992 |
| *Haemulon plumieri* | white grunt | 0.0003 |
| *Haemulon striatum* | striped grunt | 0.1502 |
| *Halichoeres garnoti* | yellowhead wrasse | 0.0007 |
| *Halichoeres* sp. | wrasse | 0.0117 |
| *Holacanthus bermudensis* | blue angelfish | 0.0078 |
| Holocentridae | squirrelfish | 0.0046 |
| *Lachnolaimus maximus* | hogfish | 0.0003 |
| *Lactophrys polygonia* | honeycomb cowfish | 0.0004 |
| *Lactophrys* sp. | cowfish | 0.0007 |
| *Liopropoma eukrines* | wrasse bass | 0.0015 |
| *Lutjanus griseus* | grey snapper | 0.0003 |
| *Lutjanus* sp. | snapper | 0.0005 |
| *Monacanthus hispidus* | planehead filefish | 0.0005 |
| *Mulloidichthys martinicus* | yellow goatfish | 0.0042 |

**Dive Site:** ROV 14-22; South Carolina, Inside Edisto MPA, 47 m Ridge, UNCW Dive 72

| | | |
|---|---|---|
| Muraenidae | moray eel | 0.0004 |
| *Mycteroperca microlepis* | gag grouper | 0.0008 |
| *Mycteroperca phenax* | scamp | 0.0028 |
| *Mycteroperca* sp. | grouper | 0.0005 |
| *Myripristis jacobus* | blackbar soldierfish | 0.0076 |
| *Opsanus* sp. | toadfish | 0.0004 |
| *Pagrus pagrus* | red porgy | 0.0052 |
| *Pareques umbrosus* | cubbyu | 0.0047 |
| *Pomacanthus arcuatus* | grey angelfish | 0.0003 |
| *Pristigenys alta* | short bigeye | 0.0083 |
| *Prognathodes aculeatus* | longsnout butterflyfish | 0.0008 |
| *Prognathodes aya* | bank butterflyfish | 0.0007 |
| *Pseudupeneus maculatus* | spotted goatfish | 0.0031 |
| *Pterois volitans* | lionfish | 0.0330 |
| *Rhomboplites aurorubens* | vermilion snapper | 0.2280 |
| *Rypticus maculatus* | whitespotted soapfish | 0.0008 |
| *Rypticus* sp. | soapfish | 0.0003 |
| *Scorpaena plumieri* | spotted scorpionfish | 0.0003 |
| *Scorpaena* sp. | scorpionfish | 0.0004 |
| Scorpaenidae | scorpionfish | 0.0020 |
| *Seriola dumerili* | greater amberjack | 0.0003 |
| *Seriola rivoliana* | almaco jack | 0.0003 |
| *Seriola* sp. | amberjack | 0.0003 |
| *Serranus annularis* | orangeback bass | 0.0005 |
| *Serranus phoebe* | tattler | 0.0013 |
| Sparidae | porgy | 0.0008 |
| *Sphoeroides spengleri* | bandtail puffer | 0.0010 |
| *Sphyraena barracuda* | barracuda | 0.0004 |
| *Stegastes partitus* | bicolor damselfish | 0.0003 |
| *Thalassoma bifasciatum* | bluehead wrasse | 0.0003 |

**Dive Site:** ROV 14-23; South Carolina, Inside Edisto MPA, Large 48 m Plateau, UNCW Dive 73

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 11/4/2014 |

## Dive Overview:

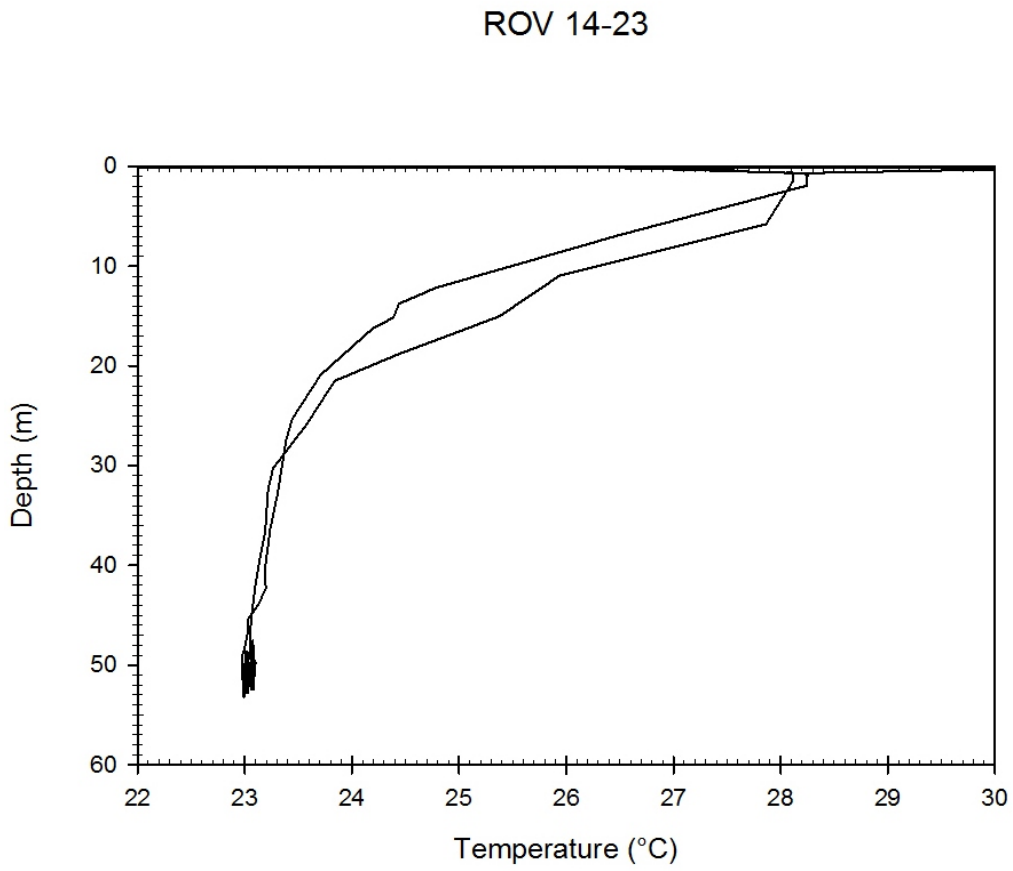
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Pisces_2012_EdistoMPA_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/25/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 153 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-23; South Carolina, Inside Edisto MPA, Large 48 m Plateau, UNCW Dive 73

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -40 | **Total Transect Length (km):** | 0.72 |
| **Maximum Bottom Depth (m):** | -51 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 8:03 | **On Bottom (Lat/Long):** | 32.34°N; -79.05°W |
| **Off Bottom (Time- EDT):** | 10:09 | **Off Bottom (Lat/Long):** | 32.35°N; -79.05°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-23; South Carolina, Inside Edisto MPA, Large 48 m Plateau, UNCW Dive 73

**Dive Imagery:**

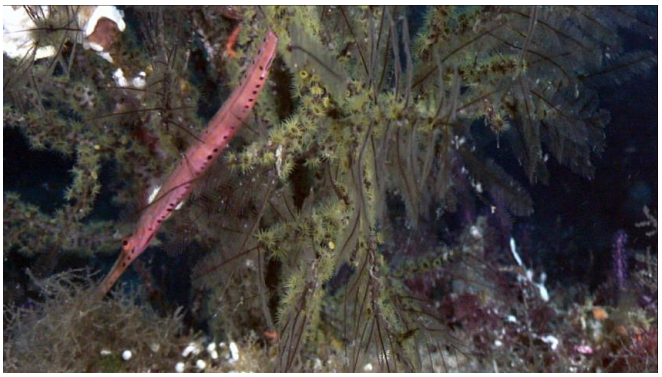


**Figure 1:** -47.3 m
Cornetfish hides in the hydroids

**Figure 2:** -47.3 m
*Diodogorgia* sp.

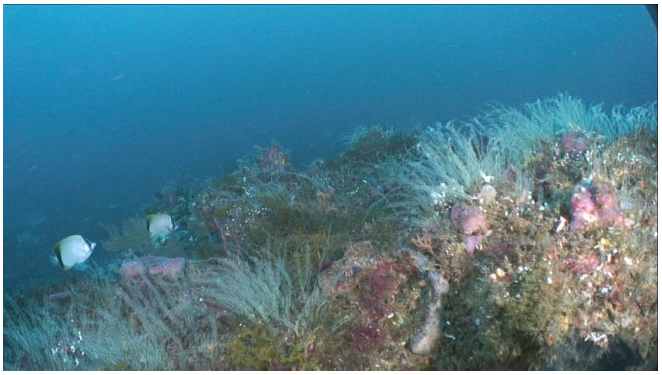


**Figure 3:** -48.3 m
Hydroid covered hard bottom

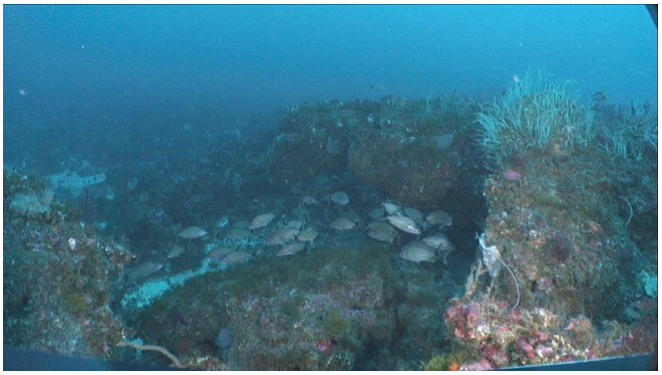


**Figure 4:** -47.1 m
Schools of fish under rock ledges

**Dive Site:** ROV 14-23; South Carolina, Inside Edisto MPA, Large 48 m Plateau, UNCW Dive 73

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-23, UNCW Mohawk ROV Dive 73; Site #- 25-VI-14-1. Target Site - South Carolina, Inside Edisto MPA, Large 48 m Plateau. Ground-truth multibeam sonar of site (Pisces_2012_EdistoMPA_MB_Grid). Conduct video/photo along plateau.

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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-23.

Site Description/Habitat/Biota:
Diving S to N on a plateau. 1 m tall rock ledges, 3-5 m wide with undercuts and overhangs; sediment between the outcrops. Hardbottom was 100 % covered in fauna and mostly algae with small hydroids or gorgonians. Top of the plateau, flat exposed hardbottom with 40 % exposed hardbottom, larger swaths of sand between. Few <1 m outcrops. Western edge of the plateau, hardbottom outcrops with 1-3 m relief (4 in small areas- 48.5 m on top), rounded knolls and overhangs and tapering out to the west into small boulders 1/4 m tall. Plateau flattened out to the east and became pavement. NW side of plateau tapered out into <1 m relief, 90% hardbottom, rock boulders. All hardbottom had 100% fauna/algal coverage. One very large patch with multiple colonies of O. varicosa on under hang.

**Dive Site:** ROV 14-23; South Carolina, Inside Edisto MPA, Large 48 m Plateau, UNCW Dive 73

**CPCe Percent Cover Analysis:**

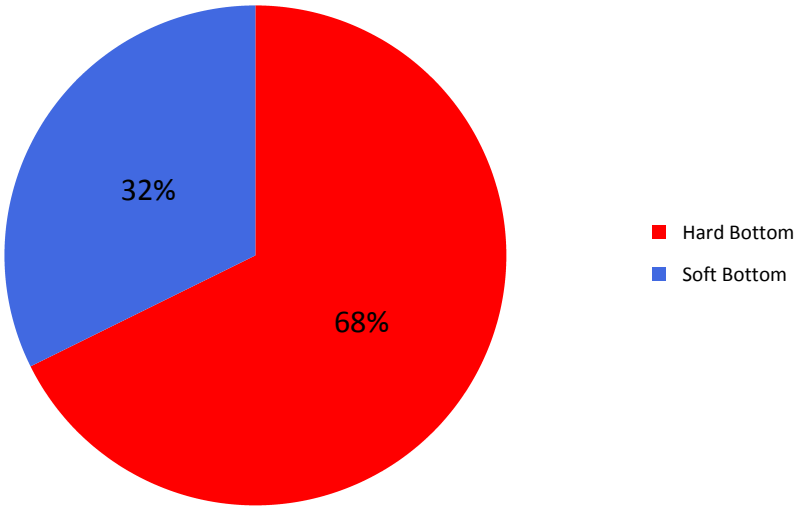
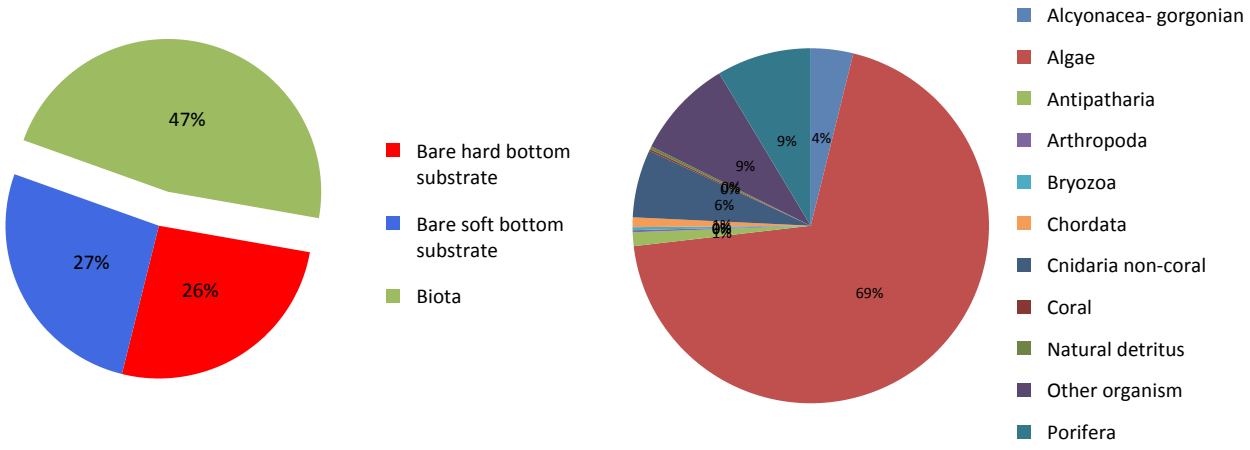



