

**NOAA CIOERT Cruise Report
South Atlantic MPAs and Oculina HAPC:
Characterization of Benthic Habitat and Biota**

**NOAA Ship *Pisces* Cruise 18-02
UNCW *Mohawk* ROV
May 12-24, 2018**

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EXECUTIVE SUMMARY

A 13 day research cruise was conducted May 12-24, 2018 by NOAA National Marine Fisheries on the NOAA Ship *Pisces* with the UNCW *Mohawk* ROV. Other collaborators involved include: the Cooperative Institute for Ocean Exploration, Research, and Technology (CIOERT) at Harbor Branch Oceanographic Institute, Florida Atlantic University (HBOI-FAU), University of North Carolina at Wilmington, and College of Charleston.

The South Atlantic Fishery Management Council (SAFMC) established eight deepwater Marine Protected Areas (MPAs) along the outer continental shelf off the southeastern U.S in February 2009 and the *Oculina* Habitat Area of Particular Concern (OHPAC) in 1984. This cruise was the first cruise of a 3-year grant to document and characterize the benthic habitats, benthic biota, and fish populations within and adjacent to the protected areas within the jurisdiction of the SAFMC.

This 2018 Cruise Report provides detailed quantitative characterization of the benthic habitat, benthic macro-biota, and fish populations for each of the 26 ROV dives completed. Appendix 1 provides a species list and percent cover of benthic biota 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 on multibeam sonar maps
- ROV dive track data (start and end coordinates, time, and depth)
- CTD plots from shipboard casts and temperature profiles for each ROV dive
- images characterizing the habitat and biota for each dive site
- characterization of habitat, benthic biota, and fish populations for each dive site
- quantitative analyses of photo transects for each dive site of benthic habitat and biota
- quantitative analyses of video transects for each dive site of fish densities.

Twenty-nine ROV dives were conducted including three failed dives, resulting in a total bottom time of 46.7 hours, covering 26.8 km, at depths from 44 to 266 m. A total of 7,868 in situ digital images were taken which included quantitative transect images (6,796), general habitat (815), and species documentation images (257) and 62 lab images of specimens. Twenty-five benthic invertebrates were collected for genetic analysis or taxonomy. One shipboard CTD cast was made and a temperature/depth sensor recorded each ROV dive. The multibeam sonar (ME-70) was used to map eight areas including inside the *Oculina* HAPC and covering a total area of 153 km².

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 DSC RTP, NOAA CRCP, NOAA Mesophotic Reef Ecosystem Program, and NOAA Marine Sanctuaries to assist management on these habitats and key species.

ACKNOWLEDGEMENTS

We gratefully acknowledge funding for research support and ROV operations by the NOAA Coral Reef Conservation Program (CRCP) and the South Atlantic Fishery Management Council (CRCP Fishery Management Council Coral Reef Conservation Cooperative Agreements- Grant #: FNA17NMF4410271). We also acknowledge the NOAA Office of Ocean Exploration and Research (OER Grant #: NA14OAR4320260), 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). The crews of the NOAA Ship *Pisces* and the *Mohawk* ROV (owned by Flower Gardens Bank National Marine Sanctuary [FGBNMS], operated by Jason White and Eric Glidden, UNCW Undersea Vehicle Program) 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, CTD, ROV navigation data, ROV video and digital images, ROV dive annotations, and HBOI-FAU CIOERT 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).

Table 1. NOAA Ship *Pisces* cruise (May 12-24, 2018) data archives (Principal Investigators- Stacey Harter, Andrew David, NOAA NMFS, Panama Lab; John Reed, HBOI-FAU).

Source	Description	Format
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
Science	ROV dive track polygons	ArcGIS Geodatabase
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 at Panama City (Andrew David, Stacey Harter, and Felicia Drummond), NOAA CIOERT at HBOI-FAU (John Reed, Stephanie Farrington), Elizabeth Gugliotti (NOAA's Coastal Center for Environmental Health and Biomolecular Research- CCEHBR) and UNCW (Jason White, Eric Glidden).

SCIENTIFIC PARTICIPANTS

Stacey Harter	Chief Scientist, Principal Investigator	NMFS/PC Lab
Andrew David	Co-Principal Investigator	NMFS/PC Lab
John Reed	Co-Principal Investigator	HBOI/FAU
Felicia Drummond	Scientist	NMFS/PC Lab
Jason White	Chief ROV Pilot	UNCW/UVP
Eric Glidden	ROV Pilot	UNCW/UVP
Elizabeth Gugliotti	Scientist/Student	CCEHBR
Jennifer Dean	NOAA Teacher-at-Sea	Camas High School, Washington

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), five Deepwater Coral Habitat Areas of Particular Concern (CHAPCs), and the *Oculina* Coral HAPC off of 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.

The *Oculina* Experimental Closed Area (OECA) was established in 1994 and closed the area to all bottom fishing in order to evaluate the effectiveness of the reserve for management and conservation of snapper grouper populations. The OECA is located within the *Oculina* Habitat Area of Particular Concern (OHAPC) which was established in 1984 when the significance and value of *Oculina varicosa* to important fishery species was recognized by the SAFMC. The OHAPC doubled in size when the Northern and Western Extensions were added with the implementation of Amendment 8 of the Fishery Management Plan in August 2015. As part of the OECA Evaluation Plan, a re-evaluation of the area is currently in progress. Data collected from the current grant will provide crucial data needed for this re-evaluation.

In February 2009, the SAFMC implemented eight Type II MPAs between Cape Hatteras, N.C. 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, July 2013, June 2014, June 2015, June 2016, and June 2017. 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 and OECA 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 side-scan sonar mapping and groundtruthing, habitat characterization, and monitoring of such areas, including deeper coral reefs, banks and beds.

Ultimately the primary benefits of these data are to characterize and document the habitat, benthic and fish communities within the shelf-edge MPAs along the southeastern U.S. from North Carolina to south Florida and inside the OECA. 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 cruise was to gather additional data on habitat and fish assemblages in six of the shelf-edge, South Atlantic Grouper/Tilefish Marine Protected Areas (MPAs) and provide data for the re-evaluation of the OECA. Data collected 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 ROV surveys of habitat and fish assemblages
- collect bathymetric data with the ME-70 multibeam mapping system on the ship to locate hard-bottom features and potential ROV dive sites
- conduct total water column Conductivity-Temperature-Depth (CTD) profiles.
- collect *Swiftia exserta* gorgonians for populations genetics and other benthic taxa for taxonomic verification of species.

METHODS

ROV Operations

The FGBNMS *Mohawk* ROV (operated by UNCW Undersea Vehicle Program) was used. ROV transect locations were selected by four methods:

- analysis of the limited multibeam bathymetric and acoustic backscatter maps produced within the preceding decade
- reef locations provided by colleagues
- sites found during previous years of this survey
- analysis of areas mapped on the current cruise.

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 outfitted with a collection skid and manipulator on some dives for collections of benthic species.

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 2,380,000 effective pixels). The camera was typically angled down ~30° 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. Video frame grabs also were taken for additional photo transect images (especially on vertical structures or when the digital still camera failed), and to document fish and benthic biota. 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 HBOI-FAU CIOERT At-Sea Database, a Microsoft Access database.

ROV Digital Still Camera

Still images were taken to document habitat and benthic macrobiota with a Kongsberg OE14-408 (Canon G11) high-definition digital still camera (10 megapixels). On May 17, the Kongsberg camera failed and was replaced with an Insite Pacific Scorpio digital still camera (3.34 megapixels). For quantitative photo transects the camera was pointed 90° down from horizontal and used two 10-cm parallel lasers for scale. Still images were captured 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[™] 10.3. On several dives the digital camera failed, and frame grabs from the video camera were taken for the photo transects.

ROV Navigation

The *Mohawk* ROV uses an integrated navigation system consisting of Hypack 2017 software (Windows 7, 64-bit, 3.4 GHz computer), LinkQuest TrackLink 1500HA USBL Underwater Acoustic Tracking System, LinkQuest TN1505b transponder, and POSMV GPS (ship provided) provides the ROV operator and the support vessel’s bridge with real time tracking display of the ROV and ship for navigation. ROV personnel install the TrackLink Ultra Short BaseLine (USBL) acoustic hydrophone on the vessels centerboard and survey its positions with respect to a reference point at the center of the vessel. POSMV and hydrophone offsets, as well as ship dimensions, are entered into Hypack software. The TrackLink 1500HA acoustically interrogates the LinkQuest TN1505b transponder on the ROV, which responds to the hydrophone to determine slant range, bearing, and depth. The real-time Hypack navigation screen accurately displays the ship (to scale) with proper position and heading, and the position and heading of the ROV. Ship and ROV positions, in addition to the ROV depth, heading and altimeter reading, are logged and processed for each dive and provided to the scientist in an Excel file. Geo-referenced TIFF files obtained with multibeam or side scan sonar can be entered into Hypack as background files to display target sites and features of interest to aid in ROV and support vessel navigation. Hypack can also export ROV data via RS232 communication protocol in real time as a NMEA data string which contains ROV position only. The TrackLink 1500HA acoustic tracking system can track up to 16 targets at one time. We carry an additional LinkQuest TN1505b transponder for a spare on all missions. 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 Collection Skid

The *Mohawk* ROV was equipped with a collection skid that consisted of a 5-function manipulator, five suction buckets (2 L each), and a bin with removable partitions (61cm x 23 cm x 17 cm). Benthic invertebrates were collected on some dives.

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 ($< \frac{1}{2}$ - 1 m) with a speed over ground of $\sim \frac{1}{4}$ - 1 knot.
2. Digital still images perpendicular to the bottom were captured every 2 minutes throughout the dive during which the ROV hovered at a height of ~ 1.3 m off the bottom to provide similar field of view area for each image (~ 1.5 m²). When the digital still camera was broken, screengrabs were taken to substitute the usable transect photos.
3. Still images captured from the photo transects were analyzed using CPCe[®] software to determine relative percent cover of benthic biota 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 the HBOI-FAU CIOERT At-Sea 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 habitat maps.

Specimen Collections

Benthic macrobiota were collected with the ROV. Benthic invertebrates were collected on some dives and will be used for museum specimens, taxonomic identification, genetic analysis, and coral health studies.

Each specimen was given a unique sample number, and stored in glass jars which were bar coded with chemical resistant labels. Specimens were preserved 95% ethanol. Specimens were photographed *in situ* when possible prior to collection, photographed in the lab, and data entered into the HBOI-FAU CIOERT At-Sea Database.

CTD Operations

Temperature and depth (pressure) profiles were collected with a Sea-Bird 39 Temperature Recorder attached to the ROV for each dive. A Shipboard CTD cast was made with a Sea-Bird 19 which recorded depth, conductivity, pressure, salinity, sound velocity, density, oxygen saturation, and nitrogen saturation. These were made in conjunction with the multibeam sonar surveys.

Multibeam Sonar Surveys

Multibeam sonar surveys were conducted with the ME-70 multibeam mapping system on the ship.

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 area was calculated by multiplying transect length times transect width. Transect length was calculated from the ROV tracking and transect width was measured using paired lasers on the ROV. Fish density (# individuals/1000 m²) was then calculated as (# of individuals/ transect area) *1000.

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 (Kohler and Gill 2006)), and following protocols established in part by Vinick et al. (2012) for offshore, deepwater surveys in this region. Random points overlaid on each image were identified as substrate type and benthic taxa. Substrate categories included: soft bottom (unconsolidated sand, mud) and hard bottom which was subdivided into rock (pavement, boulder, ledge), rock rubble/cobble (generally, 5-20 cm), and framework coral (standing coral colonies). All macro-benthic biota (usually >3 cm) were identified to the lowest taxa level possible.

For this report we used the following terminology: hard bottom is sometimes referred to as live bottom due to the amount of living organisms attached to these substrates (SAFMC 1998). Hard bottom provides anchorage for sessile or semi-sessile organisms (e.g., corals, octocorals, anemones, hydroids). Coral is defined as hard corals (Scleractinia), hydrocorals (Stylasteridae), as well as octocorals (Alcyonacea- “gorgonacea”), and black corals (Antipatharia) (Lumsden et al. 2007).

Protocol for Benthic Habitat Characterization

This protocol defines the habitat categories to characterize the benthic habitats for the shelf-edge reefs, the MPAs off southeastern U.S. within the jurisdiction of the South Atlantic Fishery Management Council. The data are results of the ROV video observations and multibeam sonar maps where available. The habitat categories are entered into the HBOI-FAU CIOERT At-Sea Database for each ROV dive site and used for Primer statistical analyses.

1. [*On/Off Reef*]: “On Reef” or “Off Reef”- Simple designation of when the dive is on some type of hard bottom (=On Reef) vs Soft Bottom (=Off Reef). This designation is not for any individual photo, but for a zonation within the dive.
2. [*Habitat_Zone= Geomorphology*]: This describes the geological feature; e.g., Ridge- West Slope, Ridge- East Slope, Ridge-Top, Oculina Coral Mound, Soft Bottom. This category is used to plot the percent cover of benthic macro-biota for each habitat zone at each dive site and to plot the dive track overlay on multibeam sonar maps in ArcGIS.
3. [*MPA Status*]: Dive site or transect is within a marine protected area (MPA) or is not protected (i.e., Outside of the 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 the field of view of the ROV.
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 is a zone of fractured rock slabs, or zones of boulders or rock outcrops. Low Rugosity would be the flat rock pavement typically found top of the ridges or at the base of the mounds and ridges. Low Rugosity would also define the rounded rock mounds and knolls that are devoid of ledges and loose boulders. For the present, this will be an unquantified relative term. Most of the multibeam sonar maps that are available for this region 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. [Seadesc Code= Substrate]: SEADESC Habitat Categories (Table 2). This is a modified subset of SEADESC Habitat Categories which was developed by the NOAA Deep-Sea Coral Program for use in analysis of deep-sea coral surveys (Partyka et al. 2007). 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, *Oculina* coral mounds, and soft bottom. This category is also used to plot the dive track overlay on the multibeam sonar maps in ArcGIS.

Table 2. SEADESC benthic habitat category codes (modified).

ID	Code	Habitat Name	Habitat Description
1	S	Soft Substrate	Unconsolidated sand/mud, unlithified
2	SR	Soft Substrate/Rubble/Rock	Soft substrate (>50% cover) with rubble and/or rock
3	R	Rubble	Rubble/cobble (~5-20 cm sized rock or coral)
4	RL	Rock/Ledges	Rocks, boulders, 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 (blue-line or golden; not sand tile)	Soft bottom with visually identifiable burrows
8	A	Artificial Substrate	Any artificial structure (e.g., shipwreck, barge)

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 MPAs, i.e., ‘no protection’). For the benthic analysis, images were analyzed using CPCe for percent cover of benthic biota. The CPCe percent cover data were then averaged by location inside and outside the MPAs (e.g., Inside North Florida MPA and Outside North Florida 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 (#/ 1000 m²) 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 SIMPROF ‘similarities profile’. SIMPER: ‘Similarity Percentages’ was utilized to determine which species contributed to the dissimilarities among group pairs. An ANOSIM (Analysis of Similarities) test was performed and compared by location inside and outside each MPA and the *Oculina* OECA. ANOSIM tests the null hypothesis that there are no community differences between groups or in this case MPA Status.

RESULTS

Study Areas

The cruise was on the continental shelf edge of the South Atlantic Bight from Florida to South Carolina. The ROV surveys covered seven shelf-edge MPA sites, including the North Florida MPA, Georgia (outside), Snowy Wreck MPA, Charleston Deep Artificial Reef MPA, Edisto MPA and Northern South Carolina MPA. Also the *Oculina* HAPC (OHAPC) was surveyed (Figs. 1-6) since high currents prevented survey of the OECA. An additional 11 dive sites were outside but adjacent to the MPAs for comparison.

Cruise Summary

Twenty-nine ROV dives were conducted resulting in a total bottom time of 46.7 hours, covering 26.8 km, at depths from 44 to 266 m (Figs. 1-6, Tables 3, 4). A total of 7,868 in situ digital images were taken which included quantitative transect images (6,796), general habitat (815), species documentation images (257), and 62 lab images of specimens. One shipboard CTD cast was made and a temperature/depth sensor recorded each ROV dive. Multibeam sonar (ME-70) was used to map eight areas (Table 6). Twenty-five specimens of benthic invertebrates were collected (Table 7). Complete species lists with percent cover of benthic macrobiota and densities of fish for each dive site are listed in Appendices 1 and 2, respectively. Each individual dive site is mapped and described in the SEADESC II report (Appendix 3). Considerable

difficulties occurred with the digital camera which failed during 24 of the dives. For these, frame grabs from the video camera was used for the photo transect. Three dives (ROV 18-01, -03, -10) were also aborted due to tracking, cable or computer issues. These issues have now all been fixed.

South Atlantic MPA's

NOAA Ship Pisces Cruise PC18-02
Oculina ROV Dives

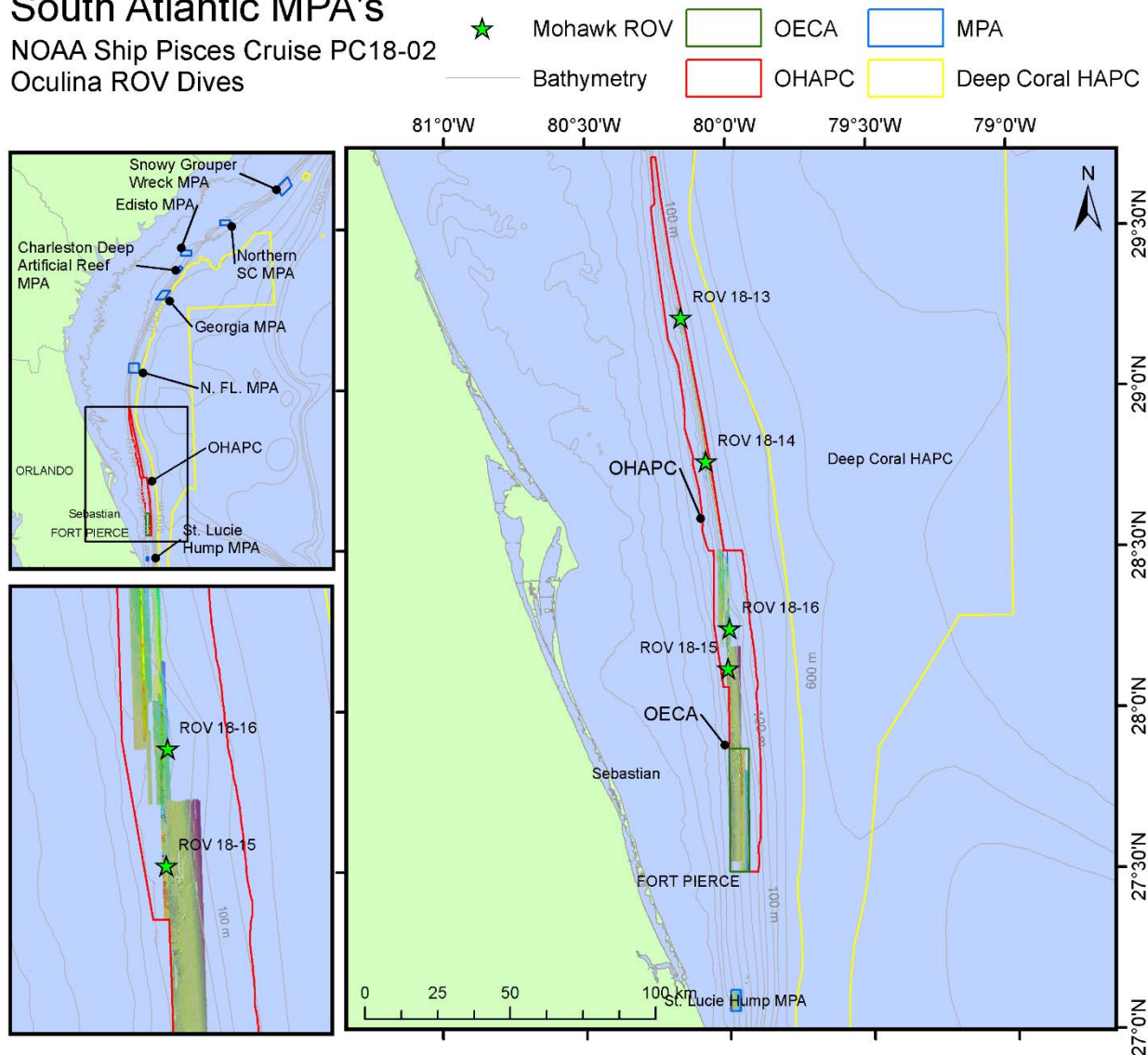


Figure 1. Locations of *Mohawk* ROV dive sites in the *Oculina* HAPC and OECA during the NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018.