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-23. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-23.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-23; South Carolina, Inside Edisto MPA, Large 48 m Plateau, UNCW Dive 73

**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 14-23.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 1118 | 47.29% |
| Algae | 775 | 32.78% |
| Chlorophyta | 3 | 0.13% |
| Corallinales/crustose coralline | 91 | 3.85% |
| Cyanophyta | 17 | 0.72% |
| Phaeophyta | 535 | 22.63% |
| Rhodophyta | 129 | 5.46% |
| Porifera | 96 | 4.06% |
| Agelas sp. | 3 | 0.13% |
| Aplysina sp. | 1 | 0.04% |
| Callyspongia vaginalis | 2 | 0.08% |
| Chondrilla sp. | 1 | 0.04% |
| Demospongiae | 33 | 1.40% |
| Demospongiae- ze tan starlet | 2 | 0.08% |
| Dictyoceratida | 3 | 0.13% |
| Geodia sp. | 1 | 0.04% |
| Ircinia campana | 18 | 0.76% |
| Ircinia sp. | 5 | 0.21% |
| Ircinia strobilina | 1 | 0.04% |
| Spirastrellidae | 17 | 0.72% |
| Xestospongia sp. | 5 | 0.21% |
| Erylus sp. | 2 | 0.08% |
| Neofibularia sp. | 2 | 0.08% |
| Coral | 2 | 0.08% |
| Oculina varicosa | 2 | 0.08% |
| Alcyonacea- gorgonian | 43 | 1.82% |
| Diodogorgia sp. | 12 | 0.51% |
| Ellisella sp. | 19 | 0.80% |
| Ellisellidae | 5 | 0.21% |
| Gorgonacea | 1 | 0.04% |
| Muricea sp. | 2 | 0.08% |
| Nicella sp. | 1 | 0.04% |
| Telesto sp./Carijoa sp. | 3 | 0.13% |
| Antipatharia | 14 | 0.59% |
| Antipatharia | 10 | 0.42% |

**Dive Site:** ROV 14-23; South Carolina, Inside Edisto MPA, Large 48 m Plateau, UNCW Dive 73

| | | |
|---|---|---|
| Antipatharia atlantica | 2 | 0.08% |
| Stichopathes lutkeni | 2 | 0.08% |
| Cnidaria non-coral | 69 | 2.92% |
| Hydroidolina | 69 | 2.92% |
| Arthropoda | 2 | 0.08% |
| Panulirus argus | 2 | 0.08% |
| Bryozoa | 3 | 0.13% |
| Bryozoa | 1 | 0.04% |
| Schizoporella sp. | 2 | 0.08% |
| Chordata | 10 | 0.42% |
| Didemnidae | 3 | 0.13% |
| Fish | 7 | 0.30% |
| Other organism | 101 | 4.27% |
| Natural detritus | 3 | 0.13% |
| Bare soft bottom substrate | 629 | 26.61% |
| Bare hard bottom substrate | 617 | 26.10% |
| Bare hard bottom substrate | 617 | 26.10% |
| Bare rock- pavement boulder ledge | 553 | 23.39% |
| Bare rubble- rock | 64 | 2.71% |
| **Grand Total** | **2364** | **100.00%** |

**Dive Site:** ROV 14-23; South Carolina, Inside Edisto MPA, Large 48 m Plateau, UNCW Dive 73

**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-23.

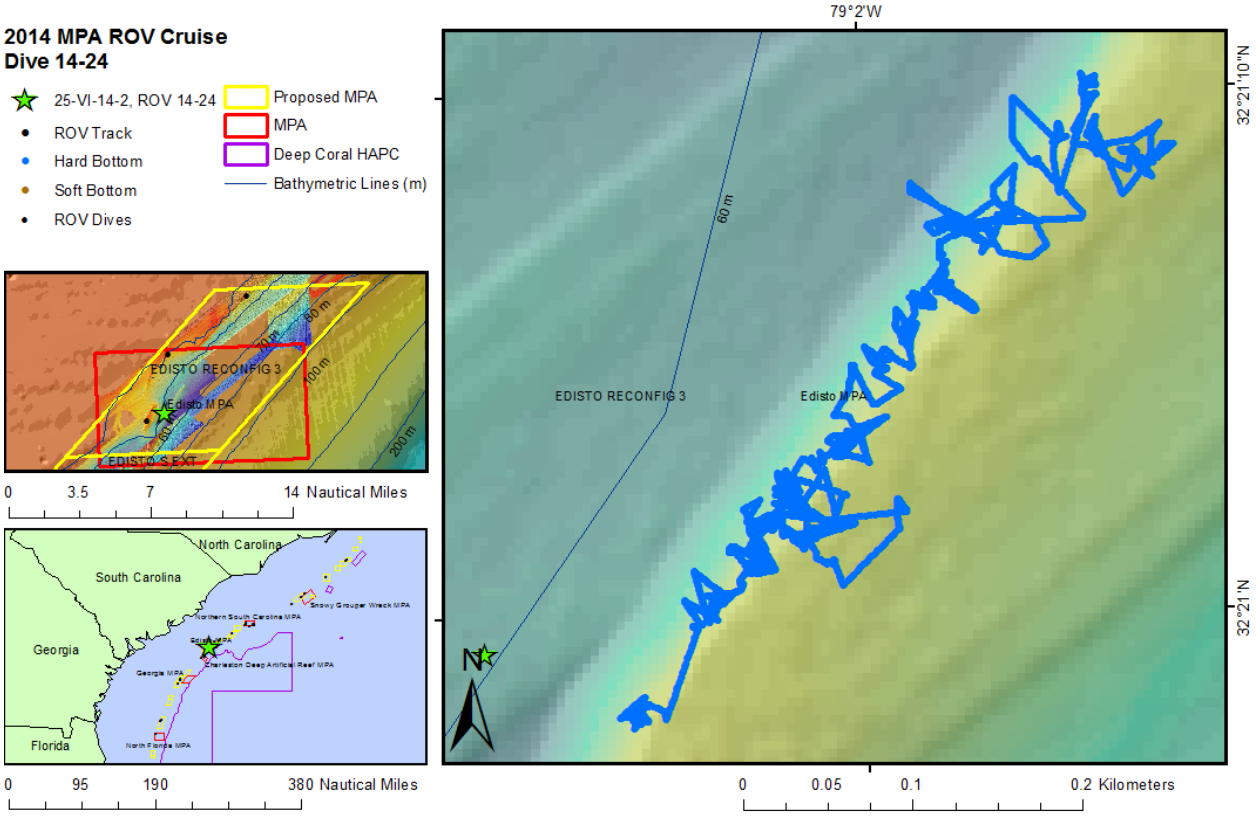
| Scientific Name | Common Name | Density |
|---|---|---|
| *Acanthurus* sp. | doctorfish | 0.0007 |
| *Apogon pseudomaculatus* | twospot cardinalfish | 0.0001 |
| *Aulostomus maculatus* | trumpetfish | 0.0003 |
| *Balistes capriscus* | grey triggerfish | 0.0007 |
| *Balistes* sp. | triggerfish | 0.0002 |
| *Balistes vetula* | queen triggerfish | 0.0002 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0040 |
| *Bodianus rufus* | spanish hogfish | 0.0005 |
| *Calamus* sp. | porgy | 0.0007 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0086 |
| Carangidae | jack | 0.0001 |
| *Centropyge argi* | cherubfish | 0.0033 |
| *Cephalopholis cruentata* | graysby | 0.0008 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0005 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0067 |
| *Chaetodon* sp. | butterflyfish | 0.0007 |
| Chaetodontidae | butterflyfish | 0.0004 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0028 |
| *Chromis insolata* | sunshinefish | 0.0131 |
| *Chromis scotti* | purple reeffish | 0.0262 |
| *Chromis* sp. | damselfish | 0.0040 |
| *Clepticus parrai* | creole wrasse | 0.0001 |
| *Diodon hystrix* | porcupinefish | 0.0001 |
| *Equetus lanceolatus* | jack-knife fish | 0.0001 |
| *Haemulon aurolineatum* | tomtate | 0.1992 |
| *Haemulon striatum* | striped grunt | 0.0497 |
| *Halichoeres garnoti* | yellowhead wrasse | 0.0023 |
| *Halichoeres* sp. | wrasse | 0.0048 |
| *Holacanthus bermudensis* | blue angelfish | 0.0031 |
| *Holacanthus tricolor* | rock beauty | 0.0006 |
| Holocentridae | squirrelfish | 0.0045 |
| *Lactophrys* sp. | cowfish | 0.0003 |
| *Liopropoma eukrines* | wrasse bass | 0.0003 |
| *Lutjanus griseus* | grey snapper | 0.0114 |
| *Lutjanus* sp. | snapper | 0.0003 |
| *Mulloidichthys martinicus* | yellow goatfish | 0.0013 |
| *Mycteroperca microlepis* | gag grouper | 0.0001 |

**Dive Site:** ROV 14-23; South Carolina, Inside Edisto MPA, Large 48 m Plateau, UNCW Dive 73

| | | |
|---|---|---|
| *Mycteroperca phenax* | scamp | 0.0017 |
| *Myripristis jacobus* | blackbar soldierfish | 0.0001 |
| *Pagrus pagrus* | red porgy | 0.0004 |
| *Paranthias furcifer* | creole-fish | 0.0032 |
| *Pareques umbrosus* | cubbyu | 0.0010 |
| *Priacanthus arenatus* | bigeye | 0.0003 |
| *Pristigenys alta* | short bigeye | 0.0003 |
| *Prognathodes aculeatus* | longsnout butterflyfish | 0.0009 |
| *Prognathodes aya* | bank butterflyfish | 0.0002 |
| *Pseudupeneus maculatus* | spotted goatfish | 0.0013 |
| *Pterois volitans* | lionfish | 0.0027 |
| *Rachycentron canadum* | cobia | 0.0001 |
| *Rhomboplites aurorubens* | vermilion snapper | 0.0074 |
| *Seriola dumerili* | greater amberjack | 0.0008 |
| *Seriola* sp. | amberjack | 0.0002 |
| *Serranus annularis* | orangeback bass | 0.0004 |
| *Serranus baldwini* | lantern bass | 0.0005 |
| *Serranus phoebe* | tattler | 0.0006 |
| Sparidae | porgy | 0.0003 |
| *Sparisoma atomarium* | greenblotch parrotfish | 0.0007 |
| *Sparisoma* sp. | parrotfish | 0.0011 |
| *Sphyraena barracuda* | barracuda | 0.0011 |
| *Stegastes partitus* | bicolor damselfish | 0.0015 |
| *Syngnathus* sp. | pipefish | 0.0003 |
| *Synodus intermedius* | sand diver | 0.0001 |

**Dive Site:** ROV 14-24; South Carolina, Inside Edisto MPA, 58 m Deep- 4 km Ridge, UNCW Dive 74

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 11/4/2014 |

## Dive Overview:

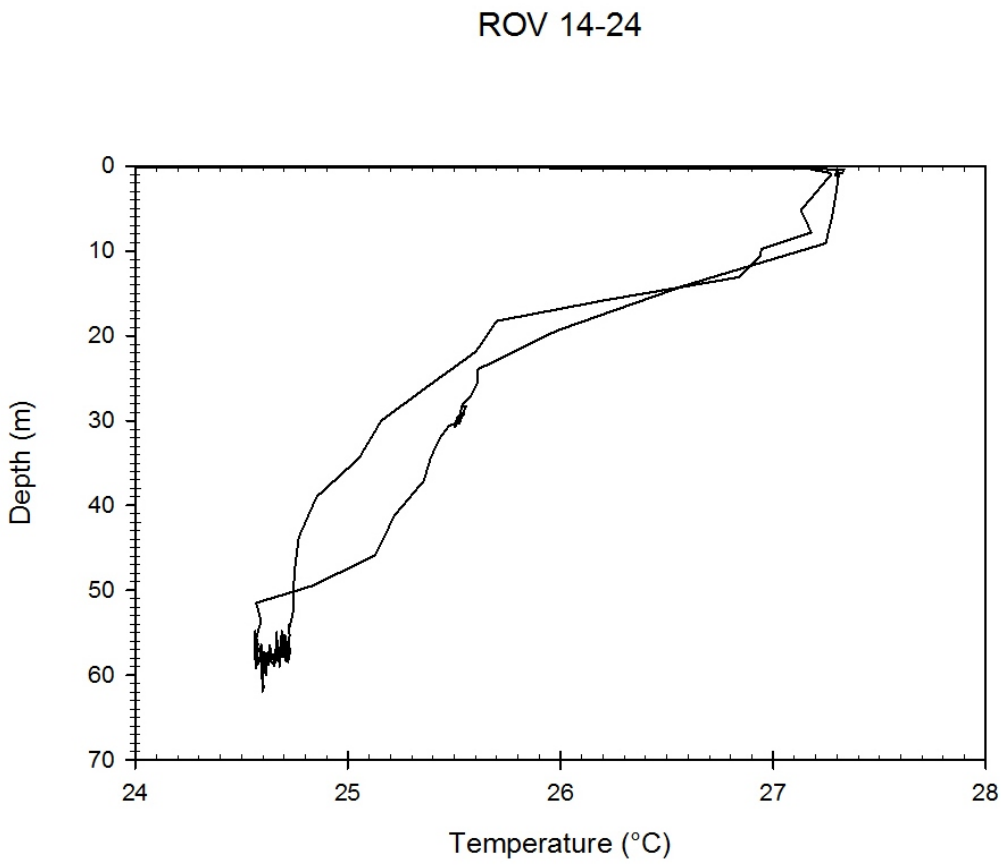
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Pisces_2012_EdistoMPA_MB_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/25/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 66 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-24; South Carolina, Inside Edisto MPA, 58 m Deep- 4 km Ridge, UNCW Dive 74

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -55 | **Total Transect Length (km):** | 0.46 |
| **Maximum Bottom Depth (m):** | -62 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 10:59 | **On Bottom (Lat/Long):** | 32.35°N; -79.03°W |
| **Off Bottom (Time- EDT):** | 12:23 | **Off Bottom (Lat/Long):** | 32.35°N; -79.03°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-24; South Carolina, Inside Edisto MPA, 58 m Deep- 4 km Ridge, UNCW Dive 74

**Dive Imagery:**

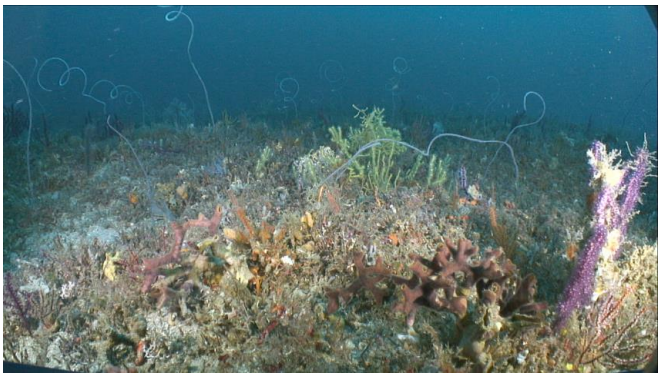


**Figure 1:** -59.3 m
*Schizoporella*, *Stichopathes* sp. and octocorals dominate this substrate

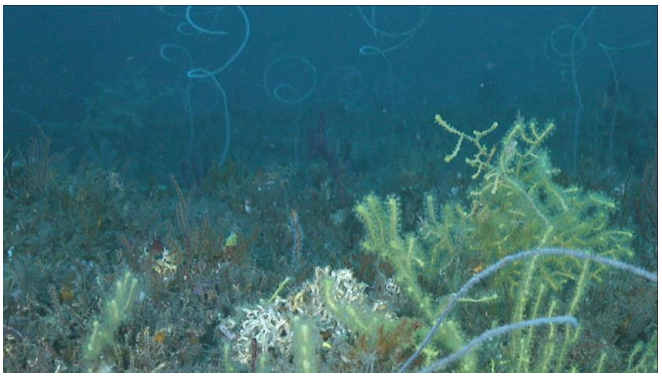


**Figure 2:** -59.3 m
octocorals and *Stichopathes* dominate this substrate

**Figure 3:** -58.6 m
Angelfish and grouper fish swim over the heavily encrusted hard bottom

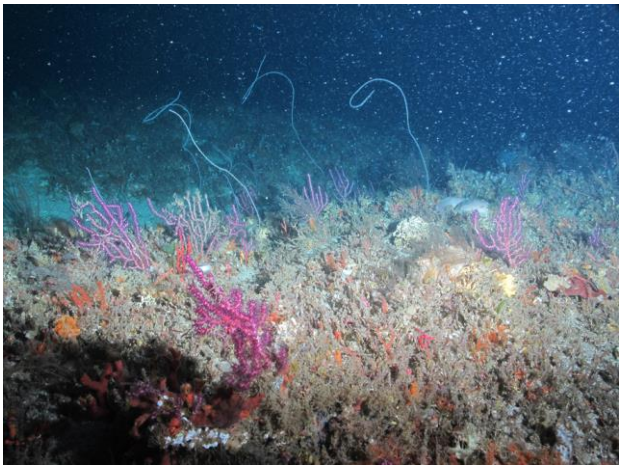


**Figure 4:** -58.2 m
*Diodogorgia* and *Stichopathes* are dominant fauna

**Dive Site:** ROV 14-24; South Carolina, Inside Edisto MPA, 58 m Deep- 4 km Ridge, UNCW Dive 74

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-24, UNCW Mohawk ROV Dive 74; Site #- 25-VI-14-2. Target Site - South Carolina, Inside Edisto MPA, 58 m Deep- 4 km Ridge. Ground-truth multibeam sonar of site (Pisces_2012_EdistoMPA_MB_Grid). Conduct video/photo along 4 km 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-24.

Site Description/Habitat/Biota:
On bottom: low relief rock boulders/ledges/pavement. West side of ridge was 2-3 m relief with undercut overhangs; top of ledge was more pavement, 45 deg slope over a few m to the west from the top of the rocks to the sediment; top rim of slope was rounded rocks. Western drop-off: 2 m tall with lots of undercuts tapering to rubble/cobble and ending abruptly in sand. 58.6 top/60 m bottom. All exposed hardbottom was covered with 100% fauna/algae. Upper plateau was rounded rock knolls. Flat - moderate rugosity, few undercuts. Common species: Stichopathes, hydroids, algae, and antipatharians.

**Dive Site:** ROV 14-24; South Carolina, Inside Edisto MPA, 58 m Deep- 4 km Ridge, UNCW Dive 74

**CPCe Percent Cover Analysis:**

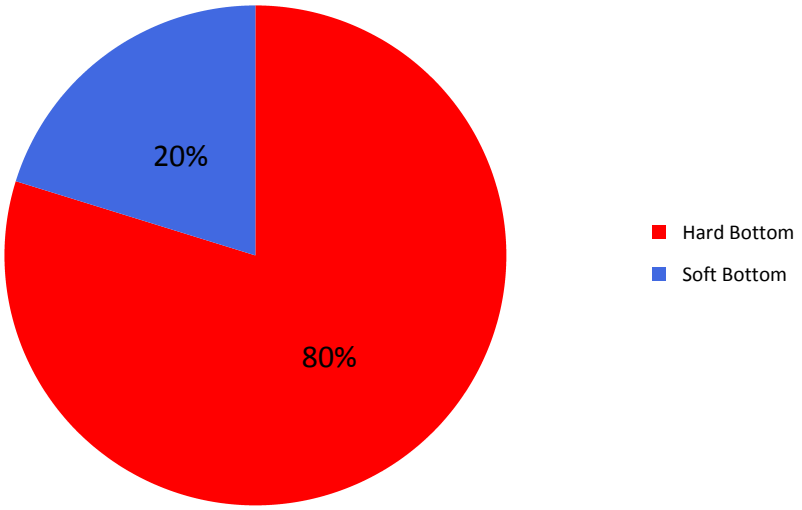
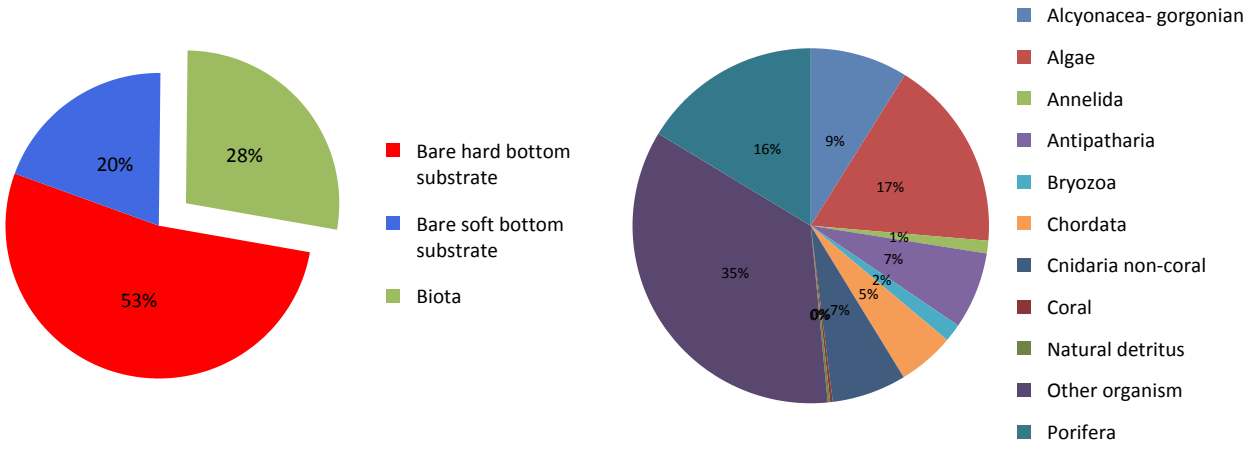



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-24. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-24.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-24; South Carolina, Inside Edisto MPA, 58 m Deep- 4 km Ridge, UNCW Dive 74

**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 14-24.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 429 | 27.61% |
| Algae | 75 | 4.83% |
| Corallinales/crustose coralline | 45 | 2.90% |
| Cyanophyta | 1 | 0.06% |
| Rhodophyta | 29 | 1.87% |
| Porifera | 70 | 4.50% |
| Aiolochroia crassa | 2 | 0.13% |
| Auletta sp. | 1 | 0.06% |
| Chondrilla sp. | 1 | 0.06% |
| Cliona sp. | 1 | 0.06% |
| Demospongiae | 28 | 1.80% |
| Demospongiae- ze tan starlet | 2 | 0.13% |
| Geodia sp. | 13 | 0.84% |
| Ircinia sp. | 1 | 0.06% |
| Niphates sp. | 1 | 0.06% |
| Spirastrellidae | 20 | 1.29% |
| Coral | 1 | 0.06% |
| Scleractinia colonial | 1 | 0.06% |
| Alcyonacea- gorgonian | 38 | 2.45% |
| Diodogorgia sp. | 9 | 0.58% |
| Ellisella sp. | 5 | 0.32% |
| Ellisellidae | 8 | 0.51% |
| Gorgonacea | 12 | 0.77% |
| Nicella sp. | 4 | 0.26% |
| Antipatharia | 30 | 1.93% |
| Antipatharia | 6 | 0.39% |
| Antipatharia atlantica | 6 | 0.39% |
| Stichopathes lutkeni | 15 | 0.97% |
| Tanacetipathes barbadensis | 3 | 0.19% |
| Cnidaria non-coral | 29 | 1.87% |
| Corallimorpharia | 1 | 0.06% |
| Hydroidolina | 28 | 1.80% |
| Annelida | 5 | 0.32% |
| Filograna sp. | 4 | 0.26% |
| Spirobranchus gigantea | 1 | 0.06% |

**Dive Site:** ROV 14-24; South Carolina, Inside Edisto MPA, 58 m Deep- 4 km Ridge, UNCW Dive 74

| | | |
|---|---|---|
| Bryozoa | 7 | 0.45% |
| Bryozoa | 1 | 0.06% |
| Schizoporella sp. | 6 | 0.39% |
| Chordata | 22 | 1.42% |
| Ascidiacea | 12 | 0.77% |
| Fish | 10 | 0.64% |
| Other organism | 151 | 9.72% |
| Natural detritus | 1 | 0.06% |
| Bare soft bottom substrate | 305 | 19.63% |
| Bare hard bottom substrate | 820 | 52.77% |
| Bare hard bottom substrate | 820 | 52.77% |
| Bare rock- pavement boulder ledge | 791 | 50.90% |
| Bare rubble- rock | 29 | 1.87% |
| **Grand Total** | **1554** | **100.00%** |

**Dive Site:** ROV 14-24; South Carolina, Inside Edisto MPA, 58 m Deep- 4 km Ridge, UNCW Dive 74

**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-24.

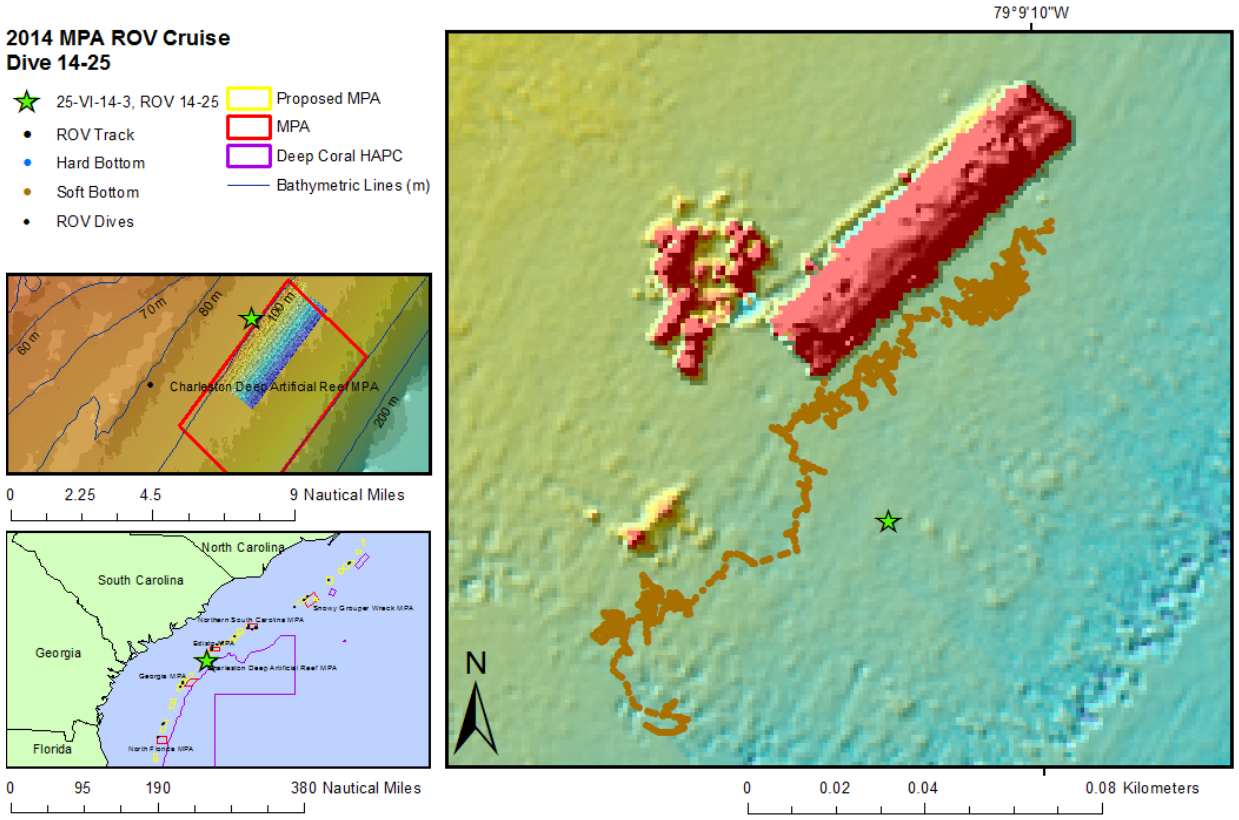
| Scientific Name | Common Name | Density |
|---|---|---|
| *Aluterus monoceros* | unicorn filefish | 0.0001 |
| *Aulostomus maculatus* | trumpetfish | 0.0000 |
| *Balistes capriscus* | grey triggerfish | 0.0003 |
| *Balistes* sp. | triggerfish | 0.0000 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0012 |
| *Calamus* sp. | porgy | 0.0004 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0008 |
| Carcharhinidae | shark | 0.0000 |
| *Centropyge argi* | cherubfish | 0.0001 |
| *Cephalopholis cruentata* | graysby | 0.0000 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0002 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0009 |
| Chaetodontidae | butterflyfish | 0.0001 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0017 |
| *Chromis insolata* | sunshinefish | 0.0113 |
| *Chromis scotti* | purple reeffish | 0.0075 |
| *Chromis* sp. | damselfish | 0.0029 |
| *Clepticus parrai* | creole wrasse | 0.0013 |
| *Equetus lanceolatus* | jack-knife fish | 0.0000 |
| *Fistularia* sp. | cornetfish | 0.0001 |
| *Fistularia tabacaria* | bluespotted cornetfish | 0.0002 |
| *Haemulon aurolineatum* | tomtate | 0.0801 |
| *Haemulon striatum* | striped grunt | 0.0194 |
| *Halichoeres garnoti* | yellowhead wrasse | 0.0000 |
| *Halichoeres* sp. | wrasse | 0.0003 |
| *Holacanthus bermudensis* | blue angelfish | 0.0008 |
| Holocentridae | squirrelfish | 0.0014 |
| *Lachnolaimus maximus* | hogfish | 0.0000 |
| *Lutjanus griseus* | grey snapper | 0.0000 |
| *Lutjanus jocu* | dog snapper | 0.0000 |
| *Lutjanus* sp. | snapper | 0.0000 |
| *Monacanthus hispidus* | planehead filefish | 0.0000 |
| *Mycteroperca microlepis* | gag grouper | 0.0000 |
| *Mycteroperca phenax* | scamp | 0.0007 |
| *Pagrus pagrus* | red porgy | 0.0014 |
| *Paranthias furcifer* | creole-fish | 0.0004 |
| *Pareques umbrosus* | cubbyu | 0.0004 |