South Atlantic MPA's

NOAA Ship Pisces Cruise PC18-02

North Florida ROV Dives

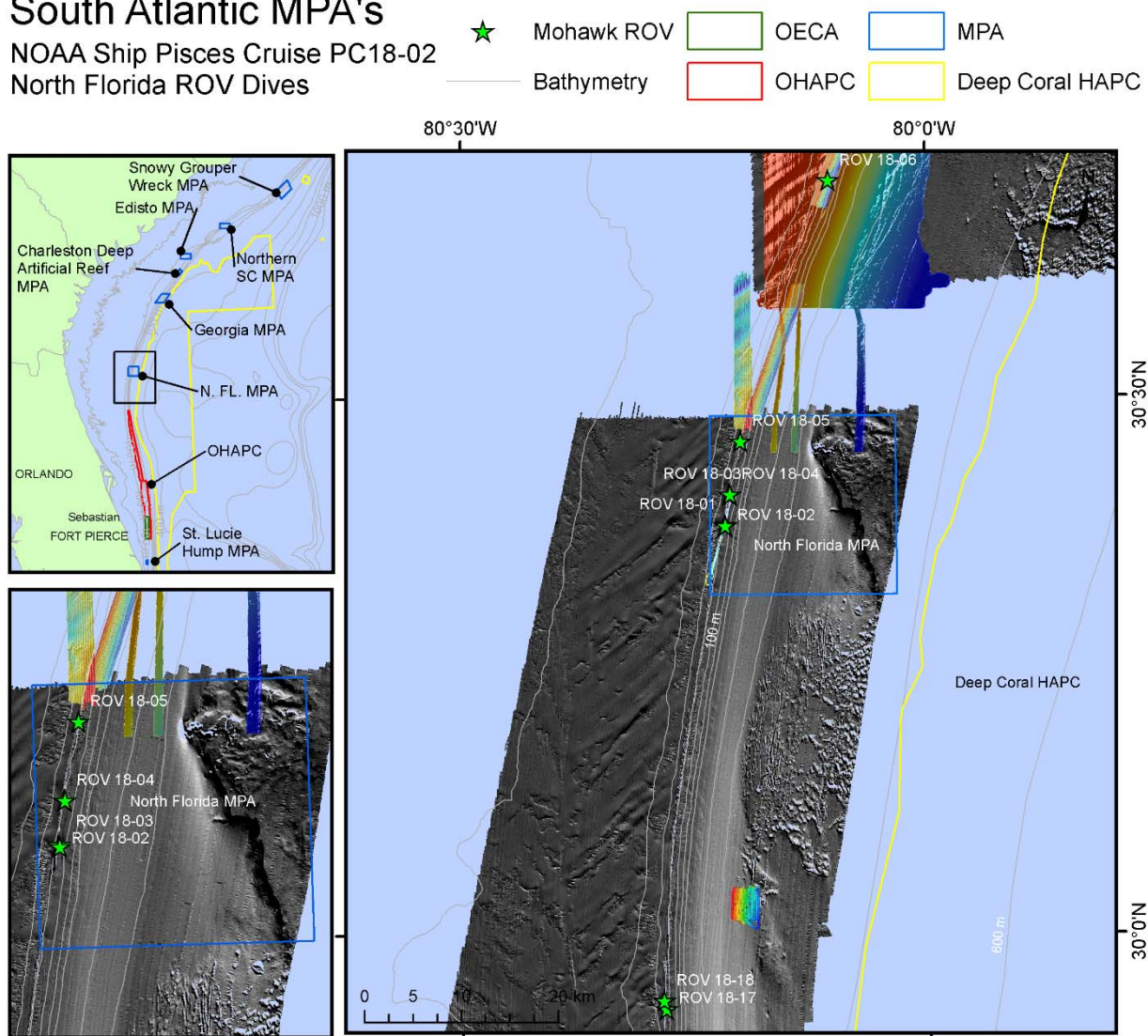


Figure 2. Locations of *Mohawk* ROV dive sites off North Florida during the NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018.

South Atlantic MPA's

NOAA Ship Pisces Cruise PC18-02

Georgia ROV Dives



Mohawk ROV



OECA



MPA

Bathymetry



OHAPC



Deep Coral HAPC

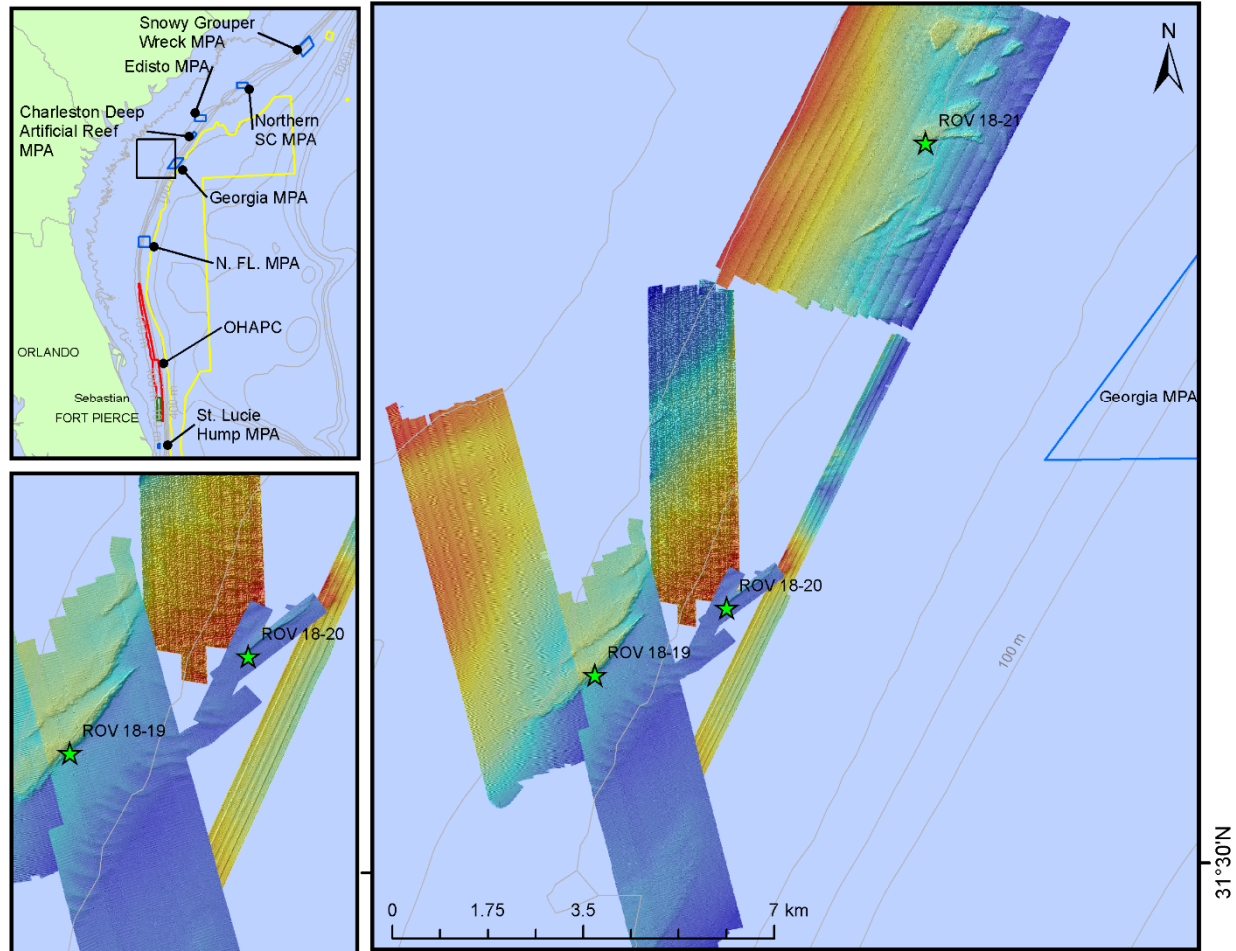


Figure 3. Locations of *Mohawk* ROV dive sites outside of Georgia MPA during the 2018 NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018.

South Atlantic MPA's

NOAA Ship Pisces Cruise PC18-02

Edisto and Charleston Deep

ROV Dives

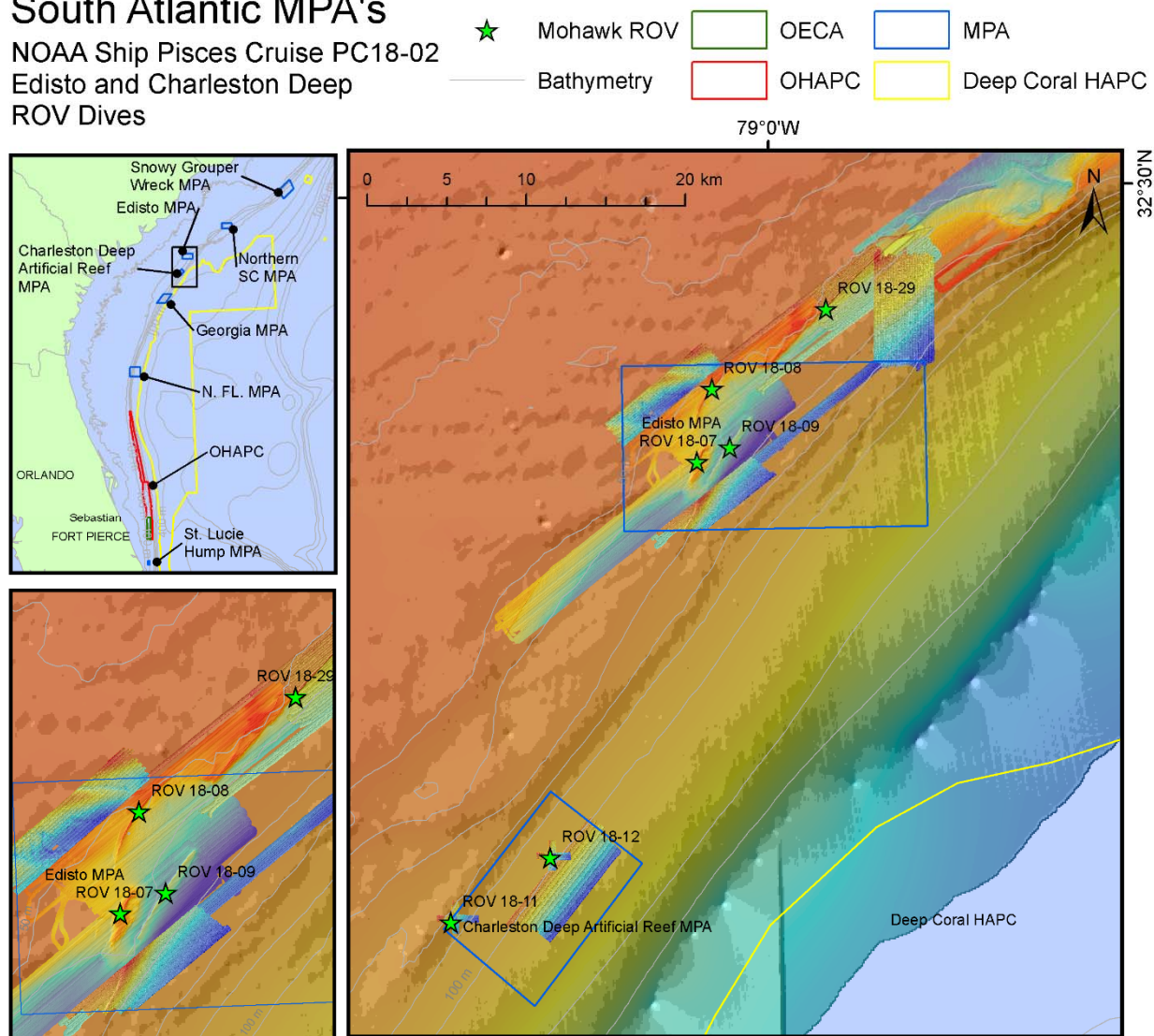


Figure 4. Locations of *Mohawk* ROV dive sites near Edisto MPA and Charleston Deep Artificial Reef MPA, South Carolina during the 2018 NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018.

South Atlantic MPA's

NOAA Ship Pisces Cruise PC18-02
Northern S. Carolina ROV Dives

★ Mohawk ROV
— Bathymetry
□ OECA
□ OHAPC
□ MPA
□ Deep Coral HAPC

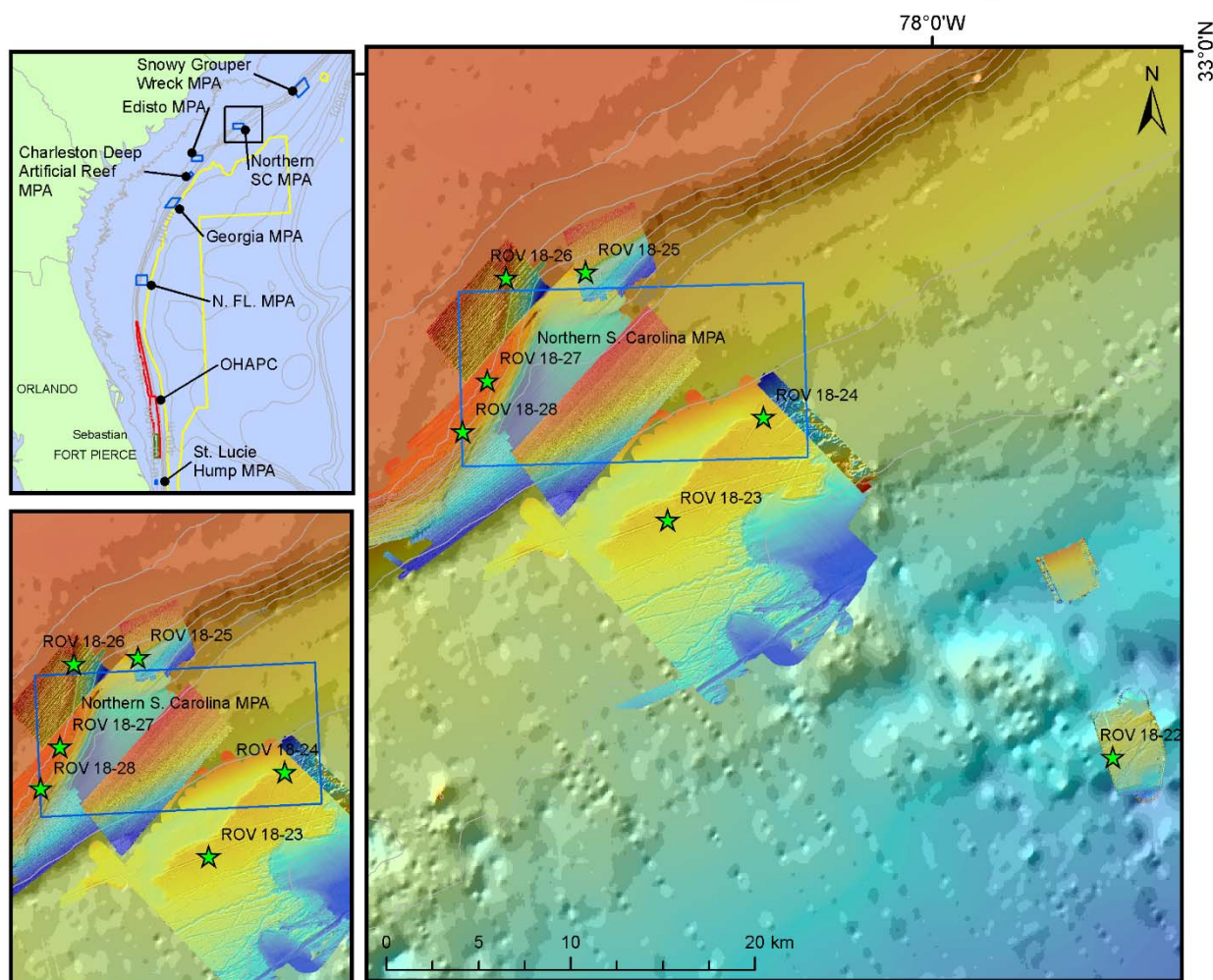


Figure 5. Locations of *Mohawk* ROV dive sites off Northern South Carolina MPA during the 2018 NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018.

South Atlantic MPA's

NOAA Ship Pisces Cruise PC18-02
Snowy Wreck ROV Dives

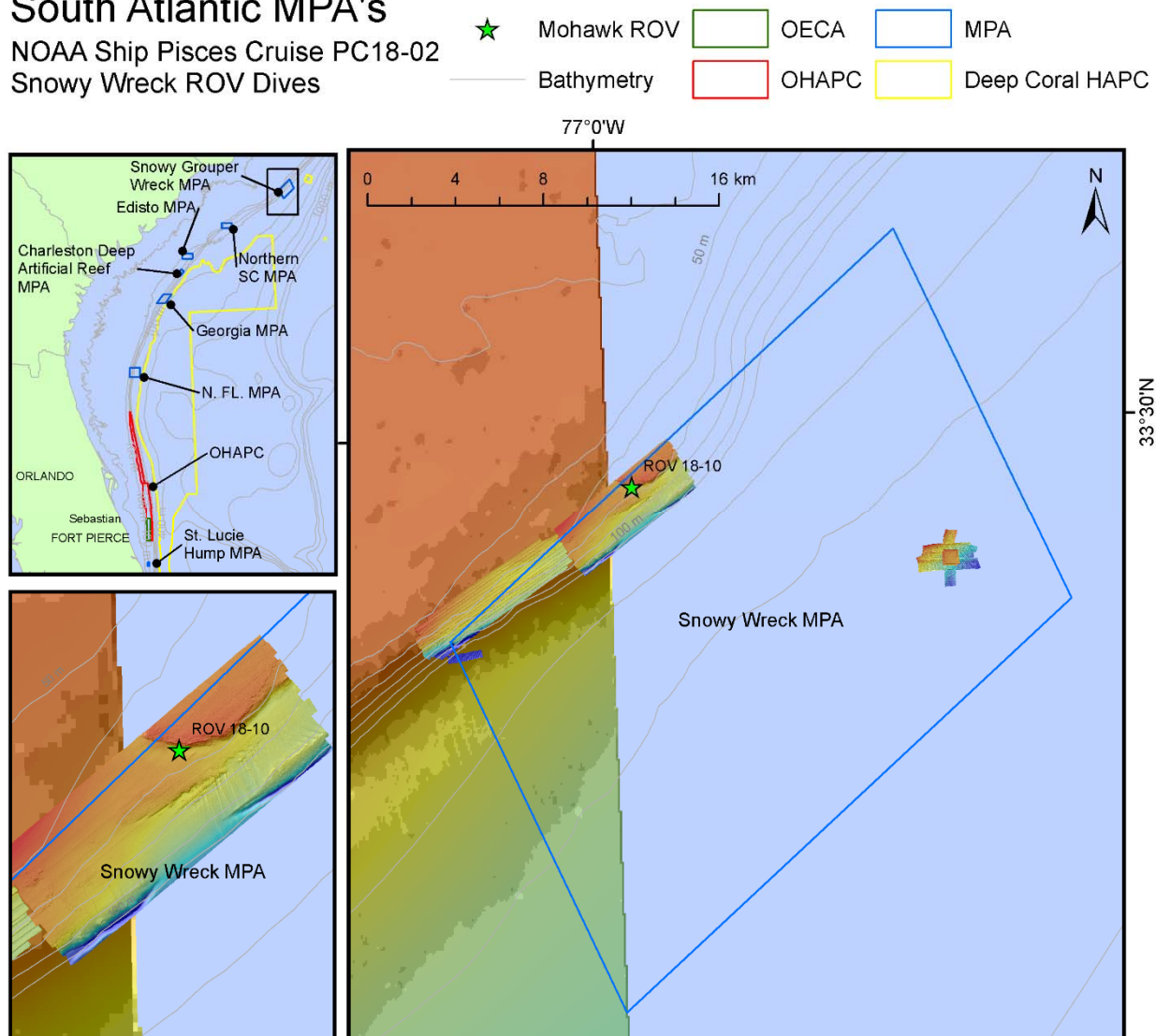


Figure 6. Locations of *Mohawk* ROV dive sites off Snowy Grouper Wreck MPA site, North Carolina during the 2018 NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018.

Table 3. ROV dive sites and CTD casts from NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018. (Site Number= Day-Month-Year-Site).

Site No.	Method	On Bottom		Off Bottom		Depth Range (m)	Distance (km)
		Latitude	Longitude	Latitude	Longitude		
12-V-18-1	ROV 18-01	30.38	-80.22	30.38	-80.22	55-55	0.00
12-V-18-2	ROV 18-02	30.38	-80.22	30.39	-80.22	56-66	0.75
12-V-18-3	CTD-01	30.47	-80.20	-	-	0-53	-
13-V-18-1	ROV 18-03	30.41	-80.21	30.41	-80.21	62-63	0.00
13-V-18-2	ROV 18-04	30.41	-80.21	30.42	-80.21	55-63	1.04
13-V-18-3	ROV 18-05	30.46	-80.20	30.47	-80.20	54-58	0.75
13-V-18-4	ROV 18-06	30.70	-80.11	30.71	-80.11	50-63	0.99

14-V-18-1	ROV 18-07	32.35	-79.05	32.35	-79.05	47-52	0.90
14-V-18-2	ROV 18-08	32.39	-79.04	32.39	-79.04	44-49	0.85
14-V-18-3	ROV 18-09	32.36	-79.03	32.36	-79.03	59-63	0.67
15-V-18-1	ROV 18-10	33.48	-76.99	33.48	-76.99	47-61	0.00
16-V-18-1	ROV 18-11	32.09	-79.22	32.09	-79.22	80-87	0.35
16-V-18-2	ROV 18-12	32.12	-79.15	32.12	-79.15	95-101	0.26
17-V-18-1	ROV 18-13	29.33	-80.16	29.23	-80.16	71-96	1.03
17-V-18-2	ROV 18-14	28.78	-80.08	28.78	-80.08	68-84	0.55
18-V-18-1	ROV 18-15	28.13	-80.00	28.14	-80.00	60-79	0.91
18-V-18-2	ROV 18-16	28.26	-80.00	28.27	-80.00	67-88	1.35
19-V-18-1	ROV 18-17	29.93	-80.28	29.94	-80.28	57-68	0.62
19-V-18-2	ROV 18-18	30.22	-80.25	30.23	-80.25	54-62	0.95
20-V-18-1	ROV 18-19	31.53	-79.74	31.54	-79.73	60-67	2.00
20-V-18-2	ROV 18-20	31.54	-79.71	31.55	-79.71	58-74	0.82
20-V-18-3	ROV 18-21	31.62	-79.67	31.62	-79.67	65-72	0.95
21-V-18-1	ROV 18-22	32.67	-77.90	32.68	-77.89	257-266	0.63
21-V-18-2	ROV 18-23	32.78	-78.16	32.78	-78.15	157-170	0.97
21-V-18-3	ROV 18-24	32.83	-78.10	32.83	-78.10	158-166	1.09
22-V-18-1	ROV 18-25	32.90	-78.21	32.90	-78.20	53-71	1.00
22-V-18-2	ROV 18-26	32.90	-78.25	32.90	-78.25	44-47	0.29
22-V-18-3	ROV 18-27	32.85	-78.26	32.86	-78.26	49-52	1.06
22-V-18-4	ROV 18-28	32.82	-78.28	32.83	-78.27	49-54	0.95
23-V-18-1	ROV 18-29	32.43	-78.96	32.44	-78.96	46-59	1.48

Table 4. Summary of ROV dive sites by state and MPA during the NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018. See Appendix 3 for description of each dive site.

State/Site	No. Dives	Dive Nos. Inside MPA	Dive Nos. Outside MPA	Depth Range (m)
Florida (Total Dives)	(12)	(9)	(3)	50-96
North Florida MPA	8	01, 02, 03, 04, 05	06, 17, 18	50-68
Oculina HAPC	4	13, 14, 15, 16		60-96
Georgia (Total Dives)	(3)		(3)	58-74
Georgia MPA	3		19, 20, 21	58-74
South Carolina (Total Dives)	(13)	(8)	(5)	44-266
Charleston Deep Artificial Reef MPA	2	11, 12		80-101
Edisto MPA	4	07, 08, 09	29	44-63
Northern South Carolina MPA (reef sites)	4	27,28	25,26	49-71
Northern South Carolina MPA (iceberg scar)	3	24	22,23	157-266
North Carolina (Total Dives)	(1)	(1)		47-61
Snowy Wreck MPA	1	10		47-61
Grand Total (Total Dives)	(29)	(18)	(11)	44-266

CTD Operations

Temperature and depth data were collected during each ROV dive (Table 5; Appendix 3 shows the temperature profile for each dive). One shipboard CTD cast was made in the northwest corner of the North Florida MPA (Fig. 7)

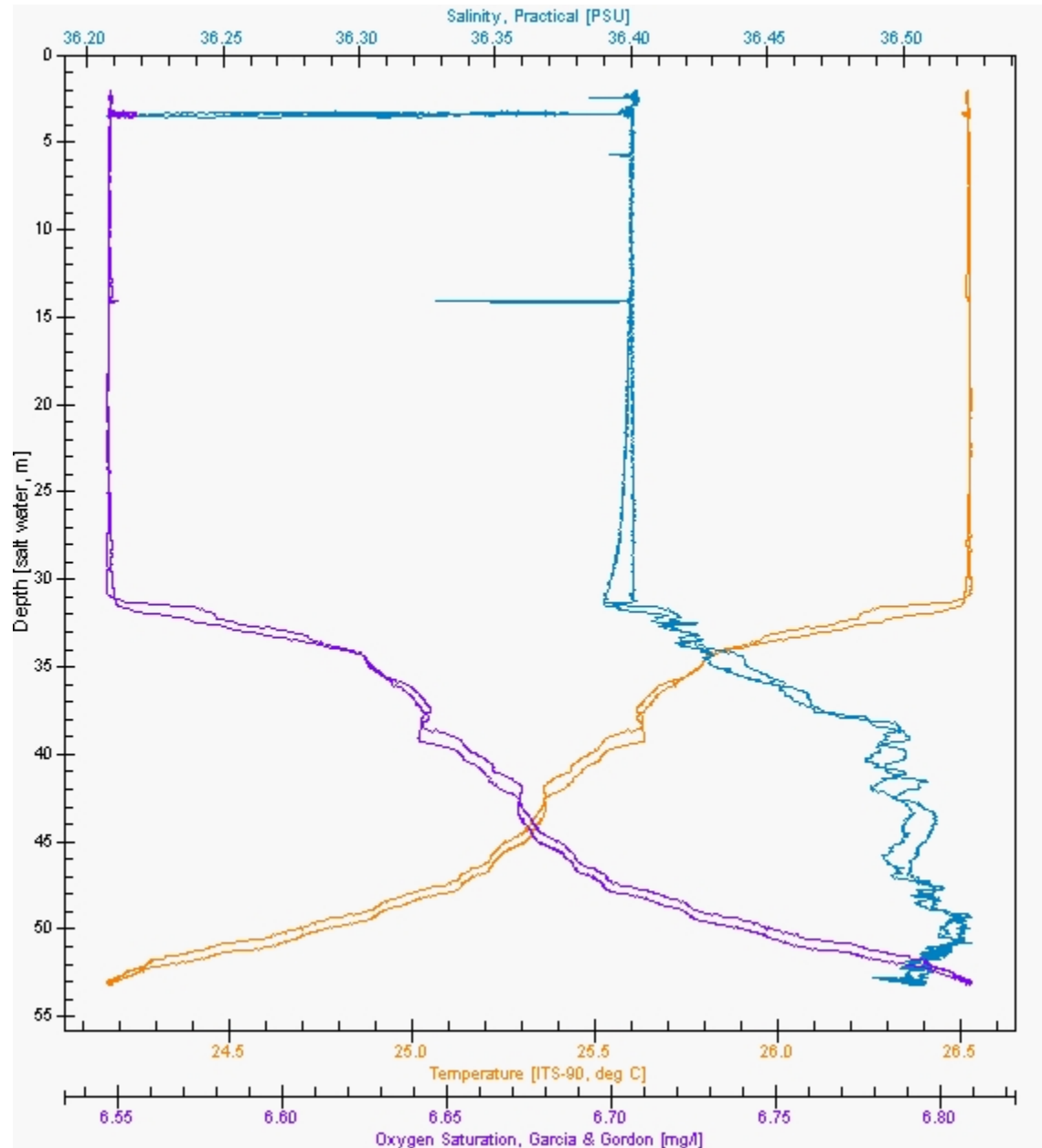


Figure 7. Shipboard CTD cast conducted at North Florida MPA site during the NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018.

Table 5. Shipboard CTD data (CTD 1) and ROV temperature data (ROV dives 18-01 to 29) from NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018. Surface and bottom temperatures, bottom salinity and bottom oxygen at maximum depth of cast.

Dive No.	Launch	Depth (m)	Surf. Temp (°C)	Bot. Min. Temp (°C)	Bot. Sal. (PSU)	Bot. Oxygen (mg/l)
ROV 18-01	5/12/18 15:45	56.83	26.68	23.39		
ROV 18-02	5/12/18 17:06	65.08	26.68	23.18		
CTD-01	5/12/18 23:47	53.08	26.52	24.17	36.51	4.54
ROV 18-03	5/13/18 7:47		26.28			
ROV 18-04	5/13/18 8:14	62.11	25.50	22.47		
ROV 18-05	5/13/18 12:09	57.23	26.36	23.09		
ROV 18-06	5/13/18 15:29	62.31	26.62	23.18		
ROV 18-07	5/14/18 7:19	51.58	23.93	21.73		
ROV 18-08	5/14/18 11:48	48.25	23.79	21.99		
ROV 18-09	5/14/18 15:21	62.73	24.21	21.19		
ROV 18-10	5/15/18 17:26	59.67	26.63	23.18		
ROV 18-11	5/16/18 9:56	86.40	23.38	20.27		
ROV 18-12	5/16/18 13:22	99.50	24.45	19.16		
ROV 18-13	5/17/18 12:24	95.19	26.54	10.84		
ROV 18-14	5/17/18 17:49	83.16	25.60	11.56		
ROV 18-15	5/18/18 10:09	78.70	25.28	10.56		
ROV 18-16	5/18/18 14:38	87.72	25.59	10.39		
ROV 18-17	5/19/18 9:35	66.01	25.53	14.25		
ROV 18-18	5/19/18 12:45	60.34	35.41	16.01		
ROV 18-19	5/20/18 7:26	66.29	24.91	19.10		
ROV 18-20	5/20/18 11:48	73.61	25.40	17.04		
ROV 18-21	5/20/18 14:50	71.13	25.11	19.31		
ROV 18-22	5/21/18 8:35	265.18	25.70	9.54		
ROV 18-23	5/21/18 13:37	168.50	24.94	15.16		
ROV 18-24	5/21/18 16:07	164.57	25.80	15.17		
ROV 18-25	5/22/18 7:22	70.53	24.36	20.80		
ROV 18-26	5/22/18 9:55	46.19	24.44	20.80		
ROV 18-27	5/22/18 11:45	50.91	24.66	20.44		
ROV 18-28	5/22/18 14:28	52.70	24.83	20.32		
ROV 18-29	5/23/18 7:46	57.61	25.49	20.61		

Multibeam Sonar Surveys

Eight multibeam sonar surveys were conducted covering a total area of 153 km² (Table 6). One site was reported in two resolutions- *Pisces_2018_NEW_SC_Mound_16m_Grid* and *Pisces_2018_NEW_SC_Mound_8m_Grid*.

Table 6. Multibeam sonar survey sites from NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018.

Name	Area (mi ²)	Area (km ²)	Resolution (m)	Min Depth (m)	Max Depth (m)
Florida	21.8	56.5	4-8	34	316
Outside North Florida MPA	12.9	33.5	4-8	34	316
Pisces_2018_NFL_MPA_4m_Grid	5.1	13.1	8	46	113
Pisces_2018_SNFL_MPA_4m_Grid	7.9	20.4	4	34	316
Oculina HAPC	8.9	23	4	55	175
Pisces_2018_OHAPC_4m_Grid	8.9	23	4	55	175
Georgia	6.2	16	4	44	102
Outside Georgia MPA	6.2	16	4	44	102
Pisces_2018_Georgia_4m_Grid	6.2	16	4	44	102
South Carolina	31.1	80.5	4-16	47	453
Edisto MPA	9.7	25	8	65	92
Pisces_2018_Edisto_8m_Grid	9.7	25	8	65	92
Northern South Carolina MPA	6.9	17.8	4	47	94
Pisces_2018_North_SC_area_4m_Grid	6.9	17.8	4	47	94
Northern South Carolina MPA Outside	14.6	37.7	8-16	265	453
Pisces_2018_NEW_SC_Mound_16m_Grid	5.8	15	16	309	453
Pisces_2018_NEW_SC_Mound_8m_Grid	5.8	15	8	309	453
Pisces_2018_Original_SC_mound_8m_Grid	3.0	7.7	8	265	435
Grand Total	59.1	153	4-16	34	453

Specimen Collections

Twenty-five of benthic invertebrates including scleractinian coral, gorgonians, black coral, sponge and hydroid were collected and will be used for museum specimens, taxonomic identification, genetic analysis, and coral health studies. The main focus was to collect *Swiftia exserta* gorgonians for DNA analysis (in behalf of Perter Etnoyer- NOAA).

Table 7. List of samples collected during the NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018.

Sample No.	MPA	ID	Sample Type	Latitude	Longitude	Depth (m)
13-V-18-2-001	North Florida MPA	<i>Tanacetipathes</i> sp.	Taxonomy	30.41	-80.21	59
13-V-18-2-002	North Florida MPA	Demospongiae- DMST	Taxonomy	30.42	-80.21	57
13-V-18-2-003	North Florida MPA	<i>Madracis myriaster</i>	Taxonomy	30.42	-80.21	61
14-V-18-1-001	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.35	-79.05	53
14-V-18-1-002	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.35	-79.05	52
14-V-18-1-003	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.35	-79.05	52
14-V-18-1-004	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.35	-79.05	52
14-V-18-1-005	Edisto MPA	<i>Tanacetipathes</i> sp.	Taxonomy	32.35	-79.05	52
14-V-18-1-006	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.35	-79.05	51
14-V-18-2-001	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.39	-79.04	48
14-V-18-2-002	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.39	-79.04	47.5

14-V-18-2-003	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.39	-79.04	47.7
14-V-18-2-004	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.39	-79.04	47.5
14-V-18-2-005	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.39	-79.04	47.6
14-V-18-2-006	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.39	-79.04	47.5
14-V-18-2-007	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.39	-79.04	47.5
14-V-18-2-008	Edisto MPA	Hydrozoa	Taxonomy	32.39	-79.04	50
14-V-18-3-001	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.36	-79.03	65
14-V-18-3-002	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.36	-79.03	64.7
14-V-18-3-003	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.36	-79.03	64.5
14-V-18-3-004	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.36	-79.03	64
14-V-18-3-005	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.36	-79.03	65
14-V-18-3-006	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.36	-79.03	65
14-V-18-3-007	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.36	-79.03	61.3
14-V-18-3-008	Edisto MPA	<i>Swiftia exserta</i>	DNA	32.36	-79.03	61

Characterization of Benthic Habitat and Benthic Macrobiota

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, figures showing each ROV dive track and habitat zones overlaid on multibeam sonar maps, dive track data (start and end latitude, longitude, depth), objectives, CTD plots, general description of the habitat and biota, and images of the biota and habitat that characterize the dive site. In addition, this SEADESC Level II Report provides quantitative analyses of each dive site including: 1) CPCe 4.1[©] analysis of percent cover of benthic macrobiota and substrate types, and 2) densities of fish populations.

Benthic Macrobiota and Habitat

Appendix 1 lists all of the benthic macroinvertebrates and algae that were identified from the quantitative photo transects at each dive site and their percent cover based on CPCe Point Count of the photo images. These analyses are also presented for each dive site 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 some 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.

A total of 176 taxa of benthic macrobiota were identified from the quantitative photo transects and were used for CPCe percent cover analyses (Appendix 1). These included 63 taxa of Cnidaria which included the following: 5 Scleractinia hard corals (*Cladocora* sp., *Madracis myriaster*, *Oculina varicosa*, *Phyllangia americana*, Scleractinia- solitary); 22 gorgonians (including *Diodogorgia* sp., *Ellisella* sp., Ellisellidae, *Muricea* sp., *Nicella* sp., Plexauridae, Plexauridae-yellow, *Plumarella* sp., Primnoidae, *Swiftia exserta*, *Telesto/Carijoa*, *Titanideum frauenfeldii* and various unidentified gorgonians); 8 Antipathidae (unidentified Antipatharia, *Antipathes atlantica*, *Antipathes furcata*, *Leiopathes* sp., *Stichopathes luetkeni*, *Tanacetipathes tanacetum*, *T.* sp.); and Alcyoniina soft corals (Nephtheidae, *Nidalia occidentalis*). Non-coral

Cnidaria included: Actiniaria (*Actinoscyphia* sp., Sagartiidae), Cerianthidae, Corallimorpharia, Hydroidolina, *Solandaria gracilis*, Zoanthidae, and Pennatulacea (*Virgularia presbytes*).

Porifera were the dominant benthic macrobiota and were species rich with 41 taxa of Demospongiae and 3 glass sponges Hexactinellida. There are many taxa that could only be identified to genus or higher level. Detailed collections specifically for taxonomy would undoubtedly uncover many more species of sponges. The dominant identified demosponges included *Agelas clathrodes*, *Aiolochoia crassa*, *Aplysina* spp., *Callyspongia vaginalis*, *Chondrosia* sp., *Chondrilla* sp., *Cinachyrella* sp., *Cliona* sp., *Corallistes typus*, *Erylus* sp., *Geodia* spp., *Ircinia* spp., *Leiodermatium* sp., *Niphates* spp., *Oceanapia* sp., *Placospongia* sp., *Polymastia* sp., and *Xestospongia* sp. The dominant glass sponge was *Aphrocallistes beatrix*.

Other fauna included Annelida (8 taxa), Arthropoda (17), Ascidiacea, Bryozoa, Echinodermata (24 taxa), and Mollusca (8). Algae (12 taxa) were dominant at many of the sites especially in the 50-60 m depth range and included Phaeophyta, Chlorophyta, and Rhodophyta; but only a few taxa were identified to species or genus level such as *Codium* sp., *Dictyota* sp., *Padina* sp., *Sargassum* sp., and *Stypopodium* sp. Calcareous algae (Corallinales) were also dominant on the shallower reefs but not identified to species. Detailed studies of the algae also would result in dozens if not hundred or more species.

Table 8. Percent cover of benthic macrobiota and substrate from CPCe Point Count analysis of ROV photographic transects listed by state and MPA status (i.e., inside MPA or no protection) during the NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018. HB= bare hard bottom, AR= bare artificial reef, SB= bare soft bottom; Coral= Scleractinia hard coral, Gorg.= Octocoral (gorgonacea), Anti.= Antipatharia (black coral), Por.=Porifera (sponges), Hum. Deb.= human debris (fishing lines, trawl nets, anchors), Other= all other benthic macrobiota.

State/MPA Status	% Bare Substrate			% Coral	% Gorg.	% Anti.	% Por.	% Algae	% Other	% Hum. Deb.
	% HB	% SB	% AR							
Florida	65.78%	12.55%	0.00%	0.43%	0.52%	4.44%	6.66%	2.08%	7.52%	0.03%
North Florida MPA	61.28%	12.19%	0.00%	0.31%	0.59%	8.88%	9.30%	1.09%	6.36%	0.00%
Outside North Florida MPA	54.30%	16.45%	0.00%	0.41%	0.75%	5.80%	9.77%	3.17%	9.27%	0.06%
Oculina HAPC	77.22%	9.76%	0.00%	0.53%	0.30%	0.78%	2.71%	1.83%	6.86%	0.02%
Georgia	42.56%	36.63%	0.00%	0.09%	0.32%	1.95%	4.64%	0.30%	13.28%	0.24%
South Carolina	46.74%	15.13%	3.44%	0.20%	2.91%	1.41%	6.46%	8.73%	14.76%	0.21%
Charleston Deep Artificial Reef MPA (Barge 1)	0.10%	5.83%	52.87%	0.00%	0.00%	0.00%	0.10%	0.00%	39.36%	1.75%
Charleston Deep Artificial Reef MPA (Barge 2)	0.16%	9.03%	9.97%	0.00%	0.00%	0.00%	0.00%	0.00%	80.84%	0.00%
Edisto MPA	68.02%	3.74%	0.00%	0.52%	2.45%	1.83%	8.62%	5.45%	9.29%	0.07%
Outside Edisto MPA	54.38%	1.23%	0.00%	0.41%	8.03%	2.17%	11.59%	9.38%	12.78%	0.04%
Northern South Carolina MPA (reef)	32.09%	17.72%	0.00%	0.14%	1.69%	0.90%	5.32%	33.02%	9.12%	0.00%
Outside Northern South Carolina	32.21%	41.64%	0.00%	0.00%	0.84%	4.43%	3.74%	6.80%	10.17%	0.16%

MPA (reef)										
Northern South Carolina MPA (iceberg scar site)	42.48%	36.35%	0.00%	0.00%	5.39%	0.00%	4.19%	0.00%	10.92%	0.67%
Outside Northern South Carolina MPA (iceberg scar site)	60.79%	17.97%	0.00%	0.00%	2.41%	0.31%	6.64%	0.00%	11.76%	0.12%
Grand Total	53.64%	16.84%	1.66%	0.28%	1.65%	2.66%	6.31%	5.07%	11.75%	0.14%

CPCe Point Count analysis was used to calculate the percent cover of bare substrate type and benthic macrobiota at each dive site (Figs. 8, Table 8, Appendix 1, Appendix 3). Overall, Figure 8 shows that the Charleston Deep Artificial Reef had the greatest biota cover (nearly 60%), but this is simply due to the barges being covered with bivalves (*Ostreidae*); however, the biotic diversity was very low on the barges. Of the reef sites, greatest cover of benthic macrobiota occurred at Outside Edisto MPA and Inside Northern South Carolina MPA. Overall, sponges had the greatest average cover (6.31%), followed by macro algae (5.07%), black corals (2.66%), gorgonian octocorals (1.65%), and scleractinian corals (0.28%). Scleractinian corals were most common at the *Oculina* HAPC sites (0.53% cover) outside North Florida MPA (0.41%), and the Edisto sites (inside MPA- 0.52%, outside- 0.41%). Gorgonians had the greatest cover at Edisto (8.03% outside MPA) and at the Northern South Carolina MPA –scar sites (5.39%%). Black corals were most common at the North Florida MPA sites (inside- 8.88%; outside- 5.80%), followed by Edisto MPA (2.17%), and the Georgia sites (1.95%). Sponges were also most common at Edisto (outside-11.59%, inside- 8.62%) and North Florida (outside- 9.77%, inside- 9.30%). Macro algae were greatest at Northern South Carolina MPA-reef (33.02% inside, 6.80% outside) and Edisto (outside- 9.38%, inside- 5.45%). Of course, the deep sites such as the Deep Artificial Reef MPA and the Iceberg scars sites had no algae. Algae appear to be quite variable over years at some sites. Some sites that were covered with *Dictyota* and other brown algae previously had much less this year.