**Dive Site:** ROV 14-24; South Carolina, Inside Edisto MPA, 58 m Deep- 4 km Ridge, UNCW Dive 74

| | | |
|---|---|---|
| *Pristigenys alta* | short bigeye | 0.0001 |
| *Prognathodes aculeatus* | longsnout butterflyfish | 0.0000 |
| *Prognathodes aya* | bank butterflyfish | 0.0002 |
| *Pseudupeneus maculatus* | spotted goatfish | 0.0003 |
| *Pterois volitans* | lionfish | 0.0006 |
| *Rhomboplites aurorubens* | vermilion snapper | 0.0109 |
| *Seriola dumerili* | greater amberjack | 0.0000 |
| *Seriola* sp. | amberjack | 0.0001 |
| *Serranus phoebe* | tattler | 0.0002 |
| *Sparisoma atomarium* | greenblotch parrotfish | 0.0001 |
| *Sphoeroides spengleri* | bandtail puffer | 0.0000 |

**Dive Site:** ROV 14-25; South Carolina, Outside Charleston Deep Artificial Reef MPA, 95 m Barge 1, UNCW Dive 75

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 11/4/2014 |

## Dive Overview:

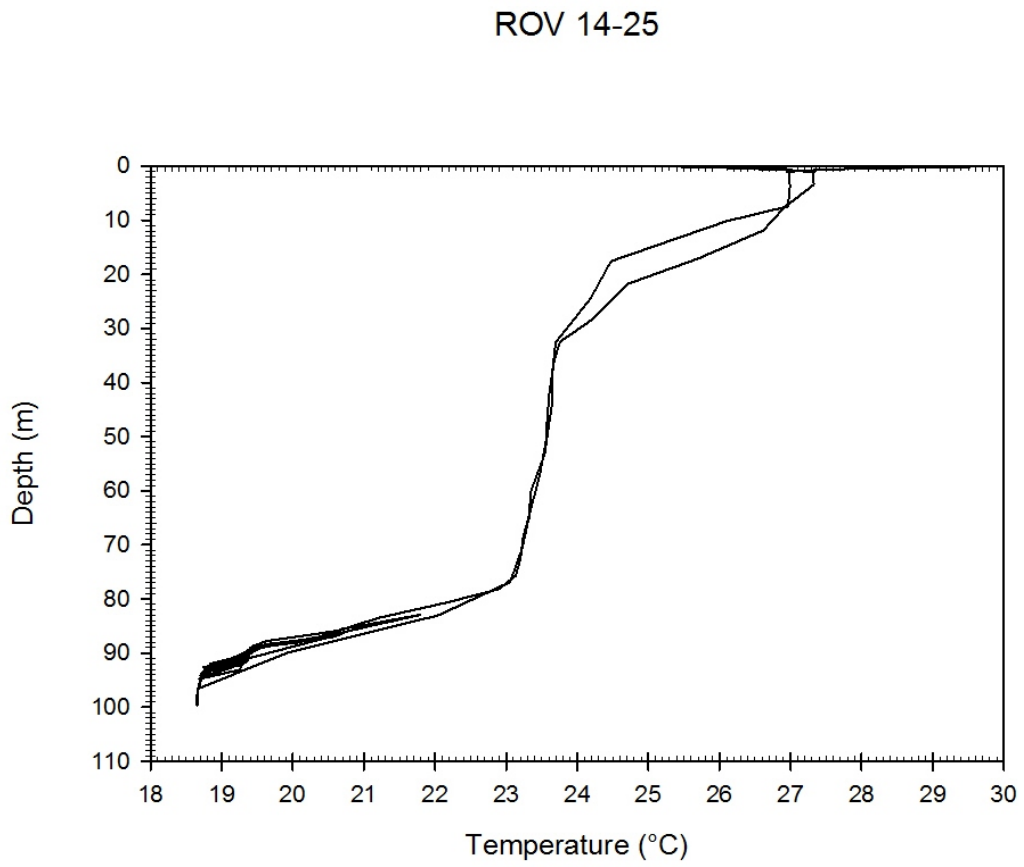
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | NancyFoster_14_08_Barge1_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/25/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 7 |
| **DVD:** | 1 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-25; South Carolina, Outside Charleston Deep Artificial Reef MPA, 95 m Barge 1, UNCW Dive 75

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -83 | **Total Transect Length (km):** | 0.16 |
| **Maximum Bottom Depth (m):** | -101 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 15:06 | **On Bottom (Lat/Long):** | 32.12°N; -79.15°W |
| **Off Bottom (Time- EDT):** | 15:34 | **Off Bottom (Lat/Long):** | 32.12°N; -79.15°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-25; South Carolina, Outside Charleston Deep Artificial Reef MPA, 95 m Barge 1, UNCW Dive 75

**Dive Imagery:**

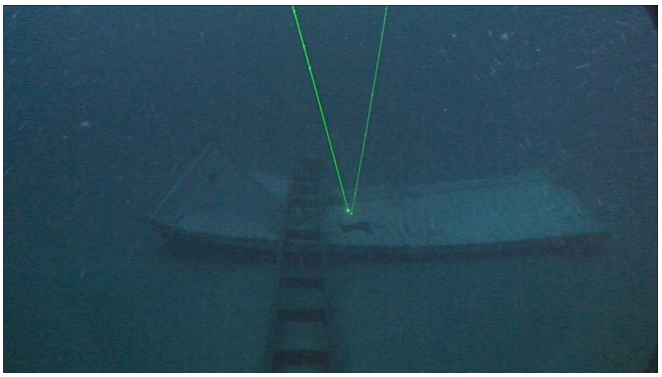


**Figure 1:** -98.3 m
Sunken barge

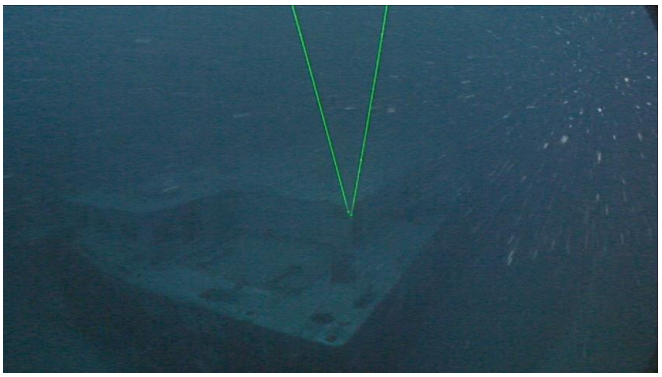


**Figure 2:** -98.3 m
Sunken barge

**Figure 3:** -92.5 m
Sunken barge

**Figure 4:** -90.2 m
Sunken barge

**Dive Site:** ROV 14-25; South Carolina, Outside Charleston Deep Artificial Reef MPA, 95 m Barge 1, UNCW Dive 75

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-25, UNCW Mohawk ROV Dive 75; Site #- 25-VI-14-3. Target Site - South Carolina, Outside Charleston Deep Artificial Reef MPA, 95 m Barge 1. Ground-truth multibeam sonar of site (NancyFoster_14_08_Barge1_Grid). Conduct video/photo along sunken Barge 1. (per Stacey Harter: plans are to move the Charleston Deep MPA to cover the 2 barges that were sunk between April and June 2014. They had accidently placed them too far NW of the planned box.)

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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-25.

Site Description/Habitat/Biota:
Dive sunken Barge 1; landed in soft sediment to the SW of the barge. There was a shipping container box about 20 m SW of the barge with a ladder(?) laying across it. Traveled the starboard side of the barge from aft to forward. Barge intact with the debris/boxes that were sunk with it to the NW of the main barge. There was a school of amberjacks swimming above the barge but no other fish/inverts sighted. Too far for good usable still images; screen grabs could be taken. No analysis of benthic biota was conducted on this site. The site was soley for the purposes of artificial reef landing reporting.

**Dive Site:** ROV 14-25; South Carolina, Outside Charleston Deep Artificial Reef MPA, 95 m Barge 1, UNCW Dive 75

**Percent Cover of Benthic Macro-Biota and Substrate:**

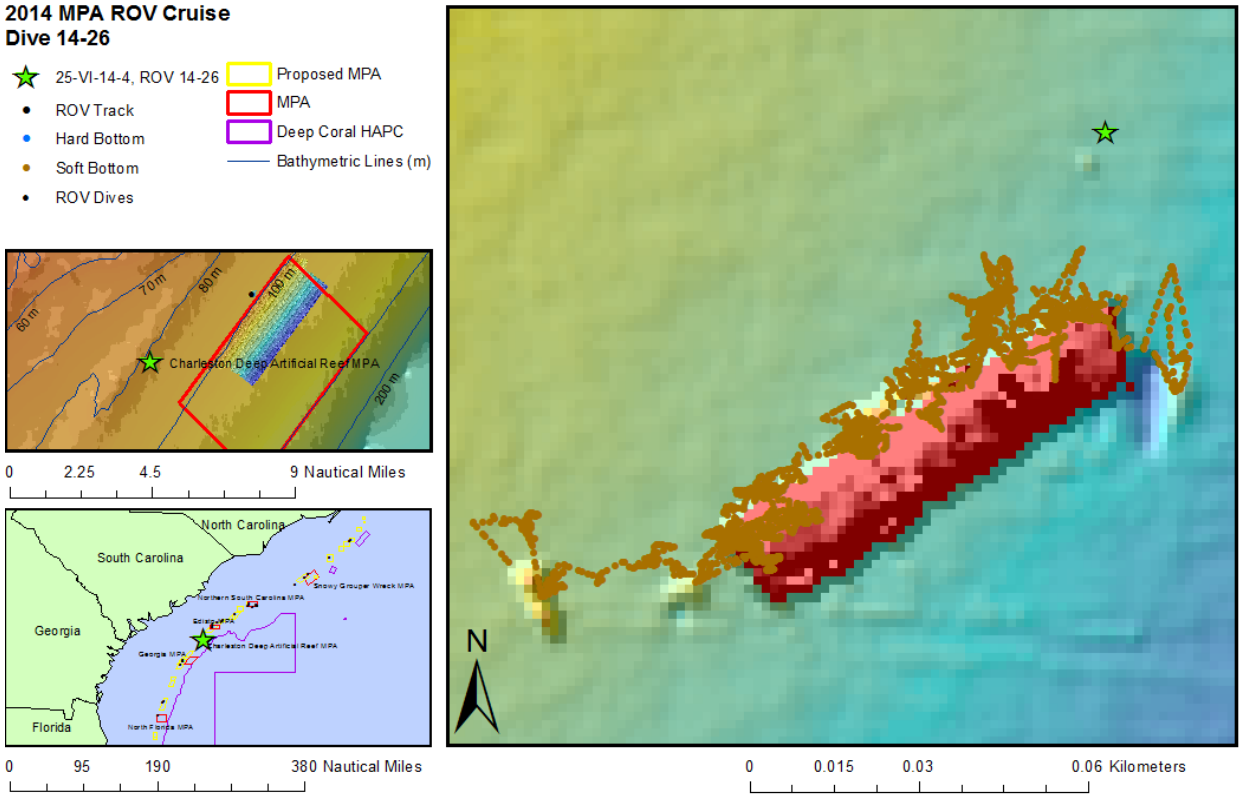
Table 2. No CPCe analysis was completed for dive site ROV 14-25.

**Density of Fish:**

No Density of fish was completed for ROV 14-25.