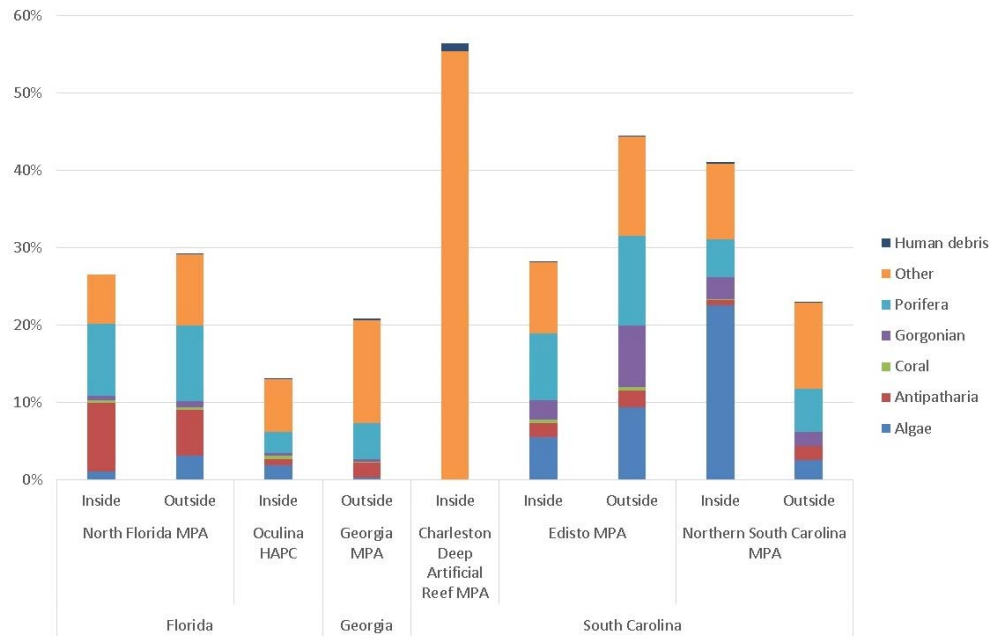


Figure 8. Percent cover of major benthic macrobiota taxa and human debris listed by MPA status and region from CPCe Point Count analysis of ROV photographic transects during the NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018.

***Oculina* Coral Reef Site Surveys**

The *Oculina* reefs are at the western edge of the Florida Current, and as the current meanders, surface currents are often 1-2+ knots, making ROV dives very difficult and sometimes impossible. Usually we have to drift northerly and are unable to stop or maneuver easily. Much of the dive we are too far off bottom, and moving too fast, for good images of the bottom. These sites are the only places known on earth where the high-relief *Oculina* coral mounds have formed. Unfortunately bottom trawling, primarily in the 1970s and 80s has devastated most of the living coral habitat, but what remain are the coral rubble, rock outcrops and ledges at the base of the mounds, and scattered live colonies of *Oculina* that are starting to regrow. The mounds themselves are up to 15-20 m tall, and made entirely of coral that has built up over centuries. There is no reason that the coral should not regrow, if there remains a complete moratorium and enforcement on any bottom tending gear which could crush the coral.

In general, deep-water coral reefs such as *Lophelia* coral and *Oculina* coral reefs have relatively lower density and diversity of macrobiota than typical shallow water and mesophotic reefs such as the shelf-edge MPAs in the region. For these reasons, typical point count analysis is not a good statistic to use on deep-water reefs. Recent surveys of deep-water corals in the canyons of the Mid-Atlantic Bight used counts of corals from the video transects rather than percent cover (Brooke et al. 2017). The following analysis of the *Oculina* dives used the video to document the coral and sponge communities. The video was first analyzed and divided into habitat types (*Oculina* mound, Valley- Rock/Rubble, and soft bottom- sand), then further divided into 5 minute increments. For each increment, corals (scleractinian hard corals, gorgonian octocorals, Alcyoniina soft corals, and antipatharians black corals), sea pens (Pennatulacea), and sponges were identified and counted whenever the ROV was close enough to the bottom. Table 9 presents these data as total counts for each dive. The maps indicate the presence of the taxa

during each 5 minute segment (Figure 9). A total of 61 colonies of live *Oculina varicosa* coral were counted (Table 9; Figs. 10, 11). The dominant macrobiota were sponges (1604), black corals (832), soft corals (547), and gorgonians (148). A total of 610 standing dead *Oculina* coral colonies were also counted. Standing *Oculina* coral colonies, whether living or dead, provide important habitat for the *Oculina* coral community, which consists of hundreds of species of invertebrates and juvenile fish which live among the coral branches (George et al. 2007; Reed 2002; Reed et al. 1982; Reed and Mikkelsen 1987).

Table 9. Counts of major benthic macrobiota (Cnidaria and Porifera) and fishing gear from video analysis of ROV dives on *Oculina* HAPC reef sites during the NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018.

Phylum/Group/scientific name	18-13	18-14	18-15	18-16	Grand Total
Demospongiae	408	171	549	476	1604
<i>Chondrilla</i> sp.	224	7	277	401	909
Demospongiae- unid. sp.	184	164	272	75	695
Cnidaria	671	814	386	259	2130
Alcyonacea - gorgonian	79	65	3	1	148
Alcyonacea- gorgonian	4	63	3	1	71
<i>Callipodium rubens</i>	50	1			51
<i>Diodogorgia</i> sp.	2				2
<i>Telesto</i> sp.	13				13
<i>Titanideum frauenfeldii</i>	10	1			11
Alcyonacea - Alcyoniina	231	218	88	10	547
<i>Nidalia occidentalis</i>	231	218	88	10	547
Antipatharia	90	430	201	111	832
Antipatharia unid. sp.		1	4		5
<i>Antipathes atlantica</i>		22	39	7	68
<i>Tanacetipathes</i> sp.	2	115	8	71	196
<i>Stichopathes luetkeni</i>	88	292	150	33	563
Coral- Scleractinia	44	7	21	14	86
<i>Oculina varicosa</i>	33	5	20	3	61
Scleractinia- unid cup	11	2	1	11	25
Pennatulacea			2		2
<i>Virgularia presbytes</i>			2		2
Corallimorpharia	12	1	5		18
Cerianthidae	25	6	24	12	67
Zoantharia	30	28	20	3	81
Hydrozoa	160	59	22	108	349
Human debris- fish line/gear	5	1			6
Dead standing <i>Oculina</i> (habitat)	162	102	131	215	610
Grand Total	1248	1093	1069	952	4362

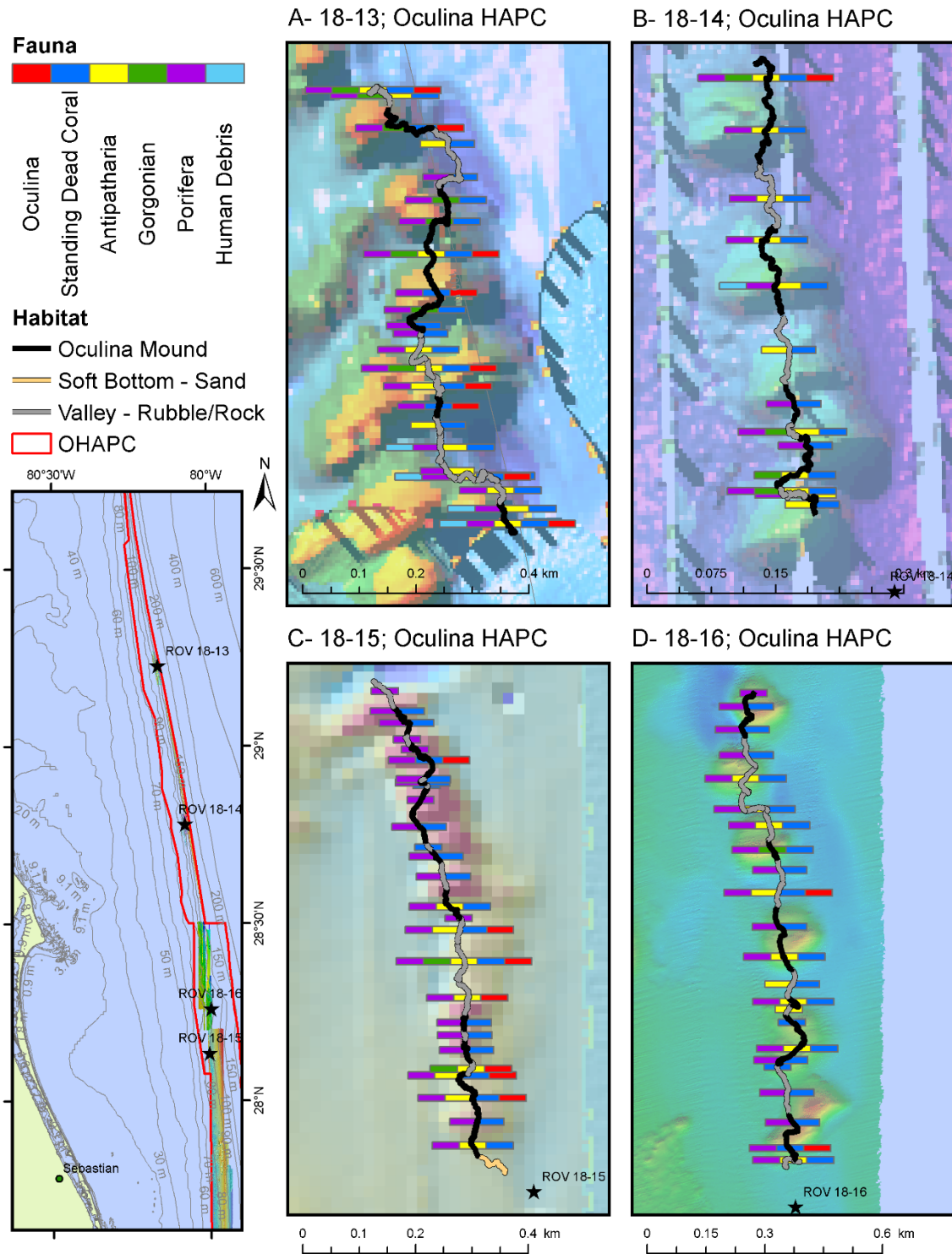


Figure 9. Presence of corals (Scleractinia, gorgonian octocorals, Antipatharia), sponges, and fishing gear based on video analysis of ROV video in 5-minute increments on *Oculina* HAPC reef sites during the NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018.

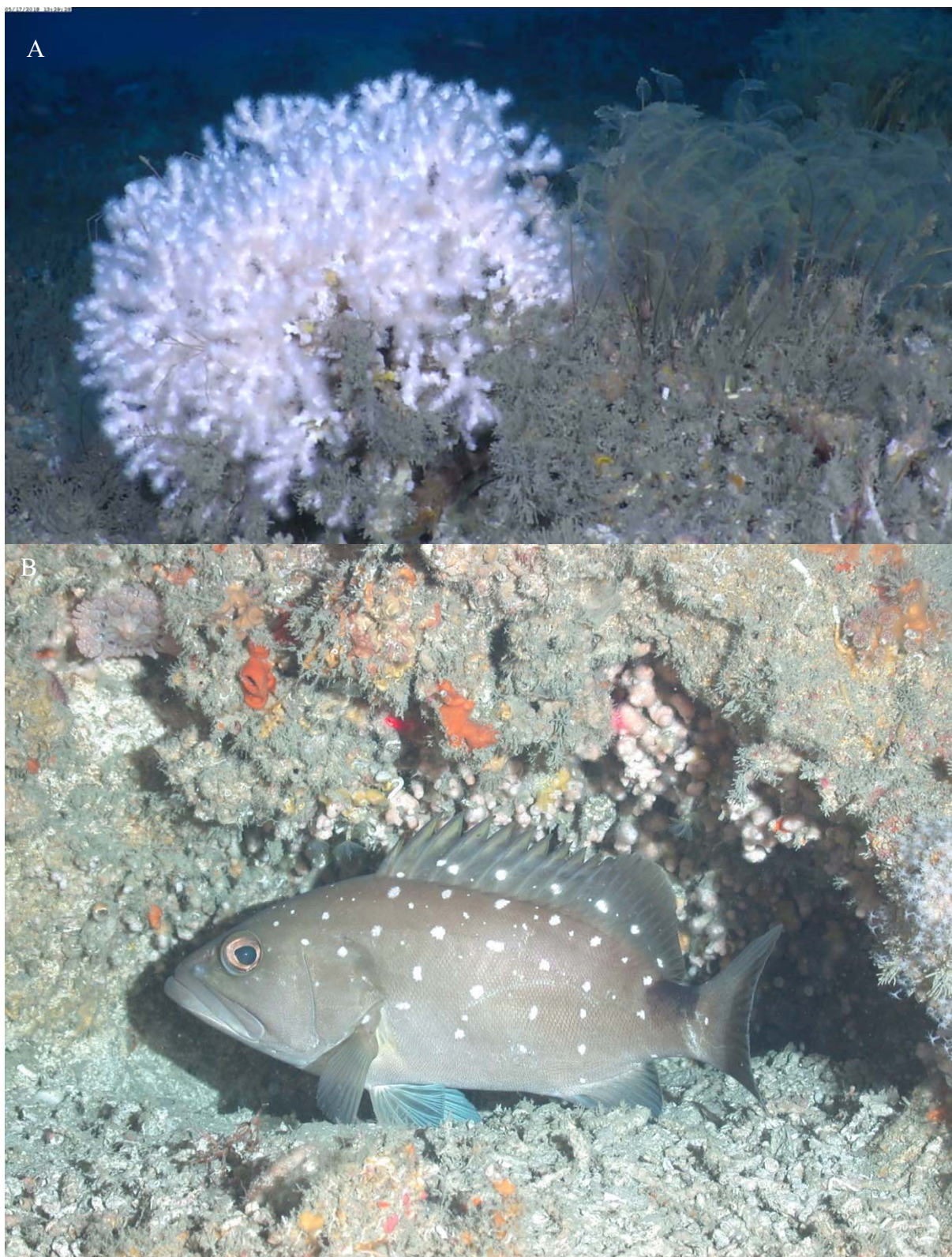


Figure 10. *Oculina* HAPC ROV images during the NOAA Ship *Pisces* cruise, May 12-24, 2018. A. Large colony of live *Oculina varicosa* on low relief, coral rubble bottom within the HAPC. B. Snowy grouper.



Figure 11. Lost debris or net wrapped around a live *Oculina* coral colony discovered within the *Oculina* HAPC during the NOAA Ship *Pisces* cruise, May 12-24, 2018.

***Swiftia exserta* Octocoral Populations within the Shelf-Edge MPAs**

Of interest to the NOAA Deep-sea Coral Program is mapping the distribution of both Scleractinian corals and gorgonian Octocorals in U.S. waters. Our previous surveys of the shelf-edge MPAs discovered some very dense populations of the gorgonian octocoral *Swiftia exserta* especially around Edisto MPA and the Snowy Wreck MPA reef sites. This beautiful orange or yellow sea fan that grows to 1-2 ft in height is common on these mesophotic reef sites and provides habitat structure for other invertebrates and fish (Fig. 10). Approximate counts of *Swiftia* colonies were made during the dives at sites with dense *Swiftia* populations (Table 10). Seven sites had *Swiftia*; the Outside Edisto MPA site had a count of 1,736 colonies during the dive, whereas 3 dives Inside Edisto MPA had 83, 21, and 9 colonies counted.

Table 10. Counts of *Swiftia exserta* gorgonians from video analysis of ROV dives during NOAA Ship *Pisces* cruise 18-02, May 12-24, 2018.

Taxa	N. FL MPA	Snowy Wreck MPA	Edisto MPA			Northern SC MPA		Total
	Inside	Inside	Inside			Outside	Inside	
	18-04	18-10	18-07	18-08	18-09	18-29	18-27	
<i>Swiftia exserta</i>	1	2	9	83	21	1736	43	1895

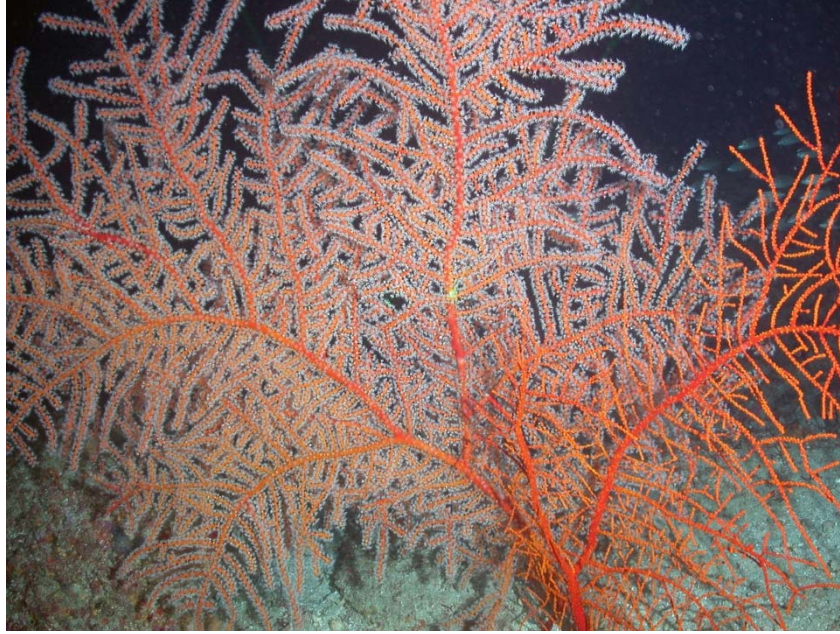


Figure 12. Fields of the gorgonian octocoral *Swiftia exserta* were found outside the Edisto MPA. *Swiftia* with polyps exsert (left), and retracted (right).

Benthic Biota and Habitat Relationships

A multi-dimensional scaling (MDS) plot was made to compare each general MPA location based on Bray-Curtis similarity matrix calculated from square-root transformation of benthic macrobiota percent cover averaged by dive. Sites inside and outside each MPA were combined for the general MPA location. (Fig. 13). In general, there were two major groupings, the artificial reefs sites (barges; SIMPROF Group a) and the shelf-edge reef sites. There is a clear distinction between the *Oculina* HAPC reef sites (40% similar to each other) and the more northern shelf-edge MPA sites (Northern Florida, Edisto, Outside Georgia MPA and Northern South Carolina MPA-reef, also 40% similar). The two Northern SC iceberg scar sites (e) which are much deeper (157- 170 m depth range) than the shelf-edge reef sites (43- 101 m) are 60% similar to each other and have much different biota than the reef sites. Whereas the 3rd iceberg scar site (b; ROV dive 18-22) is only 15% similar to the other two iceberg scar sites, it is about 90 m deeper (~260 m) and had different fauna. The remaining outlying Northern SC reef site (d) was ~75% sand as was the one Georgia site (c) which was ~89% sand. There is also clustering by region within the North Florida and the Edisto sites clustered with high similarity (60%), then the Northern South Carolina reef sites showing less similarity (40%). This shows the importance of having numerous MPA sites, with each having distinct characteristics and benthic communities.

Due to the low number of site replicates during this cruise, an Analysis of Similarity (ANOSIM) resulted in somewhat inaccurate representations of R. Therefore we did not include these results. However, we are seeing definite community differences in the MDS from the SIMPROF groupings and the SIMPER results. These are reported below. Sites Inside vs Outside the MPA for each general MPA location were compared with MDS (Fig. 14). The North Florida MPA sites (Inside vs Outside) are very similar at >60% as are the Edisto MPA sites. For the North Florida MPA region, SIMPER analysis shows that “Other biota” are the largest factor contributing to the difference of Inside (Average Abundance = 0.06) vs Outside (0.18), followed

by the bushy black coral *Tanacetipathes* sp. (inside Average Abundance = 0.15, outside = 0.17), and algae which are not present inside. For the Edisto sites, the presence of algae (0.19 Average Abundance), the gorgonian *Swiftia exserta* (0.23), hydroids (0.28), and the gorgonians *Diodogorgia* sp. (0.14) and *Nicella* sp. (0.8) are all more abundant outside the MPA.

Due to the striking differences in depth between the Northern SC iceberg sites and the shallower Northern SC reef sites, these were separated for the analysis. The MDS plot shows the relatively high similarity between the Inside vs Outside MPA iceberg scar sites (40%) and also for the Northern SC reef sites (40%) but only 20% similarity between the iceberg and reef sites. Keep in mind that one of the Outside sites was at 266 m. The Inside vs Outside iceberg scar sites differ in their abundance of Plexauridae gorgonians (0.23 inside vs 0.06 outside), natural detritus, and the sponge *Leiodermatium* (more inside). When comparing the Northern SC reef sites, algae are the most common difference (0.49 inside vs 0.08 outside), followed by hydroids and *Dictyota* sp. brown algae (all more present inside than out). The black coral *Stichopathes luetkeni* is also more common outside the MPA.

Although the OHAPC sites are all inside the MPA, the Northern and Western Extension sites were just recently included within the HAPC in 2015 but all the *Oculina* sites are relatively similar at 40%. For the *Oculina* sites, live colonies of *O. varicosa* are found in the top five species from the SIMPER results. However, due to the scatteredness of the species which makes CPCe analysis ineffective and also the importance of living *Oculina* on these reefs, the *Oculina* dives were further analyzed with video analysis (previous section).

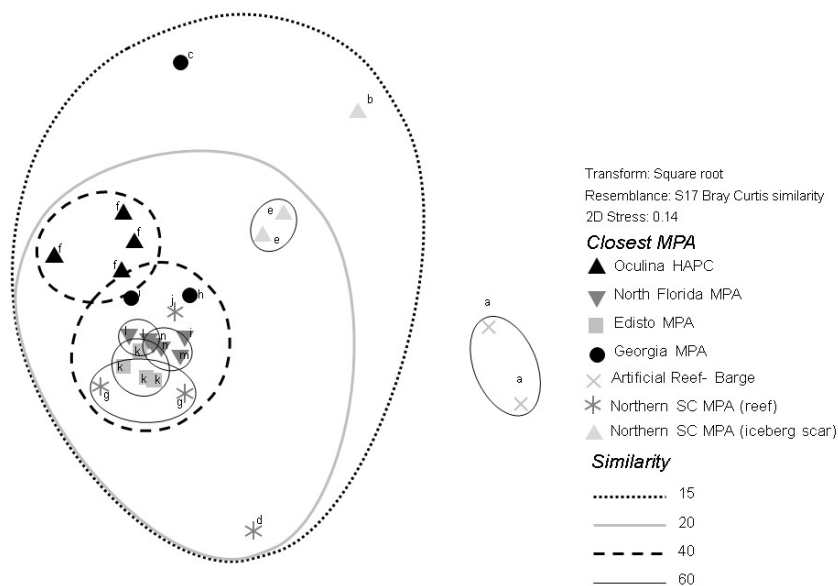


Figure 13. Multi-dimensional scaling (MDS) plot of ROV dives displayed for each general MPA location based on Bray-Curtis similarity matrix calculated from square-root transformation of benthic macrobiota percent cover averaged by dive for the 2018 NOAA Ship *Piscis* cruise. Sites inside and outside each MPA were included for the general MPA location. Assemblage similarity at 15-60% are indicated. Statistically significant SIMPROF groups are indicated by letters.

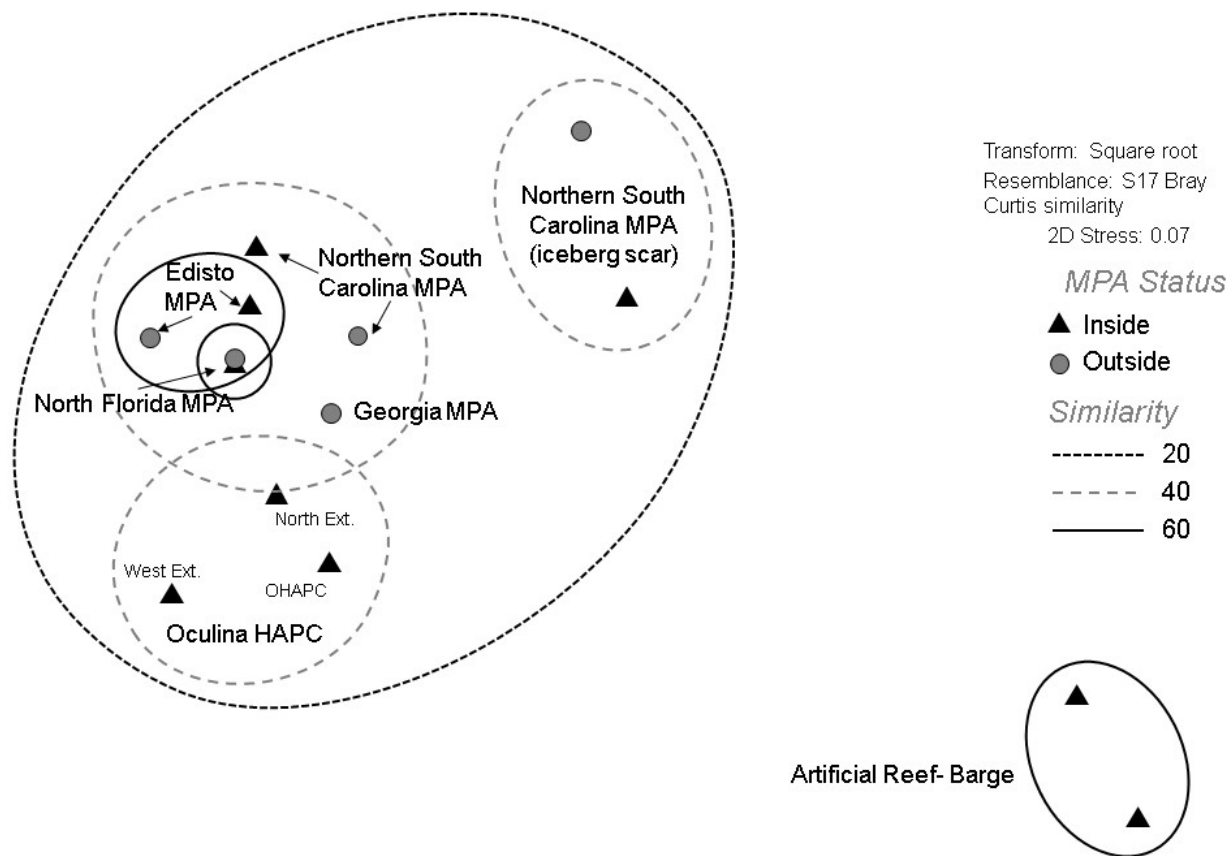


Figure 14. Multi-dimensional scaling (MDS) plot of ROV dives with species communities averaged inside and outside the MPA regions based on Bray-Curtis similarity matrix calculated from square-root transformation of benthic macrobiota percent cover for the 2018 NOAA Ship *Pisces* cruise. Assemblage similarity at 20-60% are indicated.

Analysis of Fish Video Surveys

Appendix 2 lists all fish species identified from quantitative video transects at each dive site and their densities (# individuals/1000m²). A total of 138 species were observed including 4 target species: blueline tilefish, yellowedge grouper, snowy grouper, and warsaw grouper. Dives 11 and 12 are discussed separately and were excluded from all analyses as they were conducted on artificial structures. Transects were not conducted on these dives, therefore densities could not be calculated.

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 15; PRIMER 6.0). Six statistically different groups resulted from the SIMPROF test ($p < 0.05$), indicated by letters in the figure. Fish assemblages were more similar by geographic region than they were by level of protection (inside vs. outside). The six distinct groups consisted of 1) inside and outside the deep iceberg scour sites of the Northern South Carolina MPA, 2) inside the OHAPC, 3) inside the Northern South Carolina MPA, 4) inside and outside the North Florida MPA, 5) inside and outside the Edisto MPA, and 6) outside the Georgia MPA and

Northern South Carolina MPA. The SIMPER routine (PRIMER 6.0) was used to determine the distinguishing species for each geographic region. Edisto, North Florida, and inside the Northern South Carolina MPAs were distinguished by higher densities of the most common schooling species; tomtate (*Haemulon aurolineatum*), vermilion snapper (*Rhomboplites aurorubens*), and striped grunt (*Haemulon striatum*) as well as blackbar soldierfish (*Myripristis jacobus*). This is most likely a result of habitat type as most of the habitat encountered in these MPAs was moderate to high relief, high rugosity ledge habitat which is what these species prefer. The OHAPC generally lacked an abundance of fish, but did have higher densities of short bigeye (*Pristigenys alta*) and tattler (*Serranus phoebe*). Georgia and outside the Northern South Carolina MPAs were distinguished by higher densities of red snapper (*Lutjanus campechanus*), short bigeye, pufferfish (*Canthigaster* sp.), and cubbyu (*Pareques umbrosus*). The iceberg scour sites generally had a completely different assemblage of fish from all other locations due to the deeper depths but the most differentiating species were anthiids which consisted of a mix of rough-tongue bass (*Pronotogrammus martinicensis*), red bar-bier (*Hemanthias vivanus*), and yellowfin bass (*Anthias nicholsi*) found in higher densities at the scour sites. The deeper sites also had a lack of lionfish which were observed at all other locations.

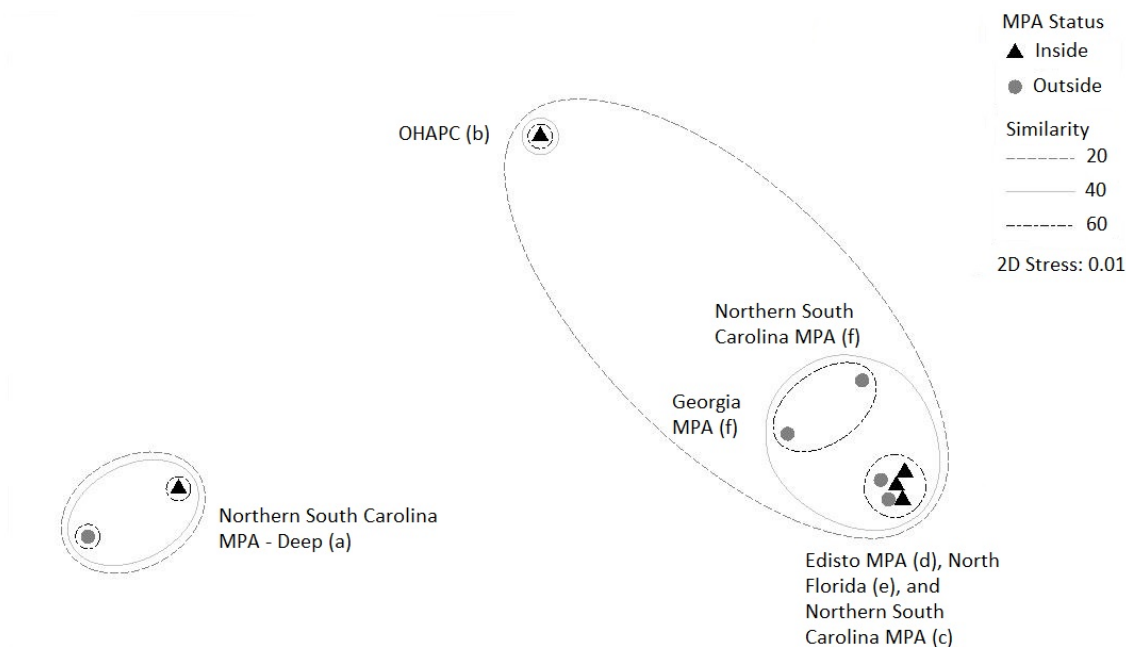


Figure 15. Multi-dimensional scaling (MDS) plot of ROV dives on the shelf-edge MPAs and *Oculina* HAPC, with the artificial reef sites removed, based on Bray-Curtis similarity matrix calculated from fourth root transformation of fish densities for the 2018 NOAA ship *Pisces* cruise. Assemblage similarity at 20-60% are indicated. Statistically different groups from the SIMPROF routine are indicated by letters (a-f).

The DIVERSE routine (PRIMER 6.0) was used to compare species diversity inside and outside each MPA (Table 11). The highest number of species was observed inside and outside the Edisto MPAs and inside the Northern South Carolina MPA ($S = 88, 74$, and 76 respectively) while the lowest was inside and outside the Northern South Carolina at the iceberg scour sites and the OHAPC ($S = 32, 36$, and 37 respectively). The same pattern was noted for species diversity. The highest species diversity was inside the Edisto MPA ($H' = 4.18$) while the lowest was inside the

OHAPC ($H' = 3.32$). When comparing diversity inside and outside each MPA, diversity was higher inside the Northern South Carolina MPA as well as slightly higher inside the Edisto and North Florida compared to those outside.

Table 11. Biodiversity indices for fish communities observed during video surveys conducted with a remotely operated vehicle inside and outside the shelf-edge MPAs and *Oculina* HAPC, with the artificial sites removed. S = total number of species; H' = Shannon-Wiener function of species diversity; J' = Pielou's evenness.

MPA	S	J'	H'
Northern South Carolina - Deep - Inside	32	0.9682	3.356
Northern South Carolina - Deep - Outside	36	0.9494	3.402
Northern South Carolina - Inside	76	0.9536	4.13
Northern South Carolina - Outside	48	0.9549	3.696
Edisto - Inside	88	0.9336	4.18
Edisto - Outside	74	0.9649	4.153
Georgia - Outside	52	0.9368	3.701
North Florida - Inside	68	0.936	3.95
North Florida - Outside	71	0.9233	3.936
OHAPC - Inside	37	0.9198	3.321

Snapper-Grouper Complex

Densities of fish species in the snapper-grouper complex were compared inside and outside for each of the MPAs (Table 12). No dives were made inside the Georgia MPA or outside the OHAPC, so comparisons could not be made for those areas. Most species had higher densities inside the Northern South Carolina MPA including scamp (*Mycteroperca phenax*) and tomtate. At the iceberg scar sites of the Northern South Carolina MPA, most species had higher densities outside the MPA. Two of the target species (yellowedge and snowy grouper), however, had higher densities inside the MPA. Most species had higher densities inside the Edisto MPA including grey snapper (*Lutjanus griseus*), scamp, and graysby (*Cephalopholis cruentata*). At the North Florida MPA, most species had higher densities inside the MPA including white grunt (*Haemulon plumieri*), mutton snapper (*Lutjanus analis*), gag (*Mycteroperca microlepis*), and red porgy (*Pagrus pagrus*). It is interesting to note that all of the target species (blueline tilefish, yellowedge grouper, and snowy grouper) were only observed at the iceberg scar sites at the Northern South Carolina MPA. In this report, the data is only based on differences of raw mean densities. Once research cruises are completed for this grant, results from all cruises will be combined to conduct a comprehensive analysis to test for MPA effects over time on species' densities.

Table 12. Densities (# individuals/1000m²) for species of the snapper-grouper complex inside (In) and outside (Out) each MPA and OHAPC, with artificial sites removed. SC = Northern South Carolina MPA, ED = Edisto MPA, GA = Georgia MPA, FL = North Florida MPA, and OHAPC = Oculina Habitat Area of Particular Concern. YES and NO indicate whether a species had a higher density inside the MPA or not. Species in bold are the target species.

Scientific Name	SC In	SC Out	Higher Inside?	SC Deep In	SC Deep Out	Higher Inside?	ED In	ED Out	Higher Inside?	GA Out	FL In	FL Out	Higher Inside?	OHAPC In
<i>Balistes caprisus</i>		0.41	NO				0.29		YES	0.79	2.33	0.93	YES	0.31
<i>Balistes</i> sp.							0.1	0.35	NO			0.23	NO	
<i>Balistes vetula</i>	0.21		YES				0.58		YES		0.6	0.35	YES	
<i>Calamus</i> sp.	2.72	5.74	NO				4.35	4.71	NO	1.78	0.52		YES	0.19
<i>Caulolatilus microps</i>				0.85	1.01	NO								
<i>Centropristis ocyurus</i>														1.37
<i>Cephalophols cruentata</i>	1.32	1.91	NO				10.15	4.6	YES	0.1	1.9	1.52	YES	
<i>Cephalophols fulva</i>											0.09		YES	
<i>Epinephelus adscensionis</i>	0.07		YES							0.1				
<i>Epinephelus guttatus</i>	0.21		YES											
<i>Epinephelus itajara</i>												0.12	NO	
<i>Epinephelus</i> sp.	0.07		YES											
<i>Haemulon aurolineatum</i>	763.55	34.14	YES				1136.09	409.59	YES	0.4	928.84	892.15	YES	
<i>Haemulon plumierii</i>	7.18	10.38	NO				0.19		YES		1.55	0.12	YES	
<i>Haemulon</i> sp.							264.35		YES			23.32	NO	

<i>Hyporthodus flavolimbatus</i>				0.14	0.11	YES								
<i>Hyporthodus niveatus</i>				2.26	1.8	YES								0.19
<i>Hyporthodus</i> sp.					0.11	NO								
<i>Lachnolaimus maximus</i>	0.98	0.68	YES				0.39	0.35	YES			0.23	NO	
<i>Lutjanus analis</i>	0.14		YES					0.12	NO	0.1	0.86	0.47	YES	
<i>Lutjanus buccanella</i>							0.48		YES			0.12	NO	
<i>Lutjanus campechanus</i>		0.14	NO				0.19		YES	11.69				
<i>Lutjanus griseus</i>							6.96	1.41	YES		3.53	3.26	YES	
<i>Lutjanus</i> sp.	0.07		YES				0.48		YES		0.43	0.7	NO	
<i>Mycteroperca bonaci</i>	0.14		YES								0.09		YES	
<i>Mycteroperca interstitialis</i>	0.14		YES				0.19	0.12	YES					
<i>Mycteroperca microlepis</i>	0.21		YES				0.1		YES	0.3	0.86	0.23	YES	
<i>Mycteroperca phenax</i>	2.16	0.27	YES	0.56		YES	9.57	2.48	YES	1.78	2.41	3.03	NO	
<i>Mycteroperca</i> sp.							0.29	0.12	YES	0.1		0.12	NO	
<i>Ocyurus chrysurus</i>							0.1		YES					
<i>Pagrus pagrus</i>				0.71	3.04	NO	0.19	0.24	NO	0.4	3.45	0.82	YES	0.06
<i>Rhomboplites aurorubens</i>	0.07		YES	0.85		YES	751.98	54.22	YES		338.13	409	NO	
<i>Seriola dumerili</i>	0.21	0.27	NO		0.67	NO	0.58	0.12	YES		0.69	0.23	YES	
<i>Seriola rivoliana</i>	0.49	0.27	YES		0.11	NO	3	4.24	NO	0.99	0.43	0.35	YES	
<i>Seriola</i> sp.	0.07	0.14	NO		1.01	NO	13.53	0.12	YES	0.3	0.09	1.17	NO	0.12
Sparidae										0.1	0.17	0.12	YES	

A few schools of snapper species were observed. A large school of approximately 50 red snapper were observed outside the Georgia MPA and smaller schools were seen inside the North Florida MPA. Small schools of grey snapper were observed inside and outside the North Florida MPA as well as inside the Edisto MPA. Several observations of juvenile fish were also made. Juvenile blackfin snapper (*Lutjanus buccanella*) were observed outside the North Florida MPA and juvenile yellowmouth grouper (*Mycteroperca interstitialis*) were seen inside the Northern South Carolina MPA and outside the Edisto MPA. Reproductive behavior was also observed on some dives. Greyhead scamp (one of their color phases indicating spawning behavior; Gilmore and Jones 1992) were observed inside and outside the North Florida MPA, inside and outside the Edisto MPA, inside the Northern South Carolina MPA, and outside the Georgia MPA.

Species diversity for snapper-grouper complex species was compared inside and outside each MPA using DIVERSE (Table 13). The highest number of species was observed inside the Edisto MPA ($S = 22$) and the lowest was inside the iceberg scour sites of the Northern South Carolina MPA and inside the OHAPC ($S = 6$). The highest species diversity was observed inside the Northern South Carolina MPA ($H' = 2.649$) while the lowest was inside the iceberg scour sites of the Northern South Carolina MPA ($H' = 1.772$). Species diversity was higher inside the MPA vs. outside for Northern South Carolina, Edisto, and North Florida MPAs.

Table 13. Biodiversity indices for snapper-grouper complex species observed during video surveys conducted with a remotely operated vehicle inside and outside the shelf-edge MPAs and *Oculina* OHAPC, with the artificial sites removed. S = total number of species; H' = Shannon-Wiener function of species diversity; J' = Pielou's evenness.