**Dive Site:** ROV 14-26; South Carolina, Outside Charleston Deep Artificial Reef MPA, 80 m Barge 2, UNCW Dive 76

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 11/4/2014 |

## Dive Overview:

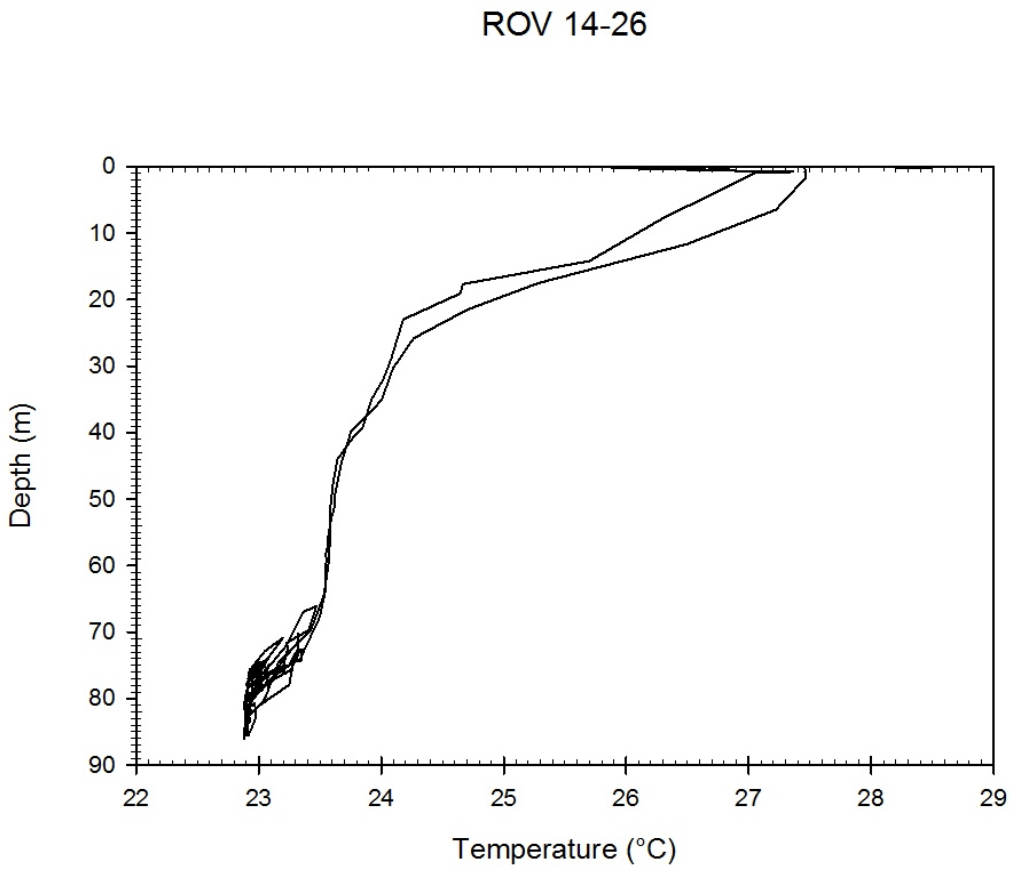
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | NancyFoster_14_08_Barge2_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/25/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 62 |
| **DVD:** | 1 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-26; South Carolina, Outside Charleston Deep Artificial Reef MPA, 80 m Barge 2, UNCW Dive 76

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -65 | **Total Transect Length (km):** | 1.45 |
| **Maximum Bottom Depth (m):** | -87 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 16:56 | **On Bottom (Lat/Long):** | 32.09°N; -79.22°W |
| **Off Bottom (Time- EDT):** | 17:36 | **Off Bottom (Lat/Long):** | 32.09°N; -79.2°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-26; South Carolina, Outside Charleston Deep Artificial Reef MPA, 80 m Barge 2, UNCW Dive 76

**Dive Imagery:**

**Figure 1:** -72.8 m
Sunken barge

**Figure 2:** -72.8 m
Sunken barge

**Figure 3:** -77.7 m
Sunken barge

**Figure 4:** -84.6 m
Sunken barge

**Dive Site:** ROV 14-26; South Carolina, Outside Charleston Deep Artificial Reef MPA, 80 m Barge 2, UNCW Dive 76

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-26, UNCW Mohawk ROV Dive 76; Site #- 25-VI-14-4. Target Site - South Carolina, Outside Charleston Deep Artificial Reef MPA, 80 m Barge 2. Ground-truth multibeam sonar of site (NancyFoster_14_08_Barge2_Grid). Conduct video/photo along sunken Barge 2. (Per Stacey Harter- plans are to move the Charleston Deep MPA to cover the 2 barges that were sunk between April and June 2014. They had accidently placed them too far NW of the Planned box.)

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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-26.

Site Description/Habitat/Biota:
Dive on sunken Barge 2. Landed on the bow of the ship and transected port side toward the aft (SW). Many of the original structure were still intact but fallen over or displaced. The bow was fractured and bent toward the surface. Bottom surrounding the ship was soft sediment. No analysis of benthic biota was conducted on this site. The site was soley for the purposes of artificial reef landing reporting

**Dive Site:** ROV 14-26; South Carolina, Outside Charleston Deep Artificial Reef MPA, 80 m Barge 2, UNCW Dive 76

**Percent Cover of Benthic Macro-Biota and Substrate:**

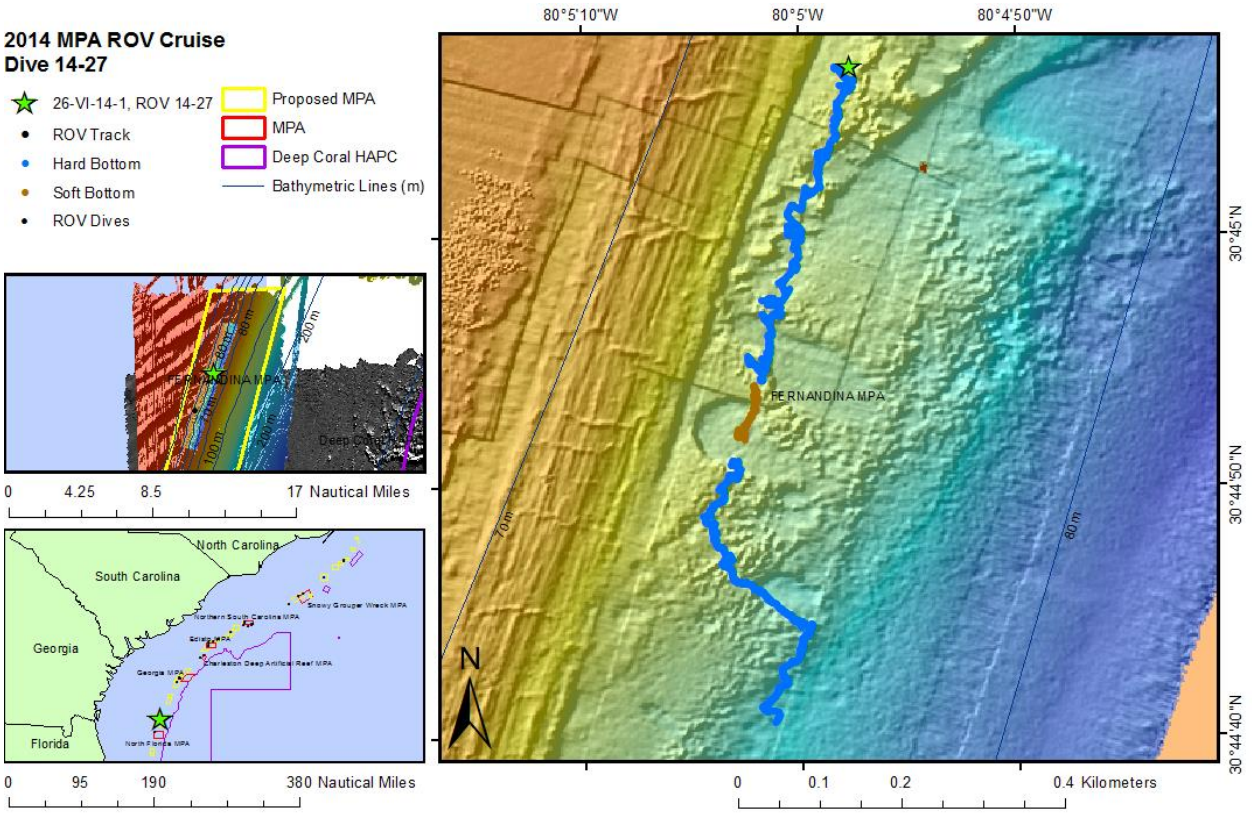
Table 2. No CPCe analysis was completed for dive site ROV 14-26.

**Density of Fish:**

No Density of fish was completed for ROV 14-26.

**Dive Site:** ROV 14-27; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 77

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

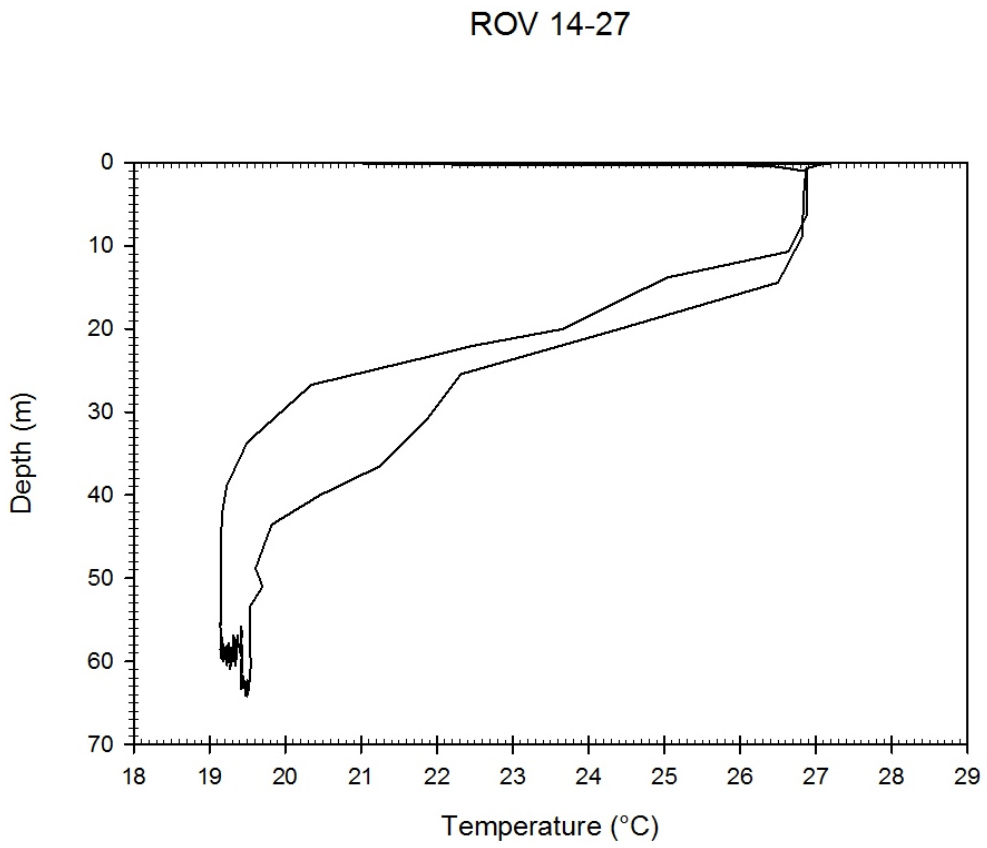
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | NancyFoster_14_08_MPA_Fernandina_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/26/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 58 |
| **DVD:** | 1 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-27; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 77

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -56 | **Total Transect Length (km):** | 0.82 |
| **Maximum Bottom Depth (m):** | -65 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 8:11 | **On Bottom (Lat/Long):** | 30.75°N; -80.08°W |
| **Off Bottom (Time- EDT):** | 9:09 | **Off Bottom (Lat/Long):** | 30.74°N; -80.08°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-27; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 77

**Dive Imagery:**

**Figure 1:** -59.8 m
Butterflyfish swim over encrusted hardbottom

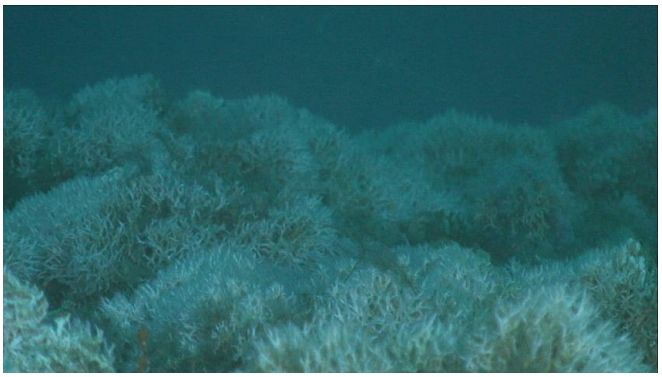


**Figure 2:** -59.8 m
A field of *Filograna* polychaete tubes

**Figure 3:** -60.1 m
Grey triggerfish nesting

**Figure 4:** -58.3 m
Large *Ellisella* gorgonian on encrusted hardbottom

**Dive Site:** ROV 14-27; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 77

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-27, UNCW Mohawk ROV Dive 77; Site #- 26-VI-14-1. Target Site -Florida, Inside Proposed Fernandina MPA, 70 m Ridge. Ground-truth multibeam sonar of site (NancyFoster_14_08 _MPA_Fernandina_Grid). Conduct video/photo along 70 m N-S 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-27.

Site Description/Habitat/Biota:
Landed east of the apparent ridge; soft bottom, few rounded rock knolls, <1 wide and <1/4 m tall. Occasional small ridge with 1 m relief and undercuts. Filograna dominate. Most of the dive was spent on sand.