MPA	S	J'	H'
Northern South Carolina - Deep - Inside	6	0.9891	1.772
Northern South Carolina - Deep - Outside	8	0.9777	2.033
Northern South Carolina - Inside	19	0.8997	2.649
Northern South Carolina - Outside	11	0.9337	2.239
Edisto - Inside	22	0.8382	2.591
Edisto - Outside	15	0.91	2.464
Georgia - Outside	14	0.9109	2.404
North Florida - Inside	19	0.8879	2.614
North Florida - Outside	21	0.8108	2.469
OHAPC - Inside	6	0.9233	1.654

Lionfish Populations

A total of 1697 lionfish were recorded on the 2018 dives. The most lionfish on a single dive was noted this year ($n=646$) since the inception of this project in 2004. This translated into a density of 245.63 lionfish per 1000m² for that dive which was conducted inside the Edisto MPA. The highest average lionfish densities were also observed inside the Edisto MPA but the variance was quite large because of the three dives completed inside this MPA, one had 646 lionfish while the other two had less than 75 (Figure 16). The only location lionfish were not observed was at the iceberg scour sites of the Northern South Carolina MPA. Lionfish densities compared for each MPA (inside and outside) were not significantly different (one-way ANOVA; $P>0.05$),

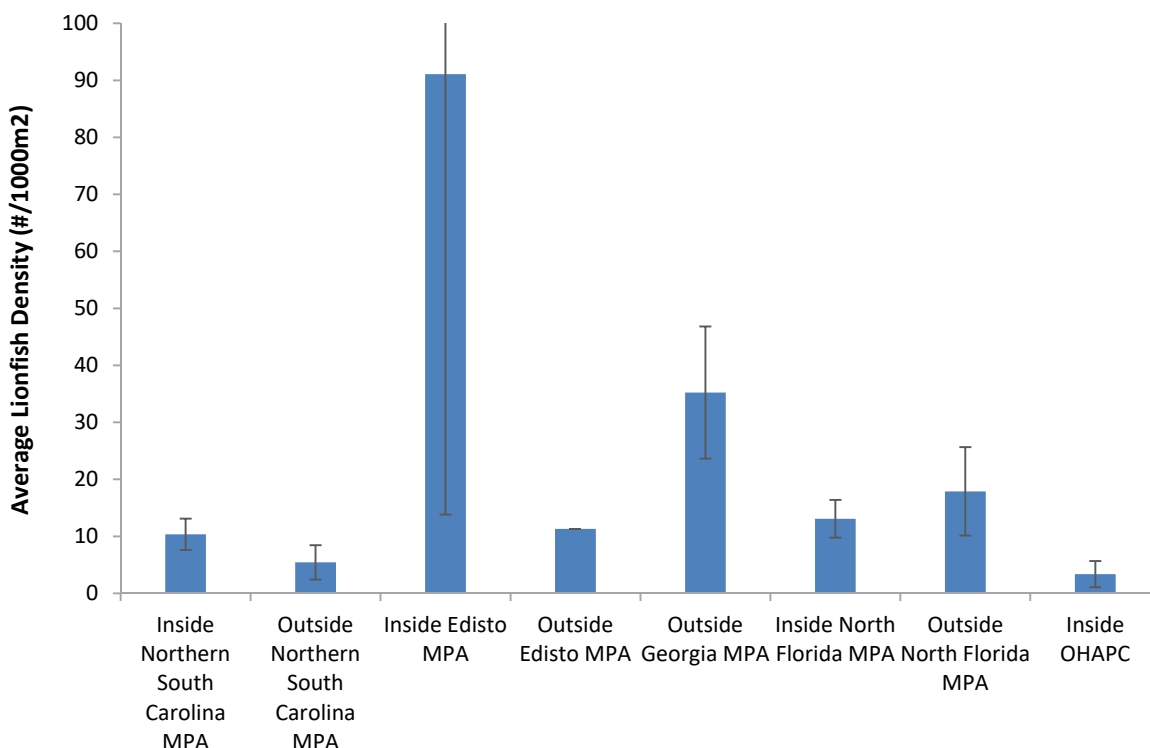


Figure 16. Density of lionfish (# individuals/1000m²) from quantitative ROV video transects during 2018 NOAA Ship *Pisces* cruise at sites inside and outside each shelf-edge MPA and *Oculina* OHAPC, with artificial sites removed.

Artificial Reefs

Two ROV dives were made on artificial reefs, one dive on each barge sunk to comprise the Deep Charleston Artificial Reef MPA. Designated transects were not run on these dives, therefore fish densities could not be calculated, but a species list and abundance estimate for each species was made.

The barges were sunk in April 2014 and we have examined them in 2014, 2016, 2017, and now in 2018. The shallow barge is at a depth of 80 m and species of interest included a juvenile snowy grouper, 10 red snapper, 3 gag grouper, 15 scamp of which 1 was in greyhead phase, and 81 lionfish (Table 14). The shallow barge also had a large school (n=300) of small silvery fish that were too far in the distance to be identified, but they could have possibly been scad. The deep barge is at a depth of 100m and species of interest included 8 snowy grouper of which 3 were juveniles, 2 warsaw grouper, 5 red snapper, 3 gag grouper, and 7 scamp of which 1 was in grayhead phase.

Table 14. Fish abundances of all species observed on the two barges comprising the Deep Charleston Artificial Reef MPA. Species in bold are target species.

Shallow Barge		Deep Barge	
Scientific Name	Abundance	Scientific Name	Abundance
<i>Baldwinella vivanus</i>	57	<i>Baldwinella vivanus</i>	
<i>Balistes capriscus</i>	2	<i>Canthigaster</i> sp.	3

<i>Centropristis ocyurus</i>	4	<i>Centropristis ocyurus</i>	1
<i>Chaetodon sedentarius</i>	1	<i>Halichoeres bathyphilus</i>	8
<i>Haemulon aurolineatum</i>	8	<i>Hyporthodus nigratus</i>	2
<i>Halichoeres bathyphilus</i>	10	<i>Hyporthodus niveatus</i>	8
<i>Halichoeres</i> sp.	43	<i>Liopropoma eukrines</i>	5
<i>Holacanthus</i> sp.	6	<i>Lutjanus campechanus</i>	5
<i>Hyporthodus niveatus</i>	1	<i>Lutjanus</i> sp.	1
<i>Hyporthodus</i> sp.	1	<i>Muraena retifera</i>	1
<i>Liopropoma eukrines</i>	1	Muraenidae	1
<i>Lutjanus campechanus</i>	10	<i>Mycteroperca microlepis</i>	3
<i>Lutjanus</i> sp.	1	<i>Mycteroperca phenax</i>	7
<i>Mycteroperca microlepis</i>	3	<i>Pagrus pagrus</i>	2
<i>Mycteroperca phenax</i>	15	<i>Pareques iwamotoi</i>	2
<i>Mycteroperca</i> sp.	1	<i>Pareques umbrosus</i>	18
<i>Pareques iwamotoi</i>	1	<i>Pterois volitans</i>	4
<i>Pareques umbrosus</i>	9	Scorpaenidae	2
<i>Pterois volitans</i>	81	<i>Seriola</i> sp.	25
<i>Rhomboplites aurorubens</i>	20	<i>Serranus notospilus</i>	2
<i>Seriola rivoliana</i>	2	unknown	1
<i>Seriola</i> sp.	47		
<i>Serranus notospilus</i>	3		
<i>Serranus phoebe</i>	1		
unknown	7		
unknown - large school	300		

FUTURE WORK AND CONCLUSIONS

This cruise and research has resulted in a rich set of new data discovering and characterizing deepwater MPA and OHAPC sites and fish populations off the southeastern United States within the jurisdiction of the South Atlantic Fishery Management Council. 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 Macrobiota

Species list of the benthic macro-invertebrates and algae that were identified from quantitative photo transects for each ROV dive during the 2018 NOAA Ship *Pisces* cruise to the South Atlantic MPAs. Still images captured from the photo transects were analyzed using CPCe[®] software to determine relative percent cover of benthic biota and habitat types. X = presence of species from observations during dive. (Best viewed in PDF format in order to zoom view).

Group/Order/Class/Scientific Name	Florida North Florida MPA										Georgia Georgia MPA										South Carolina Charleston Deep Artificial Reef MPA										Edisto MPA										Northern South Carolina MPA										Northern South Carolina MPA (Jording star site)										North Carolina Beaufort MPA																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	Inside		RVN 18-01		RVN 18-04		RVN 18-05		Outside		RVN 18-06		RVN 18-17		RVN 18-18		RVN 18-19		RVN 18-20		RVN 18-21		RVN 18-22		RVN 18-23		RVN 18-24		RVN 18-25		RVN 18-26		RVN 18-27		RVN 18-28		RVN 18-29		RVN 18-30		RVN 18-31		RVN 18-32		RVN 18-33		RVN 18-34		RVN 18-35		RVN 18-36		RVN 18-37		RVN 18-38		RVN 18-39		RVN 18-40		RVN 18-41		RVN 18-42		RVN 18-43		RVN 18-44		RVN 18-45		RVN 18-46		RVN 18-47		RVN 18-48		RVN 18-49		RVN 18-50		RVN 18-51		RVN 18-52		RVN 18-53		RVN 18-54		RVN 18-55		RVN 18-56		RVN 18-57		RVN 18-58		RVN 18-59		RVN 18-60		RVN 18-61		RVN 18-62		RVN 18-63		RVN 18-64		RVN 18-65		RVN 18-66		RVN 18-67		RVN 18-68		RVN 18-69		RVN 18-70		RVN 18-71		RVN 18-72		RVN 18-73		RVN 18-74		RVN 18-75		RVN 18-76		RVN 18-77		RVN 18-78		RVN 18-79		RVN 18-80		RVN 18-81		RVN 18-82		RVN 18-83		RVN 18-84		RVN 18-85		RVN 18-86		RVN 18-87		RVN 18-88		RVN 18-89		RVN 18-90		RVN 18-91		RVN 18-92		RVN 18-93		RVN 18-94		RVN 18-95		RVN 18-96		RVN 18-97		RVN 18-98		RVN 18-99		RVN 18-100		RVN 18-101		RVN 18-102		RVN 18-103		RVN 18-104		RVN 18-105		RVN 18-106		RVN 18-107		RVN 18-108		RVN 18-109		RVN 18-110		RVN 18-111		RVN 18-112		RVN 18-113		RVN 18-114		RVN 18-115		RVN 18-116		RVN 18-117		RVN 18-118		RVN 18-119		RVN 18-120		RVN 18-121		RVN 18-122		RVN 18-123		RVN 18-124		RVN 18-125		RVN 18-126		RVN 18-127		RVN 18-128		RVN 18-129		RVN 18-130		RVN 18-131		RVN 18-132		RVN 18-133		RVN 18-134		RVN 18-135		RVN 18-136		RVN 18-137		RVN 18-138		RVN 18-139		RVN 18-140		RVN 18-141		RVN 18-142		RVN 18-143		RVN 18-144		RVN 18-145		RVN 18-146		RVN 18-147		RVN 18-148		RVN 18-149		RVN 18-150		RVN 18-151		RVN 18-152		RVN 18-153		RVN 18-154		RVN 18-155		RVN 18-156		RVN 18-157		RVN 18-158		RVN 18-159		RVN 18-160		RVN 18-161		RVN 18-162		RVN 18-163		RVN 18-164		RVN 18-165		RVN 18-166		RVN 18-167		RVN 18-168		RVN 18-169		RVN 18-170		RVN 18-171		RVN 18-172		RVN 18-173		RVN 18-174		RVN 18-175		RVN 18-176		RVN 18-177		RVN 18-178		RVN 18-179		RVN 18-180		RVN 18-181		RVN 18-182		RVN 18-183		RVN 18-184		RVN 18-185		RVN 18-186		RVN 18-187		RVN 18-188		RVN 18-189		RVN 18-190		RVN 18-191		RVN 18-192		RVN 18-193		RVN 18-194		RVN 18-195		RVN 18-196		RVN 18-197		RVN 18-198		RVN 18-199		RVN 18-200		RVN 18-201		RVN 18-202		RVN 18-203		RVN 18-204		RVN 18-205		RVN 18-206		RVN 18-207		RVN 18-208		RVN 18-209		RVN 18-210		RVN 18-211		RVN 18-212		RVN 18-213		RVN 18-214		RVN 18-215		RVN 18-216		RVN 18-217		RVN 18-218		RVN 18-219		RVN 18-220		RVN 18-221		RVN 18-222		RVN 18-223		RVN 18-224		RVN 18-225		RVN 18-226		RVN 18-227		RVN 18-228		RVN 18-229		RVN 18-230		RVN 18-231		RVN 18-232		RVN 18-233		RVN 18-234		RVN 18-235		RVN 18-236		RVN 18-237		RVN 18-238		RVN 18-239		RVN 18-240		RVN 18-241		RVN 18-242		RVN 18-243		RVN 18-244		RVN 18-245		RVN 18-246		RVN 18-247		RVN 18-248		RVN 18-249		RVN 18-250		RVN 18-251		RVN 18-252		RVN 18-253		RVN 18-254		RVN 18-255		RVN 18-256		RVN 18-257		RVN 18-258		RVN 18-259		RVN 18-260		RVN 18-261		RVN 18-262		RVN 18-263		RVN 18-264		RVN 18-265		RVN 18-266		RVN 18-267		RVN 18-268		RVN 18-269		RVN 18-270		RVN 18-271		RVN 18-272		RVN 18-273		RVN 18-274		RVN 18-275		RVN 18-276		RVN 18-277		RVN 18-278		RVN 18-279		RVN 18-280		RVN 18-281		RVN 18-282		RVN 18-283		RVN 18-284		RVN 18-285		RVN 18-286		RVN 18-287		RVN 18-288		RVN 18-289		RVN 18-290		RVN 18-291		RVN 18-292		RVN 18-293		RVN 18-294		RVN 18-295		RVN 18-296		RVN 18-297		RVN 18-298		RVN 18-299		RVN 18-300		RVN 18-301		RVN 18-302		RVN 18-303		RVN 18-304		RVN 18-305		RVN 18-306		RVN 18-307		RVN 18-308		RVN 18-309		RVN 18-310		RVN 18-311		RVN 18-312		RVN 18-313		RVN 18-314		RVN 18-315		RVN 18-316		RVN 18-317		RVN 18-318		RVN 18-319		RVN 18-320		RVN 18-321		RVN 18-322		RVN 18-323		RVN 18-324		RVN 18-325		RVN 18-326		RVN 18-327		RVN 18-328		RVN 18-329		RVN 18-330		RVN 18-331		RVN 18-332		RVN 18-333		RVN 18-334		RVN 18-335		RVN 18-336		RVN 18-337		RVN 18-338		RVN 18-339		RVN 18-340		RVN 18-341		RVN 18-342		RVN 18-343		RVN 18-344		RVN 18-345		RVN 18-346		RVN 18-347		RVN 18-348		RVN 18-349		RVN 18-350		RVN 18-351		RVN 18-352		RVN 18-353		RVN 18-354		RVN 18-355		RVN 18-356		RVN 18-357		RVN 18-358		RVN 18-359		RVN 18-360		RVN 18-361		RVN 18-362		RVN 18-363		RVN 18-364		RVN 18-365		RVN 18-366		RVN 18-367		RVN 18-368		RVN 18-369		RVN 18-370		RVN 18-371		RVN 18-372		RVN 18-373		RVN 18-374		RVN 18-375		RVN 18-376		RVN 18-377		RVN 18-378		RVN 18-379		RVN 18-380		RVN 18-381		RVN 18-382		RVN 18-383		RVN 18-384		RVN 18-385		RVN 18-386		RVN 18-387		RVN 18-388		RVN 18-389		RVN 18-390		RVN 18-391		RVN 18-392		RVN 18-393		RVN 18-394		RVN 18-395		RVN 18-396		RVN 18-397		RVN 18-398		RVN 18-399		RVN 18-400		RVN 18-401		RVN 18-402		RVN 18-403		RVN 18-404		RVN 18-405		RVN 18-406		RVN 18-407		RVN 18-408		RVN 18-409		RVN 18-410		RVN 18-411		RVN 18-412		RVN 18-413		RVN 18-414		RVN 18-415		RVN 18-416		RVN 18-417		RVN 18-418		RVN 18-419		RVN 18-420		RVN 18-421		RVN 18-422		RVN 18-423		RVN 18-424		RVN 18-425		RVN 18-426		RVN 18-427		RVN 18-428		RVN 18-429		RVN 18-430		RVN 18-431		RVN 18-432		RVN 18-433		RVN 18-434		RVN 18-435		RVN 18-436		RVN 18-437		RVN 18-438		RVN 18-439		RVN 18-440		RVN 18-441		RVN 18-442		RVN 18-443		RVN 18-444		RVN 18-445		RVN 18-446		RVN 18-447		RVN 18-448		RVN 18-449		RVN 18-450		RVN 18-451		RVN 18-452		RVN 18-453		RVN 18-454		RVN 18-455		RVN 18-456		RVN 18-457		RVN 18-458		RVN 18-459		RVN 18-460		RVN 18-461		RVN 18-462		RVN 18-463		RVN 18-464		RVN 18-465		RVN 18-466		RVN 18-467		RVN 18-468		RVN 18-469		RVN 18-470		RVN 18-471		RVN 18-472		RVN 18-473		RVN 18-474		RVN 18-475		RVN 18-476		RVN 18-477		RVN 18-478		RVN 18-479		RVN 18-480		RVN 18-481		RVN 18-482		RVN 18-483		RVN 18-484		RVN 18-485		RVN 18-486		RVN 18-487		RVN 18-488		RVN 18-489		RVN 18-490		RVN 18-491		RVN 18-492		RVN 18-493		RVN 18-494		RVN 18-495		RVN 18-496		RVN 18-497		RVN 18-498		RVN 18-499		RVN 18-500		RVN 18-501		RVN 18-502		RVN 18-503		RVN 18-504		RVN 18-505		RVN 18-506		RVN 18-507		RVN 18-508		RVN 18-509		RVN 18-510		RVN 18-511		RVN 18-512		RVN 18-513		RVN 18-514		RVN 18-515		RVN 18-516		RVN 18-517		RVN 18-518		RVN 18-519		RVN 18-520		RVN 18-521		RVN 18-522		RVN 18-523		RVN 18-524		RVN 18-525		RVN 18-526		RVN 18-527		RVN 18-528		RVN 18-529		RVN 18-530		RVN 18-531		RVN 18-532		RVN 18-533		RVN 18-534		RVN 18-535		RVN 18-536		RVN 18-537		RVN 18-538		RVN 18-539		RVN 18-540		RVN 18-541		RVN 18-542		RVN 18-543		RVN 18-544		RVN 18-545		RVN 18-546		RVN 18-547		RVN 18-548		RVN 18-549		RVN 18-550		RVN 18-551		RVN 18-552		RVN 18-553		RVN 18-554		RVN 18-555		RVN 18-556		RVN 18-557		RVN 18-558		RVN 18-559		RVN 18-560		RVN 18-561		RVN 18-562		RVN 18-563		RVN 18-564		RVN 18-565		RVN 18-566		RVN 18-567		RVN 18-568		RVN 18-569		RVN 18-570		RVN 18-571		RVN 18-572		RVN 18-573		RVN 18-574		RVN 18-575		RVN 18-576		RVN 18-577		RVN 18-578		RVN 18-579		RVN 18-580		RVN 18-581		RVN 18-582		RVN 18-583		RVN 18-584		RVN 18-585		RVN 18-586		RVN 18-587		RVN 18-588		RVN 18-589		RVN 18-590		RVN 18-591		RVN 18-592		RVN 18-593		RVN 18-594		RVN 18-595		RVN 18-596		RVN 18-597		RVN 18-598		RVN 18-599		RVN 18-600		RVN 18-601		RVN 18-602		RVN 18-603		RVN 18-604		RVN 18-605		RVN 18-606		RVN 18-607		RVN 18-608		RVN 18-609		RVN 18-610		RVN 18-611		RVN 18-612		RVN 18-613		RVN 18-614		RVN 18-615		RVN 18-616		RVN 18-617		RVN 18-618		RVN 18-619		RVN 18-620		RVN 18-621		RVN 18-622		RVN 18-623		RVN 18-624		RVN 18-625		RVN 18-626		RVN 18-627		RVN 18-628		RVN 18-629		RVN 18-630		RVN 18-631		RVN 18-632		RVN 18-633		RVN 18-634		RVN 18-635		RVN 18-636		RVN 18-637		RVN 18-638		RVN 18-639		RVN 18-640		RVN 18-641		RVN 18-642		RVN 18-643		RVN 18-644		RVN 18-645		RVN 18-646		RVN 18-647		RVN 18-648		RVN 18-649		RVN 18-650		RVN 18-651		RVN 18-652		RVN 18-653		RVN 18-654		RVN 18-655		RVN 18-656		RVN 18-657		RVN 18-658		RVN 18-659		RVN 18-660		RVN 18-661		RVN 18-662		RVN 18-663		RVN 18-664		RVN 18-665		RVN 18-666		RVN 18-667		RVN 18-668		RVN 18-669		RVN 18-670		RVN 18-671		RVN 18-672		RVN 18-673		RVN 18-674		RVN 18-675		RVN 18-676		RVN 18-677		RVN 18-678		RVN 18-679		RVN 18-680		RVN 18-681		RVN 18-682		RVN 18-683		RVN 18-684		RVN 18-685		RVN 18-686		RVN 18-687		RVN 18-688		RVN 18-689		RVN 18-690		RVN 18-691		RVN 18-692		RVN 18-693		RVN 18-694		RVN 18-695		RVN 18-696		RVN 18-697		RVN 18-698		RVN 18-699		RVN 18-700		RVN 18-701		RVN 18-702		RVN 18-703		RVN 18-704		RVN 18-705		RVN 18-706		RVN 18-707		RVN 18-708		RVN 18-709		RVN 18-710		RVN 18-711		RVN 18-712		RVN 18-713		RVN 18-714		RVN 18-715		RVN 18-716		RVN 18-717		RVN 18-718		RVN 18-719		RVN 18-720		RVN 18-721		RVN 18-722		RVN 18-723		RVN 18-724		RVN 18-725		RVN 18-726		RVN 18-727		RVN 18-728		RVN 18-729		RVN 18-730		RVN 18-731		RVN 18-732		RVN 18-733		RVN 18-734		RVN 18-735		RVN 18-736		RVN 18-737	

	Florida										Georgia										South Carolina										North Carolina																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	North Florida MPA Inside					RVN 18-05					RVN 18-06					RVN 18-17					RVN 18-18					RVN 18-19					RVN 18-20					RVN 18-21					RVN 18-22					RVN 18-23					RVN 18-24					RVN 18-25					RVN 18-26					RVN 18-27					RVN 18-28					RVN 18-29					RVN 18-30					RVN 18-31					RVN 18-32					RVN 18-33					RVN 18-34					RVN 18-35					RVN 18-36					RVN 18-37					RVN 18-38					RVN 18-39					RVN 18-40					RVN 18-41					RVN 18-42					RVN 18-43					RVN 18-44					RVN 18-45					RVN 18-46					RVN 18-47					RVN 18-48					RVN 18-49					RVN 18-50					RVN 18-51					RVN 18-52					RVN 18-53					RVN 18-54					RVN 18-55					RVN 18-56					RVN 18-57					RVN 18-58					RVN 18-59					RVN 18-60					RVN 18-61					RVN 18-62					RVN 18-63					RVN 18-64					RVN 18-65					RVN 18-66					RVN 18-67					RVN 18-68					RVN 18-69					RVN 18-70					RVN 18-71					RVN 18-72					RVN 18-73					RVN 18-74					RVN 18-75					RVN 18-76					RVN 18-77					RVN 18-78					RVN 18-79					RVN 18-80					RVN 18-81					RVN 18-82					RVN 18-83					RVN 18-84					RVN 18-85					RVN 18-86					RVN 18-87					RVN 18-88					RVN 18-89					RVN 18-90					RVN 18-91					RVN 18-92					RVN 18-93					RVN 18-94					RVN 18-95					RVN 18-96					RVN 18-97					RVN 18-98					RVN 18-99					RVN 18-100					RVN 18-101					RVN 18-102					RVN 18-103					RVN 18-104					RVN 18-105					RVN 18-106					RVN 18-107					RVN 18-108					RVN 18-109					RVN 18-110					RVN 18-111					RVN 18-112					RVN 18-113					RVN 18-114					RVN 18-115					RVN 18-116					RVN 18-117					RVN 18-118					RVN 18-119					RVN 18-120					RVN 18-121					RVN 18-122					RVN 18-123					RVN 18-124					RVN 18-125					RVN 18-126					RVN 18-127					RVN 18-128					RVN 18-129					RVN 18-130					RVN 18-131					RVN 18-132					RVN 18-133					RVN 18-134					RVN 18-135					RVN 18-136					RVN 18-137					RVN 18-138					RVN 18-139					RVN 18-140					RVN 18-141					RVN 18-142					RVN 18-143					RVN 18-144					RVN 18-145					RVN 18-146					RVN 18-147					RVN 18-148					RVN 18-149					RVN 18-150					RVN 18-151					RVN 18-152					RVN 18-153					RVN 18-154					RVN 18-155					RVN 18-156					RVN 18-157					RVN 18-158					RVN 18-159					RVN 18-160					RVN 18-161					RVN 18-162					RVN 18-163					RVN 18-164					RVN 18-165					RVN 18-166					RVN 18-167					RVN 18-168					RVN 18-169					RVN 18-170					RVN 18-171					RVN 18-172					RVN 18-173					RVN 18-174					RVN 18-175					RVN 18-176					RVN 18-177					RVN 18-178					RVN 18-179					RVN 18-180					RVN 18-181					RVN 18-182					RVN 18-183					RVN 18-184					RVN 18-185					RVN 18-186					RVN 18-187					RVN 18-188					RVN 18-189					RVN 18-190					RVN 18-191					RVN 18-192					RVN 18-193					RVN 18-194					RVN 18-195					RVN 18-196					RVN 18-197					RVN 18-198					RVN 18-199					RVN 18-200					RVN 18-201					RVN 18-202					RVN 18-203					RVN 18-204					RVN 18-205					RVN 18-206					RVN 18-207					RVN 18-208					RVN 18-209					RVN 18-210					RVN 18-211					RVN 18-212					RVN 18-213					RVN 18-214					RVN 18-215					RVN 18-216					RVN 18-217					RVN 18-218					RVN 18-219					RVN 18-220					RVN 18-221					RVN 18-222					RVN 18-223					RVN 18-224					RVN 18-225					RVN 18-226					RVN 18-227					RVN 18-228					RVN 18-229					RVN 18-230					RVN 18-231					RVN 18-232					RVN 18-233					RVN 18-234					RVN 18-235					RVN 18-236					RVN 18-237					RVN 18-238					RVN 18-239					RVN 18-240					RVN 18-241					RVN 18-242					RVN 18-243					RVN 18-244					RVN 18-245					RVN 18-246					RVN 18-247					RVN 18-248					RVN 18-249					RVN 18-250					RVN 18-251					RVN 18-252					RVN 18-253					RVN 18-254					RVN 18-255					RVN 18-256					RVN 18-257					RVN 18-258					RVN 18-259					RVN 18-260					RVN 18-261					RVN 18-262					RVN 18-263					RVN 18-264					RVN 18-265					RVN 18-266					RVN 18-267					RVN 18-268					RVN 18-269					RVN 18-270					RVN 18-271					RVN 18-272					RVN 18-273					RVN 18-274					RVN 18-275					RVN 18-276					RVN 18-277					RVN 18-278					RVN 18-279					RVN 18-280					RVN 18-281					RVN 18-282					RVN 18-283					RVN 18-284					RVN 18-285					RVN 18-286					RVN 18-287					RVN 18-288					RVN 18-289					RVN 18-290					RVN 18-291					RVN 18-292					RVN 18-293					RVN 18-294					RVN 18-295					RVN 18-296					RVN 18-297					RVN 18-298					RVN 18-299					RVN 18-300					RVN 18-301					RVN 18-302					RVN 18-303					RVN 18-304					RVN 18-305					RVN 18-306					RVN 18-307					RVN 18-308					RVN 18-309					RVN 18-310					RVN 18-311					RVN 18-312					RVN 18-313					RVN 18-314					RVN 18-315					RVN 18-316					RVN 18-317					RVN 18-318					RVN 18-319					RVN 18-320					RVN 18-321					RVN 18-322					RVN 18-323					RVN 18-324					RVN 18-325					RVN 18-326					RVN 18-327					RVN 18-328					RVN 18-329					RVN 18-330					RVN 18-331					RVN 18-332					RVN 18-333					RVN 18-334					RVN 18-335					RVN 18-336					RVN 18-337					RVN 18-338					RVN 18-339					RVN 18-340					RVN 18-341					RVN 18-342					RVN 18-343					RVN 18-344					RVN 18-345					RVN 18-346					RVN 18-347					RVN 18-348					RVN 18-349					RVN 18-350					RVN 18-351					RVN 18-352					RVN 18-353					RVN 18-354					RVN 18-355					RVN 18-356					RVN 18-357					RVN 18-358					RVN 18-359					RVN 18-360					RVN 18-361					RVN 18-362					RVN 18-363					RVN 18-364					RVN 18-365					RVN 18-366					RVN 18-367					RVN 18-368					RVN 18-369					RVN 18-370					RVN 18-371					RVN 18-372					RVN 18-373					RVN 18-374					RVN 18-375					RVN 18-376					RVN 18-377					RVN 18-378					RVN 18-379					RVN 18-380					RVN 18-381					RVN 18-382					RVN 18-383					RVN 18-384					RVN 18-385					RVN 18-386					RVN 18-387					RVN 18-388					RVN 18-389					RVN 18-390					RVN 18-391					RVN 18-392					RVN 18-393					RVN 18-394					RVN 18-395					RVN 18-396					RVN 18-397					RVN 18-398					RVN 18-399					RVN 18-400					RVN 18-401					RVN 18-402					RVN 18-403					RVN 18-404					RVN 18-405					RVN 18-406					RVN 18-407					RVN 18-408					RVN 18-409					RVN 18-410					RVN 18-411					RVN 18-412					RVN 18-413					RVN 18-414					RVN 18-415					RVN 18-416					RVN 18-417					RVN 18-418					RVN 18-419					RVN 18-420					RVN 18-421					RVN 18-422					RVN 18-423					RVN 18-424					RVN 18-425					RVN 18-426					RVN 18-427					RVN 18-428					RVN 18-429					RVN 18-430					RVN 18-431					RVN 18-432					RVN 18-433					RVN 18-434					RVN 18-435					RVN 18-436					RVN 18-437					RVN 18-438					RVN 18-439					RVN 18-440					RVN 18-441					RVN 18-442					RVN 18-443					RVN 18-444					RVN 18-445					RVN 18-446					RVN 18-447					RVN 18-448					RVN 18-449					RVN 18-450					RVN 18-451					RVN 18-452					RVN 18-453					RVN 18-454					RVN 18-455					RVN 18-456					RVN 18-457					RVN 18-458					RVN 18-459					RVN 18-460					RVN 18-461					RVN 18-462					RVN 18-463					RVN 18-464					RVN 18-465					RVN 18-466					RVN 18-467					RVN 18-468					RVN 18-469					RVN 18-470					RVN 18-471					RVN 18-472					RVN 18-473					RVN 18-474					RVN 18-475					RVN 18-476					RVN 18-477					RVN 18-478					RVN 18-479					RVN 18-480					RVN 18-481					RVN 18-482					RVN 18-483					RVN 18-484					RVN 18-485					RVN 18-486					RVN 18-487					RVN 18-488					RVN 18-489					RVN 18-490					RVN 18-491					RVN 18-492					RVN 18-493					RVN 18-494					RVN 18-495					RVN 18-496					RVN 18-497					RVN 18-498					RVN 18-499					RVN 18-500					RVN 18-501					RVN 18-502					RVN 18-503					RVN 18-504					RVN 18-505					RVN 18-506					RVN 18-507					RVN 18-508					RVN 18-509					RVN 18-510					RVN 18-511					RVN 18-512					RVN 18-513					RVN 18-514					RVN 18-515					RVN 18-516					RVN 18-517					RVN 18-518					RVN 18-519					RVN 18-520					RVN 18-521					RVN 18-522					RVN 18-523					RVN 18-524					RVN 18-525					RVN 18-526					RVN 18-527					RVN 18-528					RVN 18-529					RVN 18-530					RVN 18-531					RVN 18-532					RVN 18-533					RVN 18-534					RVN 18-535					RVN 18-536					RVN 18-537					RVN 18-538					RVN 18-539					RVN 18-540					RVN 18-541					RVN 18-542					RVN 18-543					RVN 18-544					RVN 18-545					RVN 18-546					RVN 18-547					RVN 18-548					RVN 18-549					RVN 18-550					RVN 18-551					RVN 18-552					RVN 18-553					RVN 18-554					RVN 18-555					RVN 18-556					RVN 18-557					RVN 18-558					RVN 18-559					RVN 18-560					RVN 18-561					RVN 18-562					RVN 18-563					RVN 18-564					RVN 18-565					RVN 18-566					RVN 18-567					RVN 18-568					RVN 18-569					RVN 18-570					RVN 18-571					RVN 18-572					RVN 18-573					RVN 18-574					RVN 18-575					RVN 18-576					RVN 18-577					RVN 18-578					RVN 18-579					RVN 18-580					RVN 18-581					RVN 18-582					RVN 18-583					RVN 18-584					RVN 18-585					RVN 18-586					RVN 18-587					RVN 18-588					RVN 18-589					RVN 18-590					RVN 18-591					RVN 18-592					RVN 18-593					RVN 18-594					RVN 18-595					RVN 18-596					RVN 18-597					RVN 18-598					RVN 18-599					RVN 18-600					RVN 18-601					RVN 18-602					RVN 18-603					RVN 18-604					RVN 18-605					RVN 18-606					RVN 18-607					RVN 18-608					RVN 18-609					RVN 18-610					RVN 18-611					RVN 18-612					RVN 18-613					RVN 18-614					RVN 18-615					RVN 18-616					RVN 18-617					RVN 18-618					RVN 18-619					RVN 18-620					RVN 18-621					RVN 18-622					RVN 18-623					RVN 18-624					RVN 18-625					RVN 18-626					RVN 18-627					RVN 18-628					RVN 18-629					RVN 18-630					RVN 18-631					RVN 18-632					RVN 18-633					RVN 18-634					RVN 18-635					RVN 18-636					RVN 18-637					RVN 18-638					RVN 18-639					RVN 18-640					RVN 18-641					RVN 18-642					RVN 18-643					RVN 18-644					RVN 18-645					RVN 18-646					RVN 18-647					RVN 18-648					RVN 18-649					RVN 18-650					RVN 18-651					RVN 18-652					RVN 18-653					RVN 18-654					RVN 18-655					RVN 18-656					RVN 18-657					RVN 18-658					RVN 18-659					RVN 18-660					RVN 18-661					RVN 18-662					RVN 18-663					RVN 18-664					RVN 18-665					RVN 18-666					RVN 18-667					RVN 18-668					RVN 18-669					RVN 18-670					RVN 18-671					RVN 18-672					RVN 18-673					RVN 18-674					RVN 18-675					RVN 18-676					RVN 18-677					RVN 18-678					RVN 18-679					RVN 18-680					RVN 18-681					RVN 18-682					RVN 18-683					RVN 18-684					RVN 18-685					RVN 18-686					RVN 18-687					RVN 18-688					RVN 18-689					RVN 18-690					RVN 18-691					RVN 18-692					RVN 18-693					RVN 18-694					RVN 18-695					RVN 18-696					RVN 18-697					RVN 18-698					RVN 18-699					RVN 18-700					RVN 18-701					RVN 18-702					RVN 18-703					RVN 18-704					RVN 18-705					RVN 18-706					RVN 18-707					RVN 18-708					RVN 18-709					RVN 18-710					RVN 18-711					RVN 18-712					RVN 18-713					RVN 18-714					RVN 18-715					RVN 18-716					RVN 18-717					RVN 18-718					RVN 18-719					RVN 18-720					RVN 18-721					RVN 18-722					RVN 18-723					RVN 18-724					RVN 18-725					RVN 18-726					RVN 18-727					RVN 18-728					RVN 18-729					RVN 18-730					RVN 18-731					RVN 18-732					RVN 18-733					RVN 18-734					RVN 18-735					RVN 18-736					RVN 18-737					RVN 18-738					RVN 18-739					RVN 18-740					RVN 18-741					RVN 18-742					RVN 18-743					RV			

APPENDIX 2

Species List and Density of Fish Populations

Species list all of fish that were identified and counted from the quantitative video transects for each ROV dive during the 2018 NOAA Ship *Pisces* cruise to the South Atlantic MPAs. Fish density (# individuals/1000 m²) was calculated as (# of individuals/transect area) *1000. Transect length was calculated from the ROV tracking. Transect width was measured using the paired lasers.

	Florida North Florida MPA										Georgia Georgia MPA			South Carolina Edisto MPA			Northern South Carolina MPA			Northern South Carolina MPA (iceberg scar site)									
Taxa, Author- Common name	18-02	18-04	18-05	Outside 18-06	18-17	18-18	Oculina HAPC Inside 18-13	18-14	18-15	18-16	18-19	18-20	18-21	18-07	18-08	18-09	Outside 18-29	Inside 18-27	18-28	Outside 18-25	18-26	Inside 18-24	Outside 18-22	18-23					
Actinopterygii																													
Anguilliformes																													
<i>Gymnothorax funebris</i> Ranzani, 1839- green moray	0.24																												
<i>Gymnothorax moringa</i> (Cuvier, 1829)- spotted moray		0.27		0.71	1.40				0.35	0.59		1.53	0.24	0.16		0.21	0.40												
<i>Gymnothorax saxicola</i> Jordan & Davis, 1891- honeycomb moray											0.17																		
<i>Gymnothorax</i> sp.- moray eel	0.24					0.38	0.17	1.31		0.38																			
<i>Muraena retifera</i> Goode & Bean, 1882- reticulate moray							0.35	0.57	0.38	0.26	0.44																		
<i>Muraena robusta</i> Osório, 1911- stout moray	0.27			1.05					0.18	1.74	0.20	0.38	0.12																
Muraenidae- moray eel							0.38			0.18	2.18	0.47				0.35													
<i>Myrichthys breviceps</i> (Richardson, 1848)- sharptail eel																													
Aulopiformes																													
<i>Aulopus</i> sp.- flagfin																													
<i>Chlorophthalmus agassizi</i> Bonaparte, 1840- shortnose greeneye																													
<i>Synodus intermedius</i> (Spix & Agassiz, 1829)- sand diver													0.62																
<i>Synodus</i> sp.- lizardfish													0.71	0.44	0.47	0.20	0.24	0.16	0.83	0.14	0.15								
<i>Synodus synodus</i> (Linnaeus, 1758)- red lizardfish															0.16														
Batrachoidiformes																													
<i>Opsanus</i> sp.- toadfish													0.47																
Beryciformes																													
<i>Gephyroberyx darwini</i> (Johnson, 1866)- big roughy																													
Holocentridae- soldierfish													0.12																
Holocentridae- soldierfish/squirrelfish	0.54													0.16															
Holocentridae- squirrelfish	4.28	19.07	0.27	2.78	0.71	14.01	1.88		0.17	1.77	4.51	2.28	44.34	3.54	2.37														
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	8.31	24.17	6.26	10.20	2.13	26.61			0.53	19.22	16.35	14.53	4.71	6.48	2.87	3.51	1.62												
<i>Holocentrus rufus</i> (Walbaum, 1792)- longspine squirrelfish													0.20	0.12		0.75													
<i>Hoplostethus occidentalis</i> Woods, 1973- western roughy																													
<i>Myripristis jacobus</i> Cuvier, 1829- blackbar soldierfish	33.49	39.48	5.17	9.97	29.76																								
<i>Ostichthys trachypoma</i> (Günther, 1859)- bigeye soldierfish																													
<i>Plectrypops retropinnis</i> (Guichenot, 1853)- cardinal soldierfish	0.71	0.54	0.27	0.46	0.35			0.35	0.20		4.18	1.15	0.83	0.12															
Gadiformes																													
<i>Laemonema barbatulum</i> Goode & Bean, 1883- shortbeard codling																													
Phycidae- hake													0.35																
<i>Urophycis earlilii</i> (Bean, 1880)- carolina hake															0.21														
Lophiiformes																													
<i>Ogcocephalus corniger</i> Bradbury, 1980- longnose batfish											0.34																		
<i>Ogcocephalus parvus</i> Longley & Hildebrand, 1940- roughback batfish											0.17																		
<i>Ogcocephalus</i> sp.- batfish											0.26	0.34	0.99																
Ophidiiformes																													
<i>Bratula barbata</i> (Bloch & Schneider, 1801)- bearded brotula																													
Ostraciidae																													
Ostraciidae- boxfish	0.27			0.23																									
Perciformes																													
<i>Acanthurus</i> sp.- surgeonfish	1.66	0.81	0.82											1.37	3.42	0.38	0.83	7.11	1.75	1.86	0.81								
Anthiinae- anthiid											0.34																		
<i>Anthias nicholsi</i> Firth, 1933- yellowfin bass																								215.65	18.16	171.81			
<i>Antigonia capros</i> Lowe, 1843- deepbody boarfish																								1.84	57.47				
<i>Apogon pseudomaculatus</i> Longley, 1932- twospot cardinalfish				0.23	0.35					0.71	0.44	0.94	0.38		0.12	0.16	0.21	19.21					18.25						
<i>Apogon</i> sp.- cardinalfish													3.30																
<i>Baldwinella vivanus</i> (Jordan & Swain, 1885)- red barbier																								5.08	7.75				
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	15.68	27.67	8.16	14.61	12.61																								
<i>Bodianus rufus</i> (Linnaeus, 1758)- spanish hogfish											0.51	2.47	1.31	0.47	0.98	0.38	0.12	0.47	0.25										
<i>Calamus</i> sp.- porgy	0.24	0.81	0.54											2.35	9.89	2.68	4.71	4.90	1.00	7.01	3.23								
Carangidae- jack											3.33																		
<i>Carangoides bartholomaei</i> (Cuvier, 1833)- yellow jack																								1.18					
<i>Caulolatilus microps</i> Goode & Bean, 1878- blueline tilefish																								0.85		1.37			
<i>Centropristis ocyurus</i> (Jordan & Evermann, 1887)- bank sea bass							5.94	0.38																					
<i>Centropyge argi</i> Woods & Kanazawa, 1951- cherubfish													2.16	0.38		0.25													
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	1.66	3.49	0.54	0.70	3.50					0.18	7.06	17.49	8.79	4.60	2.85	0.12	2.89												
<i>Cephalopholis fulva</i> (Linnaeus, 1758)- coney grouper	0.27																												
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	0.71	4.57	2.45	4.17	4.26	3.85	0.26			0.17	10.61	12.20	2.81	4.51	3.42	8.79	3.30	3.64	3.12	5.57	2.02								
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	22.09	32.23	23.40	21.57	2.84	33.61	1.13	1.13	1.54	0.84	11.84	8.71	2.34	25.69	37.64	12.61	19.21	11.22	13.97	11.76	4.04								
<i>Chaetodon striatus</i> Linnaeus, 1758- banded butterflyfish							1.52																						
Chaetodontidae- butterflyfish				0.69																									
<i>Chromis cyanea</i> (Poey, 1860)- blue chromis																													
<i>Chromis enchrysurus</i> Jordan & Gilbert, 1882- yellowtail reeffish	12.83	8.06	20.14	1.62	4.55			0.38	0.77	0.34	1.94	2.61	0.20		0.39	7.60	1.91	2.12	0.32	0.50	4.54	6.87							