**Dive Site:** ROV 14-27; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 77

**CPCe Percent Cover Analysis:**

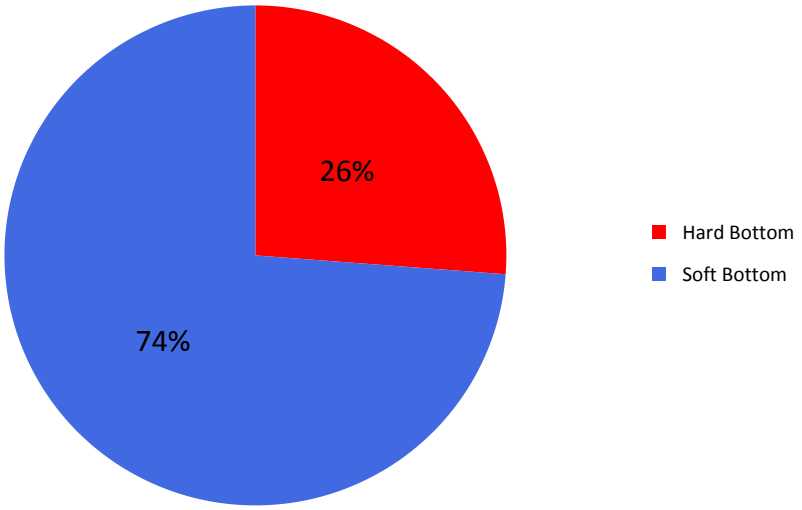
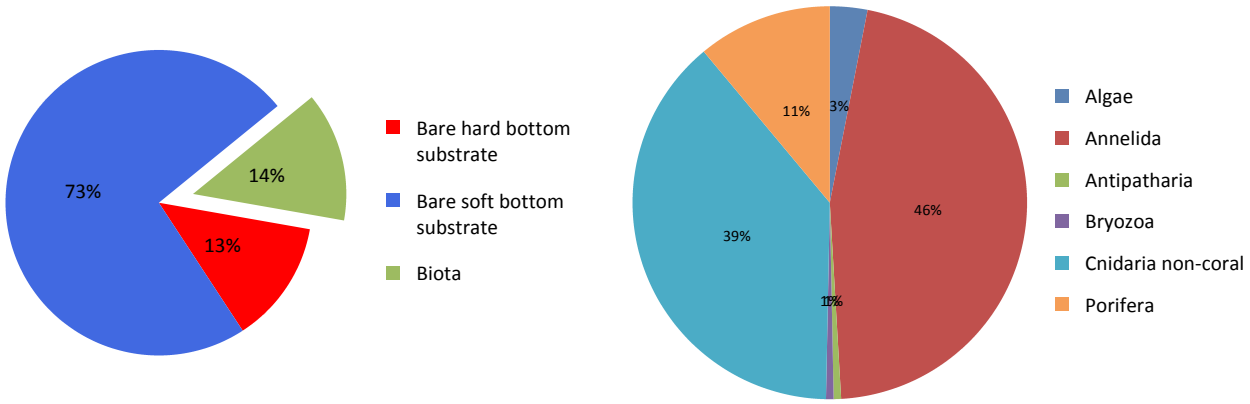



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-27. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-27.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-27; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 77

**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 14-27.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 163 | 13.69% |
| Algae | 5 | 0.42% |
| Corallinales/crustose coralline | 4 | 0.34% |
| Phaeophyta | 1 | 0.08% |
| Porifera | 18 | 1.51% |
| Demospongiae | 12 | 1.01% |
| Ircinia sp. | 1 | 0.08% |
| Spirastrellidae | 5 | 0.42% |
| Antipatharia | 1 | 0.08% |
| Stichopathes lutkeni | 1 | 0.08% |
| Cnidaria non-coral | 63 | 5.29% |
| Hydroidolina | 63 | 5.29% |
| Annelida | 75 | 6.30% |
| Filograna sp. | 75 | 6.30% |
| Bryozoa | 1 | 0.08% |
| Schizoporella sp. | 1 | 0.08% |
| Bare soft bottom substrate | 873 | 73.30% |
| Bare hard bottom substrate | 155 | 13.01% |
| Bare hard bottom substrate | 155 | 13.01% |
| Bare rock- pavement boulder ledge | 95 | 7.98% |
| Bare rubble- rock | 60 | 5.04% |
| **Grand Total** | **1191** | **100.00%** |

**Dive Site:** ROV 14-27; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 77

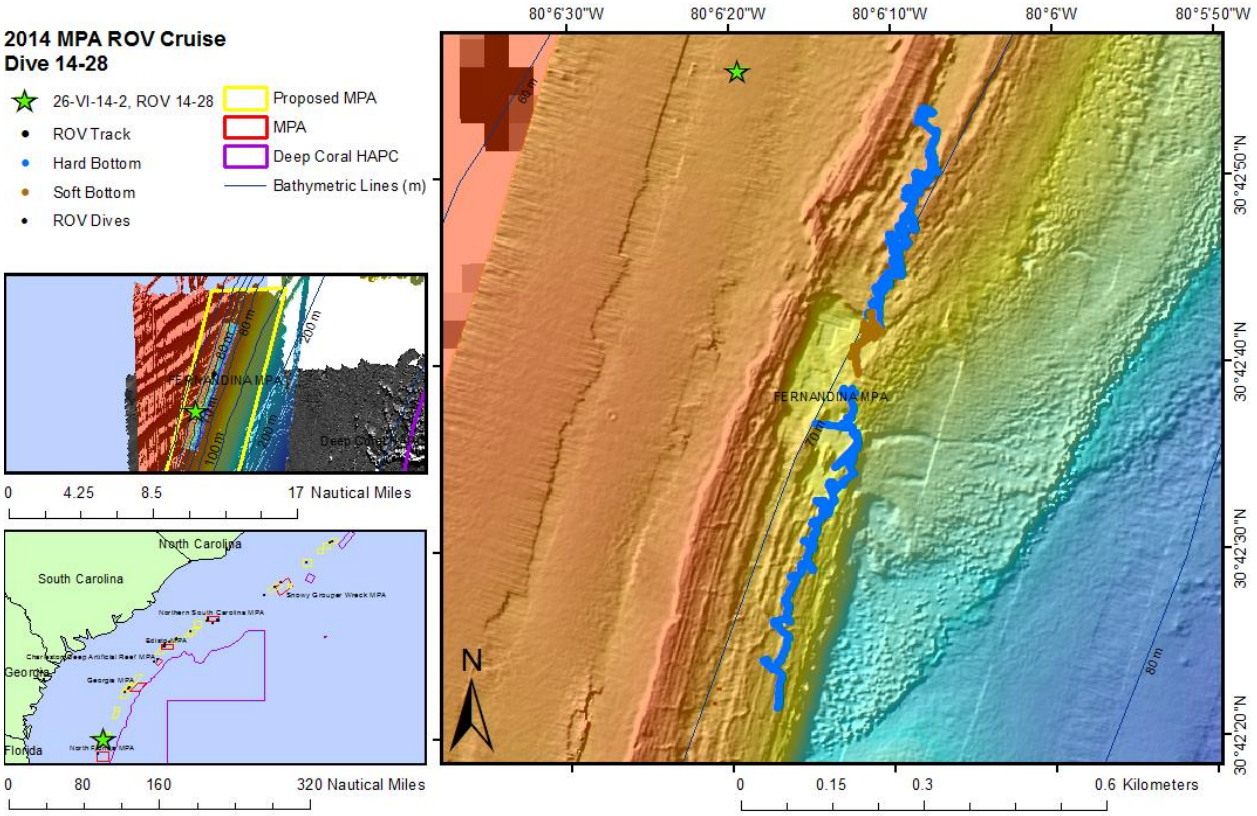
**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-27.

| Scientific Name | Common Name | Density |
|---|---|---|
| *Balistes capriscus* | grey triggerfish | 0.0004 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0003 |
| *Calamus* sp. | porgy | 0.0001 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0025 |
| *Centropristis ocyurus* | bank sea bass | 0.0002 |
| *Centropyge argi* | cherubfish | 0.0020 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0004 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0042 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0037 |
| *Chromis insolata* | sunshinefish | 0.0006 |
| *Diodon holocanthus* | balloonfish | 0.0006 |
| *Gymnothorax vicinus* | purplemouth moray eel | 0.0001 |
| *Haemulon aurolineatum* | tomtate | 0.0007 |
| *Halichoeres garnoti* | yellowhead wrasse | 0.0013 |
| *Halichoeres* sp. | wrasse | 0.0050 |
| *Holacanthus bermudensis* | blue angelfish | 0.0005 |
| Holocentridae | squirrelfish | 0.0008 |
| *Lactophrys* sp. | cowfish | 0.0001 |
| *Mycteroperca phenax* | scamp | 0.0001 |
| *Myripristis jacobus* | blackbar soldierfish | 0.0001 |
| *Opsanus* sp. | toadfish | 0.0001 |
| *Pagrus pagrus* | red porgy | 0.0028 |
| *Priacanthus arenatus* | bigeye | 0.0006 |
| *Pristigenys alta* | short bigeye | 0.0005 |
| *Pterois volitans* | lionfish | 0.0018 |
| Scorpaenidae | scorpionfish | 0.0002 |
| *Seriola dumerili* | greater amberjack | 0.0006 |
| *Seriola* sp. | amberjack | 0.0001 |
| *Serranus annularis* | orangeback bass | 0.0010 |
| *Serranus baldwini* | lantern bass | 0.0001 |
| *Serranus phoebe* | tattler | 0.0023 |
| *Serranus* sp. | sea bass | 0.0006 |
| Sparidae | porgy | 0.0020 |
| *Stegastes partitus* | bicolor damselfish | 0.0007 |

**Dive Site:** ROV 14-28; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 78

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

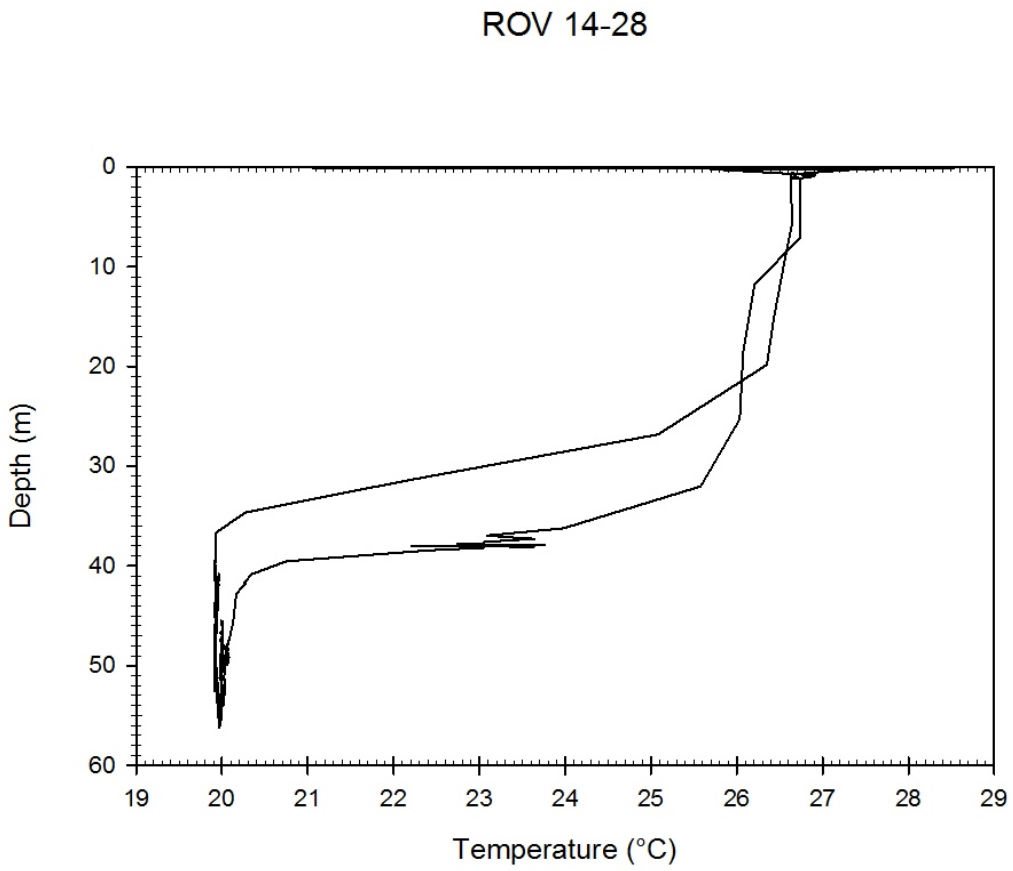
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | NancyFoster_14_08_MPA_Fernandina_Grid |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/26/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 62 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-28; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 78

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -41 | **Total Transect Length (km):** | 1.06 |
| **Maximum Bottom Depth (m):** | -57 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 10:06 | **On Bottom (Lat/Long):** | 30.71°N; -80.1°W |
| **Off Bottom (Time- EDT):** | 11:49 | **Off Bottom (Lat/Long):** | 30.71°N; -80.1°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-28; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 78

**Dive Imagery:**

**Figure 1:** -51.9 m
Brown algae, *Diodogorgia* and *Ircinia* are common

**Figure 2:** -51.9 m
*Diodogorgia* and *Ircinia* are common

**Figure 3:** -51.6 m
*Ircinia* are common

**Figure 4:** -51.8 m
Queen angelfish with lionfish on encrusted hardbottom

**Dive Site:** ROV 14-28; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 78

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-28, UNCW Mohawk ROV Dive 78; Site #- 26-VI-14-2. Target Site -Florida, Inside Proposed Fernandina MPA, 70 m Ridge. Ground-truth multibeam sonar of site (NancyFoster_14_08 _MPA_Fernandina_Grid). Conduct video/photo along 70 m N-S 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-28.

Site Description/Habitat/Biota:
Rock ledge, low slope, low relief, covered in fauna. Ridge tapers out to the west to small boulders then rubble and 100% sand. Crossed area of pavement and rounded rock knolls with thick sediment veneer. Changed to sediment with a few rock ledges, Diodogorgia, hydroids, I. campana, Stichopathes all common on the exposed hard bottom. Filograna was also very abundant through most of the dive. Came off bottom for about 10 minutes and landed back on a rock ledge, small outcrops, low relief. Some of the exposed pavement had exposed edges with slight undercuts and some were square puzzle-piece breaks. Square blocks of pavement with sand on top and between. We were on this site 2 years ago and we had exposed hardbottom with a goliath grouper. Now from above (5 m altitude) we can see there is little to no habitat and no large fish. The bottom had pavement with square puzzle-piece blocks, but the site was filled in with sand.

**Dive Site:** ROV 14-28; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 78

**CPCe Percent Cover Analysis:**

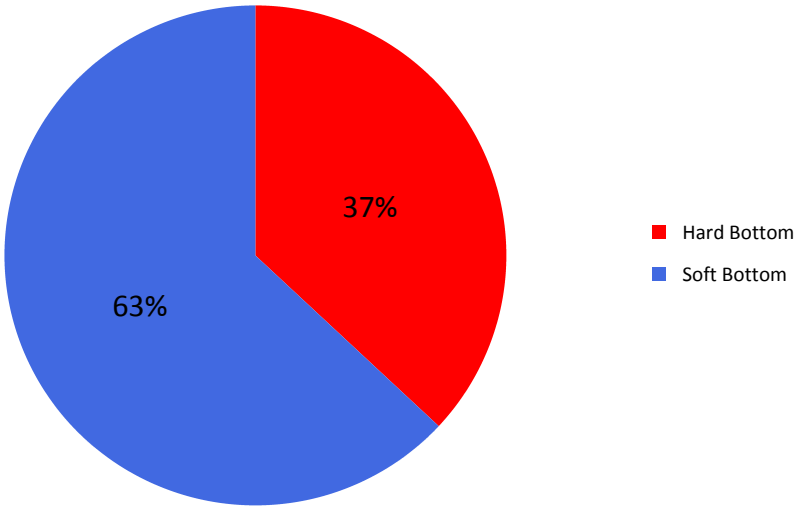
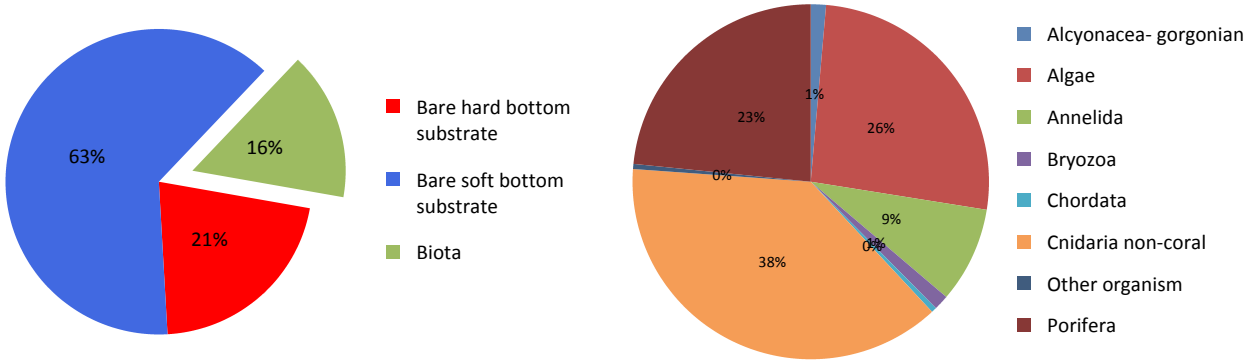



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-28. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-28.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-28; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 78

**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 14-28.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 218 | 15.71% |
| Algae | 57 | 4.11% |
| Chlorophyta | 1 | 0.07% |
| Corallinales/crustose coralline | 10 | 0.72% |
| Cyanophyta | 2 | 0.14% |
| Phaeophyta | 6 | 0.43% |
| Rhodophyta | 38 | 2.74% |
| Porifera | 51 | 3.67% |
| Cinachyra sp./Cinachyrella sp. | 1 | 0.07% |
| Clathria sp. | 1 | 0.07% |
| Demospongiae | 14 | 1.01% |
| Demospongiae- ze tan starlet | 6 | 0.43% |
| Geodia sp. | 1 | 0.07% |
| Holopsamma sp. | 1 | 0.07% |
| Ircinia campana | 9 | 0.65% |
| Ircinia sp. | 1 | 0.07% |
| Ircinia strobilina | 1 | 0.07% |
| Spirastrellidae | 16 | 1.15% |
| Alcyonacea- gorgonian | 3 | 0.22% |
| Diodogorgia sp. | 2 | 0.14% |
| Leptogorgia sp. | 1 | 0.07% |
| Cnidaria non-coral | 83 | 5.98% |
| Hydroidolina | 83 | 5.98% |
| Annelida | 19 | 1.37% |
| Filograna sp. | 19 | 1.37% |
| Bryozoa | 3 | 0.22% |
| Bryozoa | 1 | 0.07% |
| Schizoporella sp. | 2 | 0.14% |
| Chordata | 1 | 0.07% |
| Fish | 1 | 0.07% |
| Other organism | 1 | 0.07% |
| Bare soft bottom substrate | 874 | 62.97% |
| Bare hard bottom substrate | 296 | 21.33% |
| Bare hard bottom substrate | 296 | 21.33% |
| Bare rock- pavement boulder ledge | 253 | 18.23% |

**Dive Site:** ROV 14-28; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 78

| | | |
|---|---|---|
| Bare rubble- rock | 43 | 3.10% |
| **Grand Total** | **1388** | **100.00%** |

**Dive Site:** ROV 14-28; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 78

**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-28.

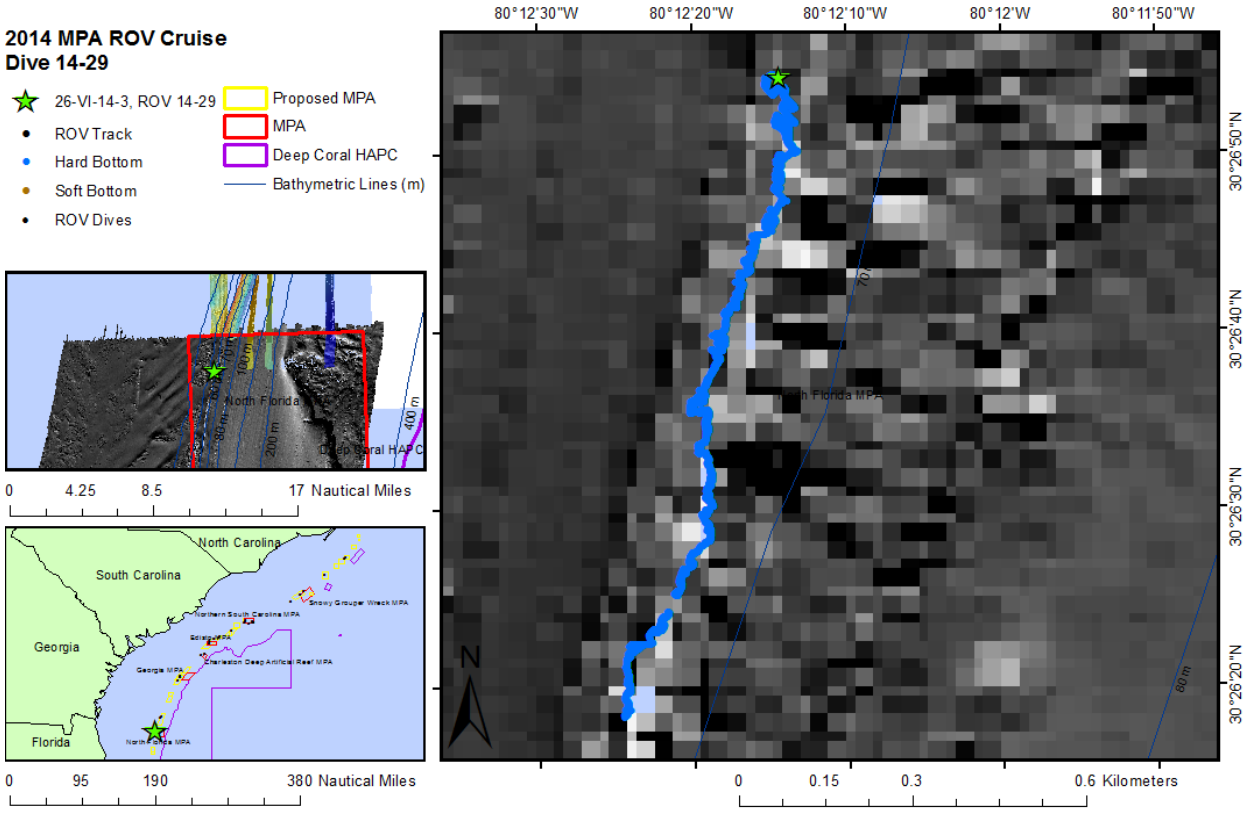
| Scientific Name | Common Name | Density |
|---|---|---|
| *Acanthurus* sp. | doctorfish | 0.0019 |
| *Balistes capriscus* | grey triggerfish | 0.0008 |
| *Balistes vetula* | queen triggerfish | 0.0004 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0026 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0049 |
| Carangidae | jack | 0.0050 |
| *Centropyge argi* | cherubfish | 0.0004 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0011 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0079 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0084 |
| *Chromis insolata* | sunshinefish | 0.0009 |
| *Chromis scotti* | purple reeffish | 0.0035 |
| *Chromis* sp. | damselfish | 0.0007 |
| *Equetus lanceolatus* | jack-knife fish | 0.0003 |
| *Haemulon aurolineatum* | tomtate | 0.0332 |
| *Halichoeres garnoti* | yellowhead wrasse | 0.0021 |
| *Halichoeres* sp. | wrasse | 0.0084 |
| *Holacanthus bermudensis* | blue angelfish | 0.0019 |
| Holocentridae | squirrelfish | 0.0024 |
| *Lachnolaimus maximus* | hogfish | 0.0006 |
| *Liopropoma eukrines* | wrasse bass | 0.0008 |
| *Malacanthus plumieri* | sand tilefish | 0.0003 |
| *Mycteroperca phenax* | scamp | 0.0019 |
| *Myripristis jacobus* | blackbar soldierfish | 0.0021 |
| *Pagrus pagrus* | red porgy | 0.0016 |
| *Paranthias furcifer* | creole-fish | 0.0019 |
| *Pareques umbrosus* | cubbyu | 0.0019 |
| *Priacanthus arenatus* | bigeye | 0.0007 |
| *Pristigenys alta* | short bigeye | 0.0008 |
| *Pseudupeneus maculatus* | spotted goatfish | 0.0003 |
| *Pterois volitans* | lionfish | 0.0018 |
| *Rhomboplites aurorubens* | vermilion snapper | 0.0019 |
| *Seriola dumerili* | greater amberjack | 0.0012 |
| *Seriola rivoliana* | almaco jack | 0.0009 |
| *Serranus annularis* | orangeback bass | 0.0003 |
| *Serranus baldwini* | lantern bass | 0.0012 |
| *Serranus phoebe* | tattler | 0.0024 |

**Dive Site:** ROV 14-28; Florida, Inside Proposed Fernandina MPA, 70 m Ridge, UNCW Dive 78

| | | |
|---|---|---|
| *Serranus* sp. | sea bass | 0.0006 |
| Sparidae | porgy | 0.0005 |
| *Sparisoma* sp. | parrotfish | 0.0006 |
| *Stegastes partitus* | bicolor damselfish | 0.0003 |

**Dive Site:** ROV 14-29; Florida, Inside North Florida MPA, 70 m Ridge, UNCW Dive 79

## General Location and Dive Track:




## Site Overview:

| | |
|---|---|
| **Project:** | 2014 MPA Cruise |
| **Principal Investator:** | Stacy Harter |
| **PI Contact Info:** | 3500 Delwood Beach Rd., Panama City, FL 32444 |
| **Website:** | http://teacheratsea.noaa.gov/2014/bilotta.html |
| **Scientific Observers:** | Andy David, Heather Moe, Jason White, Lance Horne, Stacy Harter, Stephanie Farrington |
| **Data Management:** | Access Database |
| **ROV Navigation Data:** | |
| **Ship Position System:** | DGPS |
| **Report Analyst:** | John Reed, Stephanie Farrington |
| **Date Compiled:** | 10/22/2014 |

## Dive Overview:

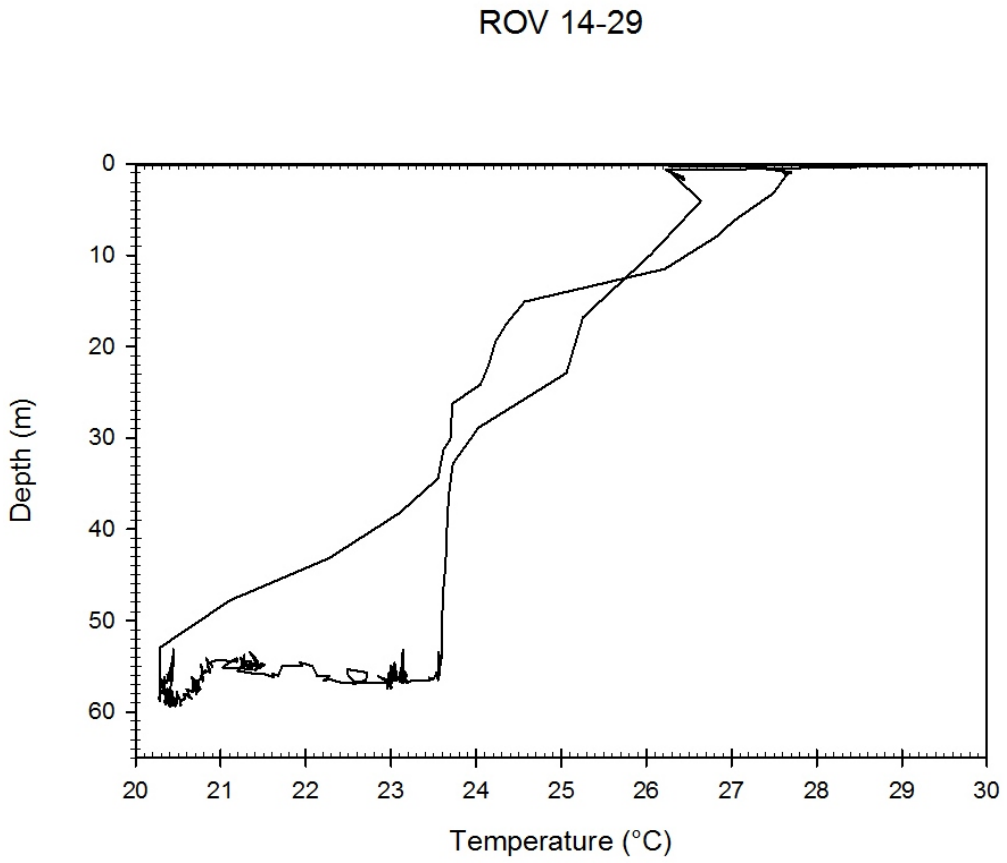
| | |
|---|---|
| **Vessel:** | NOAA Ship *Nancy Foster* |
| **Sonar Data:** | Navy_2011_CONFIDENTIAL_USWTR_Tif |
| **Purpose:** | Conduct ROV surveys and multibeam sonar of shelf-edge MPAs |
| **ROV:** | Mohawk ROV |
| **ROV Sensors:** | Temperature (°C), Depth (m) |
| **Date of Dive:** | 6/26/2014 |
| **Specimens:** | 0 |
| **Digital Photos:** | 139 |
| **DVD:** | 2 |
| **Hard Drive:** | 1 |

**Dive Site:** ROV 14-29; Florida, Inside North Florida MPA, 70 m Ridge, UNCW Dive 79

**Dive Data:**

| | | | |
|---|---|---|---|
| **Minimum Bottom Depth (m):** | -53 | **Total Transect Length (km):** | 1.15 |
| **Maximum Bottom Depth (m):** | -60 | **Surface Current (kn):** | N/A |
| **On Bottom (Time- EDT):** | 13:56 | **On Bottom (Lat/Long):** | 30.45°N; -80.2°W |
| **Off Bottom (Time- EDT):** | 15:54 | **Off Bottom (Lat/Long):** | 30.44°N; -80.21°W |

**Physical Environment:**




ROV CTD: Temperature (°C) and Depth (m) were recorded throughout the dive.

**Dive Site:** ROV 14-29; Florida, Inside North Florida MPA, 70 m Ridge, UNCW Dive 79

**Dive Imagery:**

**Figure 1:** -56.3 m
*Tanacetipathes* sp. black coral

**Figure 2:** -56.3 m
Human debris attached to an zoanthid encrusted piece of fishing filament

**Figure 3:** -58.5 m
*Stenorhynchus seticornis* arrow crab under a *Tanacetipathes* black coral

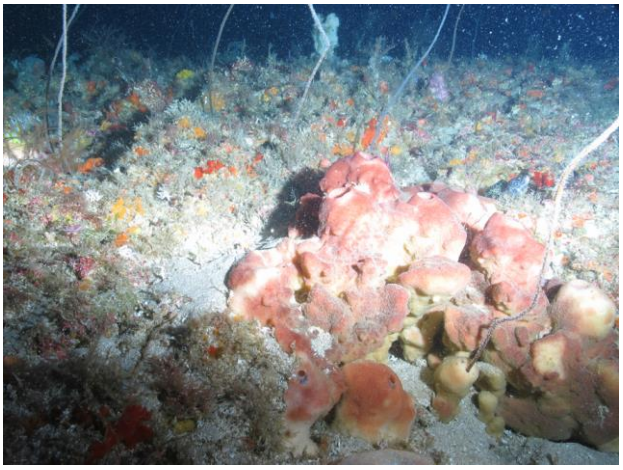


**Figure 4:** -59.5 m
*Neofibularia* fire sponge and *Stichopathes* wire coral on heavily encrusted hardbottom

**Dive Site:** ROV 14-29; Florida, Inside North Florida MPA, 70 m Ridge, UNCW Dive 79

**Dive Notes:**

**Objectives, Site Description, Habitat, Fauna:**

Site/Objectives:
ROV Dive 14-29, UNCW Mohawk ROV Dive 79; Site #- 26-VI-14-3. Target Site -Florida, Inside North Florida MPA, 70 m Ridge. Ground-truth multibeam sonar of site (Navy_2011_CONFIDENTIAL_USWTR_Tif). Conduct video/photo along 70 m N-S 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. Continuous video taken with a high definition video camera (Insite Pacific Mini Zeus high definition CMOS color zoom camera with 2,000,000 effective pixels) which is angled ~20-30° down with 10 cm parallel lasers for scale. Digital still images are taken for quantitative analysis of habitat and benthic macrobiota with a high definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels), pointed down 90° with 10 cm parallel lasers. Still images are captured with the digital still camera every 2 minutes throughout the dive at a height of 1.3 m to provide relatively consistent area for each image. Logged the dive track 14-29.

Site Description/Habitat/Biota:
Landed on rock outcrops, 0.5-2 m wide and <1 m tall, sediment between; 100% fauna/algal coverage on hardbottom. Many very large Tanacetipathes (50+ cm). Boulders became larger, taller and more abundant, 1-2 m tall and totally covered in fauna/algae. From above, can tell the rocks are puzzle-pieced. Boulders and low relief hardbottom tapered out to the sides of the ridge into sand. Changed to flat pavement with sediment veneer and minimal fauna: Stichopathes, hydroids, didemnid, and tilefish burrows. Dive ended on hardbottom pavement turning to rock ledge.

**Dive Site:** ROV 14-29; Florida, Inside North Florida MPA, 70 m Ridge, UNCW Dive 79

**CPCe Percent Cover Analysis:**

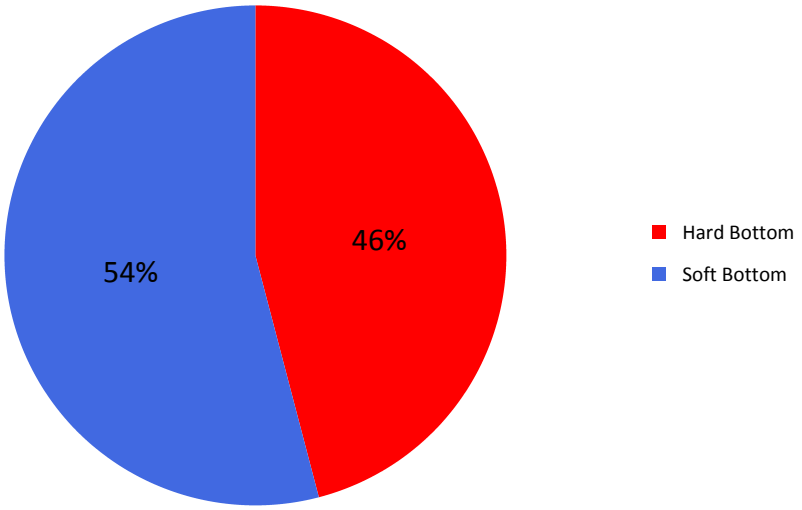
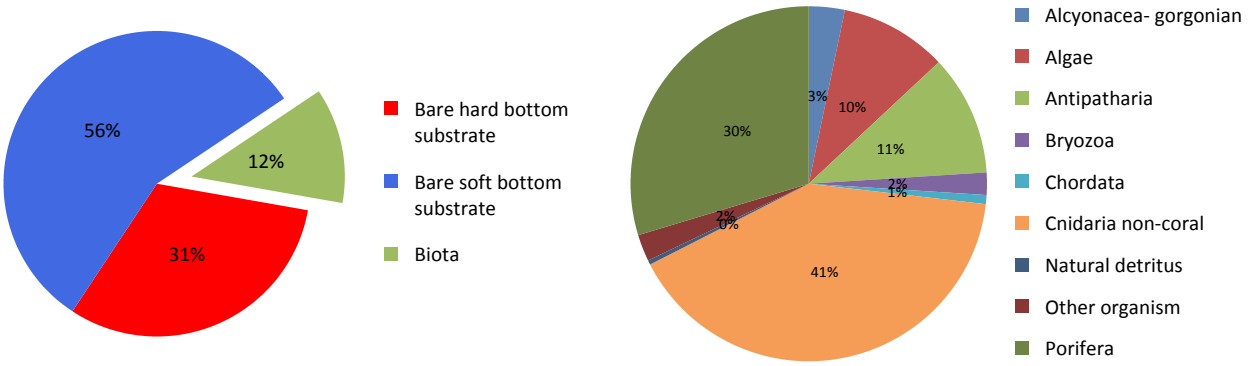



Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 14-29. CPCe© points on organisms were scored as the underlying substrate (hard or soft).




A B

Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 14-29.
A. CPCe percent cover of biota and bare substrate (hard or soft bottom). B. CPCe percent cover of biota and human debris.

**Dive Site:** ROV 14-29; Florida, Inside North Florida MPA, 70 m Ridge, UNCW Dive 79

**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 14-29.

| Benthic Macro-biota and Substrate Type | Point Count | % Cover |
|---|---|---|
| Biota | 246 | 12.20% |
| Algae | 24 | 1.19% |
| Corallinales/crustose coralline | 3 | 0.15% |
| Cyanophyta | 5 | 0.25% |
| Rhodophyta | 16 | 0.79% |
| Porifera | 73 | 3.62% |
| Demospongiae | 27 | 1.34% |
| Demospongiae- ze tan starlet | 8 | 0.40% |
| Ircinia sp. | 2 | 0.10% |
| Spirastrellidae | 36 | 1.79% |
| Alcyonacea- gorgonian | 8 | 0.40% |
| Diodogorgia sp. | 3 | 0.15% |
| Ellisellidae | 2 | 0.10% |
| Gorgonacea | 3 | 0.15% |
| Antipatharia | 27 | 1.34% |
| Antipatharia | 1 | 0.05% |
| Stichopathes lutkeni | 11 | 0.55% |
| Tanacetipathes barbadensis | 15 | 0.74% |
| Cnidaria non-coral | 100 | 4.96% |
| Actiniaria | 1 | 0.05% |
| Hydroidolina | 97 | 4.81% |
| Zoanthidae | 2 | 0.10% |
| Bryozoa | 5 | 0.25% |
| Bryozoa | 4 | 0.20% |
| Schizoporella sp. | 1 | 0.05% |
| Chordata | 2 | 0.10% |
| Ascidiacea | 2 | 0.10% |
| Other organism | 6 | 0.30% |
| Natural detritus | 1 | 0.05% |
| Bare soft bottom substrate | 1135 | 56.30% |
| Bare hard bottom substrate | 635 | 31.50% |
| Bare hard bottom substrate | 635 | 31.50% |
| Bare rock- pavement boulder ledge | 505 | 25.05% |
| Bare rubble- rock | 130 | 6.45% |
| **Grand Total** | **2016** | **100.00%** |

**Dive Site:** ROV 14-29; Florida, Inside North Florida MPA, 70 m Ridge, UNCW Dive 79

**Density of Fish:**

Table 2. Density (# of individuals $m^{-3}$) of fish from video transects at dive site ROV 14-29.

| Scientific Name | Common Name | Density |
|---|---|---|
| *Acanthurus* sp. | doctorfish | 0.0005 |
| *Apogon pseudomaculatus* | twospot cardinalfish | 0.0004 |
| *Balistes capriscus* | grey triggerfish | 0.0004 |
| *Balistes* sp. | triggerfish | 0.0001 |
| *Balistes vetula* | queen triggerfish | 0.0001 |
| *Bodianus pulchellus* | spotfin hogfish | 0.0034 |
| *Calamus* sp. | porgy | 0.0001 |
| *Canthigaster rostrata* | sharpnose puffer | 0.0067 |
| *Centropristis ocyurus* | bank sea bass | 0.0001 |
| *Cephalopholis cruentata* | graysby | 0.0001 |
| *Chaetodon ocellatus* | spotfin butterflyfish | 0.0004 |
| *Chaetodon sedentarius* | reef butterflyfish | 0.0057 |
| *Chaetodon* sp. | butterflyfish | 0.0016 |
| Chaetodontidae | butterflyfish | 0.0003 |
| *Chromis enchrysurus* | yellowtail reeffish | 0.0128 |
| *Chromis insolata* | sunshinefish | 0.0011 |
| *Chromis scotti* | purple reeffish | 0.0025 |
| *Chromis* sp. | damselfish | 0.0007 |
| *Fistularia* sp. | cornetfish | 0.0001 |
| *Fistularia tabacaria* | bluespotted cornetfish | 0.0001 |
| *Gymnothorax moringa* | spotted moray eel | 0.0007 |
| *Haemulon aurolineatum* | tomtate | 0.0240 |
| *Haemulon striatum* | striped grunt | 0.0133 |
| *Halichoeres garnoti* | yellowhead wrasse | 0.0005 |
| *Halichoeres* sp. | wrasse | 0.0106 |
| *Holacanthus bermudensis* | blue angelfish | 0.0025 |
| Holocentridae | squirrelfish | 0.0010 |
| *Lachnolaimus maximus* | hogfish | 0.0003 |
| *Lactophrys quadricornis* | scrawled cowfish | 0.0001 |
| *Lactophrys* sp. | cowfish | 0.0002 |
| *Liopropoma eukrines* | wrasse bass | 0.0003 |
| *Lutjanus analis* | mutton snapper | 0.0001 |
| *Muraena retifera* | reticulate moray eel | 0.0001 |
| Muraenidae | moray eel | 0.0002 |
| *Mycteroperca phenax* | scamp | 0.0001 |
| *Myripristis jacobus* | blackbar soldierfish | 0.0009 |
| *Pagrus pagrus* | red porgy | 0.0003 |

**Dive Site:** ROV 14-29; Florida, Inside North Florida MPA, 70 m Ridge, UNCW Dive 79

| | | |
|---|---|---|
| *Pareques umbrosus* | cubbyu | 0.0005 |
| *Pomacanthus paru* | french angelfish | 0.0002 |
| Priacanthidae | bigeye | 0.0001 |
| *Priacanthus arenatus* | bigeye | 0.0003 |
| *Pristigenys alta* | short bigeye | 0.0003 |
| *Prognathodes aya* | bank butterflyfish | 0.0005 |
| *Pseudupeneus maculatus* | spotted goatfish | 0.0003 |
| *Pterois volitans* | lionfish | 0.0020 |
| *Rhomboplites aurorubens* | vermilion snapper | 0.0238 |
| *Rypticus* sp. | soapfish | 0.0001 |
| *Seriola rivoliana* | almaco jack | 0.0001 |
| *Seriola* sp. | amberjack | 0.0001 |
| *Serranus annularis* | orangeback bass | 0.0010 |
| *Serranus baldwini* | lantern bass | 0.0007 |
| *Serranus phoebe* | tattler | 0.0024 |
| *Sparisoma* sp. | parrotfish | 0.0001 |
| *Stegastes partitus* | bicolor damselfish | 0.0001 |