	Florida North Florida MPA							Oculina HAPC				Georgia Georgia MPA			South Carolina Edisto MPA				Northern South Carolina MPA				Northern South Carolina MPA (iceberg scar site)			
	Inside			Outside				Inside				Outside			Inside		Outside		Inside		Outside		Inside		Outside	
Taxa, Author- Common name	18-02	18-04	18-05	18-06	18-17	18-18	18-13	18-14	18-15	18-16	18-19	18-20	18-21	18-07	18-08	18-09	18-29	18-27	18-28	18-25	18-26	18-24	18-22	18-23		
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	20.67	12.62	10.88	3.25		3.85					0.35			29.22	13.69	74.16	64.47		3.32	42.79	17.54					
<i>Chromis scotti</i> Emery, 1968- purple reeffish	22.80	11.82	2.72	4.64		3.15					0.35	0.87		16.86	47.91	24.85	25.70		2.85	2.00	1.24					
<i>Chromis</i> sp.- damselfish	51.31	3.76	1.09	1.86						0.17				5.69	14.07	22.94	14.38			31.94	0.21					
<i>Clepticus parrae</i> (Bloch & Schneider, 1801)- creole wrasse				0.46												9.56			8.69	0.37						
<i>Cookeolus japonicus</i> (Cuvier, 1829)- bulleye																						2.26		0.61		
<i>Decodon puellaris</i> (Poey, 1860)- red hogfish							0.75	0.26														10.87		4.41		
<i>Diplodus holbrookii</i> (Bean, 1878)- spottail pinfish																	0.35									
<i>Epinephelus adscensionis</i> (Osbeck, 1765)- rock hind											0.18									0.12						
<i>Epinephelus guttatus</i> (Linnaeus, 1758)- red hind																		0.47								
<i>Epinephelus itajara</i> (Lichtenstein, 1822)- goliath grouper				0.23																						
<i>Epinephelus</i> sp. Bloch, 1793- grouper																			0.16							
<i>Equetus lanceolatus</i> (Linnaeus, 1758)- jackknife fish			0.82	2.78		8.40					0.18	0.47						3.00		0.21	12.52					
Gobiidae- goby															0.76											
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	481.00	2303.25	49.52	#####	61.75	357.14					0.71			205.88	1541.44	2542.05	409.59	1730.95			100.97					
<i>Haemulon plumierii</i> (Lacepède, 1801)- white grunt	0.24	4.57				0.35									0.76			15.49	0.62	15.47	0.40					
<i>Haemulon sciurus</i> (Shaw, 1803)- bluestriped grunt		0.27																								
<i>Haemulon</i> sp.- grunt						70.03								536.27												
<i>Haemulon striatum</i> (Linnaeus, 1758)- striped grunt	90.26					28.01		1.54						153.92	114.07	55.43	159.71	213.40								
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse						2.80					1.94	3.49	2.34	0.78	3.42	1.53	1.06	0.16	0.12	4.13	20.19	0.99		0.46		
<i>Halichoeres cyanocephalus</i> (Bloch, 1791)- yellowcheek wrasse			1.36	0.93		0.35												1.74	1.62							
<i>Halichoeres garnoti</i> (Valenciennes, 1839)- yellowhead wrasse	5.23	8.33	5.99	14.38		4.55								8.63	18.63	1.53	4.13	45.37	11.60							
<i>Halichoeres</i> sp.- wrasse	4.75	1.34	21.22	14.61		6.30					6.36	0.87	0.47	4.71	41.83		4.71	11.22	14.60	68.08	12.12	0.42				
<i>Holacanthus</i> sp.- angelfish	16.86	26.86	4.90	9.97	2.13	17.86	1.50	1.29	0.68		5.48	8.28		11.57	27.00	8.41	10.73	4.90	2.74	4.54	0.40					
<i>Holacanthus tricolor</i> (Bloch, 1795)- rock beauty	0.95	0.81	0.27	0.23										2.35	0.38	2.68	0.59	1.74	0.87	0.62						
<i>Hyperoglyphe perciformis</i> (Mitchill, 1818)- barrelfish																								1.37		
<i>Hyporhamphus flavilimbatus</i> (Poey, 1865)- yellowedge grouper							0.85															0.14		0.15		
<i>Hyporhamphus niveatus</i> (Valenciennes, 1828)- snowy grouper																						2.26		2.43		
<i>Hyporhamphus</i> sp.- grouper																								0.15		
<i>Jeboehkia gladiifer</i> Robins, 1967- bladefin basslet																							0.86	0.15		
<i>Kyphosus</i> sp.- chub																		0.47								
<i>Lachnolaimus maximus</i> (Walbaum, 1792)- hogfish				0.46										0.20	1.14		0.35	0.95	1.00	0.83	0.40					
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	2.85	2.15	0.82	0.70	0.71	4.55	0.28			0.34	1.77	4.36		1.37	11.03	5.35	2.71	2.85	0.50	5.16		0.56		0.15		
<i>Lutjanus analis</i> (Cuvier, 1828)- mutton snapper	0.48	0.27	1.90	0.93							0.18						0.12		0.25							
<i>Lutjanus apodus</i> (Walbaum, 1792)- schoolmaster		0.27		0.70																						
<i>Lutjanus buccanella</i> (Cuvier, 1828)- blackfin snapper				0.23												1.91										
<i>Lutjanus campechanus</i> (Poey, 1860)- red snapper											13.96	14.38	2.81	0.20	0.38					0.21						
<i>Lutjanus griseus</i> (Linnaeus, 1758)- grey snapper	0.71	10.21		6.49										1.96	17.87	5.73	1.41									
<i>Lutjanus</i> sp.- snapper	0.48	0.27	0.54	1.16		0.35								0.59	0.76			0.16								
<i>Malacanthus plumieri</i> (Bloch, 1786)- sand tilefish			0.82																0.12							
<i>Mulloidichthys martinicus</i> (Cuvier, 1829)- yellow goatfish														1.57			2.00	0.16								
<i>Mycteroperca bonaci</i> (Poey, 1860)- black grouper	0.24																		0.25							
<i>Mycteroperca interstitialis</i> (Poey, 1860)- yellowmouth grouper														0.20	0.38		0.12	0.32								
<i>Mycteroperca microlepis</i> (Goode & Bean, 1879)- gag grouper	1.66	0.27	0.54	0.46							0.18	0.87			0.38			0.47								
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	1.90	4.57	0.82	3.25		4.20					0.53	5.23	1.40	4.90	17.49	10.70	2.48	4.27	0.50	0.41		0.56				
<i>Mycteroperca</i> sp.- grouper						0.35					0.18			0.39	0.38		0.12									
<i>Ocyurus chrysurus</i> (Bloch, 1791)- yellowtail snapper														0.20												
<i>Pagrus pagrus</i> (Linnaeus, 1758)- red porgy		3.76	7.07	1.62			0.28					1.31	0.47		0.76		0.24				0.71		4.11			
<i>Paranthias furcifer</i> (Valenciennes, 1828)- creolefish	3.56													0.20		0.38	0.24									
<i>Pareques iwamotoi</i> Miller & Woods, 1988- blackbar drum																						1.41		2.58		
<i>Pareques umbrasus</i> (Jordan & Eigenmann, 1889)- cubbyu	19.24	14.77	0.82	9.97		17.51	0.38	6.43	0.17		4.60	137.69	1.87	17.65	23.57	43.96	19.09	40.63	0.12	9.90						
<i>Plectranthias garrupellus</i> Robins & Starck, 1961- apricot bass									0.34													7.77		11.56		
<i>Pomacanthus arcuatus</i> (Linnaeus, 1758)- gray angelfish															0.76											
<i>Pomacanthus paru</i> (Bloch, 1787)- french angelfish	0.24	1.34	0.82	2.32		0.26								0.59	1.90		0.24	0.47	0.12	0.21						
<i>Pomacanthus</i> sp.- angelfish				0.46																						
Priacanthidae Günther, 1859- bulleye/bigeye																								0.30		
<i>Priacanthus arenatus</i> Cuvier, 1829- bigeye			0.27				0.38		0.34		2.12			0.20	0.38	3.82	1.30	0.63		3.71						
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye			0.27				12.73	9.01	3.60	0.68	6.01	14.38	13.56	0.59	10.27	2.29	1.89			12.79	8.08		1.98			
<i>Pragnathodes aculeatus</i> (Poey, 1860)- longsnout butterflyfish	0.24	1.34				0.35								0.98		2.68	0.24		0.62							
<i>Pragnathodes aya</i> (Jordan, 1886)- bank butterflyfish	4.51	9.67		4.87	0.71	3.85	2.83	7.51	1.80	3.38	4.95	16.12	2.34	2.55	2.28	12.61	2.36	0.16	0.25	2.68		0.14		0.30		
<i>Pragnathodes guyanensis</i> (Durand, 1960)- french butterflyfish																						0.14				
<i>Pronotogrammus martinicensis</i> (Guichenot, 1868)- rough-tongue bass							0.85			1.69												9.89		1.22		
<i>Pseudupeneus maculatus</i> (Bloch, 1793)- spotted goatfish	0.71	0.27	0.27	3.01										5.69	6.84	9.56	4.01	14.23	0.25	0.21						
<i>Ptereleotris</i> sp.- dartfish											0.35															
<i>Rhomboplites aurorubens</i> (Cuvier, 1829)- vermilion snapper	207.84	819.23		768.78	124.91	5.95								44.12	2718.63	154.82	54.22	0.16				0.85				
<i>Rypticus maculatus</i> Holbrook, 1855- whitespotted soapfish											1.77				3.80		0.12									

	Florida North Florida MPA							Oculina HAPC				Georgia Georgia MPA			South Carolina Edisto MPA			Northern South Carolina MPA				Northern South Carolina MPA (iceberg scar site)				
Taxa, Author- Common name	18-02	18-04	18-05	18-06	18-17	18-18	18-13	18-14	18-15	18-16	18-19	18-20	18-21	18-07	18-08	18-09	18-29	18-27	18-28	18-25	18-26	18-24	18-07	18-08	Outside 18-22	18-23
<i>Rypticus saponaceus</i> (Bloch & Schneider, 1801)- greater soapfish	0.71			1.16		1.05								1.96	0.76			1.11	0.25							
<i>Rypticus</i> sp.- soapfish															0.38											
Scaridae Rafinesque, 1810- parrotfish														0.20	0.38											
<i>Seriola dumerilli</i> (Risso, 1810)- greater amberjack	0.48	0.54	1.09	0.46										1.18			0.12	0.32	0.12		0.81					0.91
<i>Seriola rivoliana</i> Valenciennes, 1833- almaco jack	0.71		0.54	0.46		0.35					1.77			0.78	10.27		4.24	0.95	0.12	0.41						0.15
<i>Seriola</i> sp.- amberjack	0.24			1.86	0.71	0.35	0.57					0.87	0.47	0.20	26.62	26.38	0.12	0.16		0.21						1.37
Serranidae- sea bass										0.17																
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	3.80	2.95	2.45	1.39		4.20					8.13	3.05		3.73	2.28	5.35	4.60	0.95	4.74	5.16						
<i>Serranus baldwini</i> (Evermann & Marsh, 1899)- lantern bass	1.19	0.54	1.63	0.23							4.24			1.18	2.28	0.38	1.77	0.63	3.37	1.03						
<i>Serranus notospilus</i> Longley, 1935- saddle bass													0.94											4.24		0.61
<i>Serranus phoebe</i> Poey, 1851- tattler	1.66		5.71	0.70		0.70	4.53	8.26	4.63	3.71	10.43	6.97	10.29		2.28		1.18	0.63	3.99	25.38	3.63					
<i>Serranus</i> sp.- sea bass						0.35					0.35													0.28		
<i>Serranus tigrinus</i> (Bloch, 1790)- harlequin bass														1.18	0.38	0.38	0.35	0.32	0.12							
<i>Serranus tortugarum</i> Longley, 1935- chalk bass																			0.62							
Sparidae- porgy	0.48			0.23									0.47													
<i>Sparisoma atomarium</i> (Poey, 1861)- greenblotch parrotfish	0.71													5.88	2.28		2.95	1.74	3.12	1.03						
<i>Sparisoma aurofrenatum</i> (Valenciennes, 1840)- redband parrotfish															1.14											
<i>Sphyaena barracuda</i> (Edwards, 1771)- barracuda	0.48			1.86										2.75	3.04			0.16	0.12							
<i>Stegastes partitus</i> (Poey, 1868)- bicolor damselfish	1.19	1.07	0.27	0.23										3.53	3.04	0.38	1.06	1.58	1.50		0.81					
<i>Synagrops</i> sp.- lanternbelly																								0.14		1.30
<i>Thalassoma bifasciatum</i> (Bloch, 1791)- bluehead wrasse														0.20	0.76											
<i>Xyrichtys</i> sp.- razorfish																			0.25							
Pleuronectiformes																										
Paralichthyidae- flounder																									0.14	
Scorpaeniformes																										
<i>Dactylopterus volitans</i> (Linnaeus, 1758)- flying gurnard										0.17																
<i>Helicolenus dactylopterus</i> (Delaroche, 1809)- blackbelly rosefish														0.18											58.37	
<i>Pontinus rathbuni</i> Goode & Bean, 1896- highfin scorpionfish										0.17																0.15
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	10.93	19.61	8.71	8.35	12.07	33.26	0.57	10.14	0.26	2.53	22.98	58.39	24.32	12.75	245.63	14.91	11.32	13.12	7.61	8.46	2.42					
<i>Scorpaena plumieri</i> Bloch, 1789- spotted scorpionfish					0.71	0.35									2.28		0.12									
Scorpaenidae- scorpionfish	0.71	0.27			0.71	0.35	9.34	3.00	2.06	3.38	0.53	0.44		0.20		0.38	0.12	0.16						5.65		5.02
Syngnathiformes																										
<i>Aulostomus maculatus</i> Valenciennes, 1841- trumpetfish	1.88			0.46											0.38	5.73	2.48	0.47								
<i>Fistularia tabacaria</i> Linnaeus, 1758- bluespotted cornetfish				0.70				0.38						0.39	1.90		0.12	0.32								
<i>Macroramphosus scolopax</i> (Linnaeus, 1758)- longspine snipefish																								0.42		
<i>Macroramphosus</i> sp.- snipefish																										0.46
Tetraodontiformes																										
<i>Acanthostracion polygonius</i> Poey, 1876- honeycomb cowfish				0.23													0.12			0.21						
<i>Acanthostracion quadricornis</i> (Linnaeus, 1758)- scrawled cowfish	0.27													0.59	0.38		0.12									
<i>Acanthostracion</i> sp. - cowfish				0.46											0.38		0.12									
<i>Balistes capriscus</i> Gmelin, 1789- grey triggerfish	0.95	0.27	5.99	1.62		0.35	0.28	0.75	0.51		0.35	2.61				1.15				0.21	0.81					
<i>Balistes</i> sp.- triggerfish				0.46											0.38		0.35									
<i>Balistes vetula</i> Linnaeus, 1758- queen triggerfish	0.24	0.81	0.82	0.70											1.90	0.38		0.47								
<i>Cantherhines macrocerus</i> (Hollard, 1853)- whitespotted filefish																		0.79	0.12							
<i>Cantherhines pullus</i> (Ranzani, 1842)- orangespotted filefish														0.20	1.14			0.16	0.25							
<i>Canthigaster</i> sp.- puffer	22.33	32.50	9.52	16.00	3.55	44.82					14.50	25.27	13.10	36.08	98.48	56.96	73.31	26.56	8.86	10.73	4.04					
<i>Chilomycterus antillarum</i> Jordan & Rutter, 1897- web burrfish																				0.21						
<i>Chilomycterus schoepfii</i> (Walbaum, 1792)- striped burrfish										0.17																
<i>Diodon holocanthus</i> Linnaeus, 1758- balloonfish																					0.21					
<i>Diodon hystrix</i> Linnaeus, 1758- porcupinefish		0.27																								
Monacanthidae- filefish																	0.24		0.12							
<i>Sphoeroides</i> sp.- puffer											0.18															
<i>Sphoeroides spengleri</i> (Bloch, 1785)- bandtail puffer	0.24	0.81									0.18	3.05	2.81	0.20	7.22	1.15	1.06	0.16		1.44						
schooling fish															836.50											
Elasmobranchii																										
Carcharhiniformes																										
<i>Carcharhinus plumbeus</i> (Nardo, 1827)- sandbar shark														0.39												
<i>Carcharhinus</i> sp.- shark															0.38											
Myliobatiformes																										
<i>Dasyatis</i> sp.- sting ray			0.27																							
UNKNOWN	4.28	2.69	2.45	34.79		1.75	1.70	0.38		0.17	1.41	0.44	0.47	2.16	2.28	1.91	1.77		1.00	4.33	1.21		0.71	0.43		0.76

APPENDIX 3

SEADESC II REPORT

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

Provides the following data for each dive site during the 2018 NOAA Ship *Pisces* cruise to the South Atlantic MPAs:

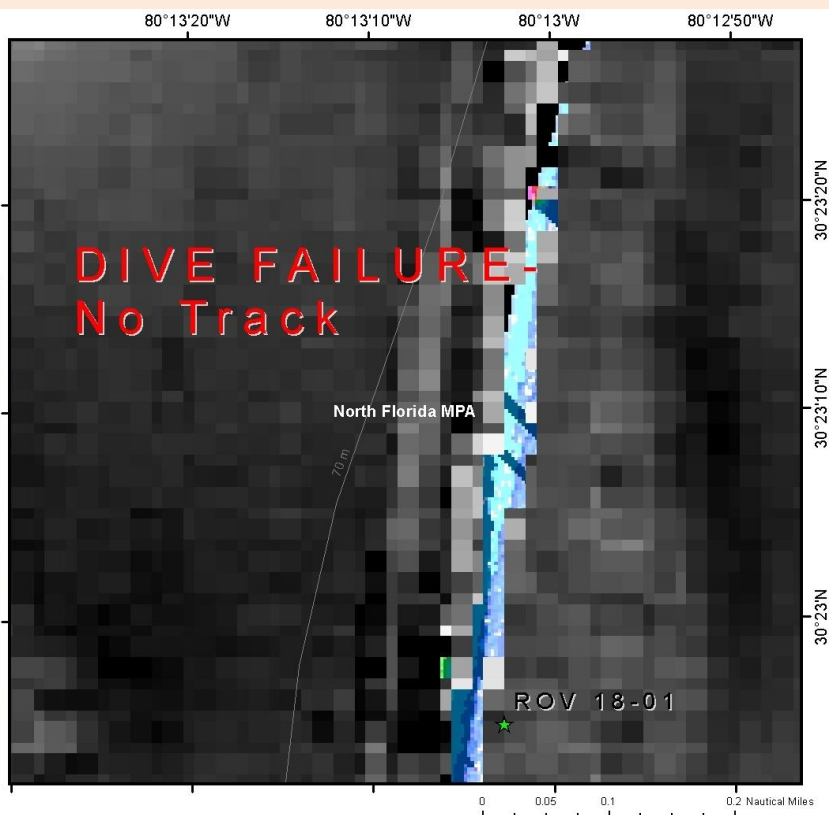
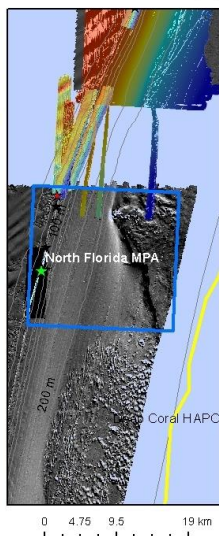
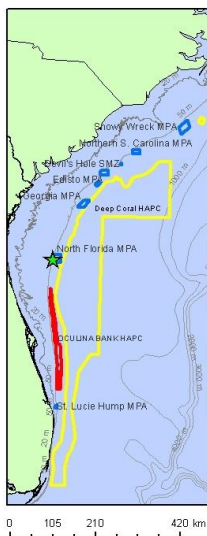
- cruise and ROV dive metadata and objectives
- figures showing each ROV dive track and habitat zones overlaid on multibeam sonar maps
- ROV dive track data (start and end coordinates, time, and depth)
- CTD plots from temperature profiles for each ROV dive
- images characterizing the habitat and biota for each dive site
- characterization of habitat, benthic biota, and fish populations for each dive site
- quantitative analyses of photo transects for each dive site including CPCe 4.1[®] Coral Point Count analysis of percent cover of benthic biota and substrate types
- quantitative analyses of video transects for each dive site of fish densities by species

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-01, UNCW 571; 12-V-18-1

General Location and Dive Track:

Florida, North Florida MPA;
Target FL-1; 70 m; ROV 18-01,
UNCW 571; 12-V-18-1

- ★ ROV 18-01
- ★ Mohawk ROV
- ★ CTD
- Oculina HAPC
- MPA
- Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Navy_2011_CONFIDENTIAL_US WTR_Tif

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/12/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 0

No. DVD: 1

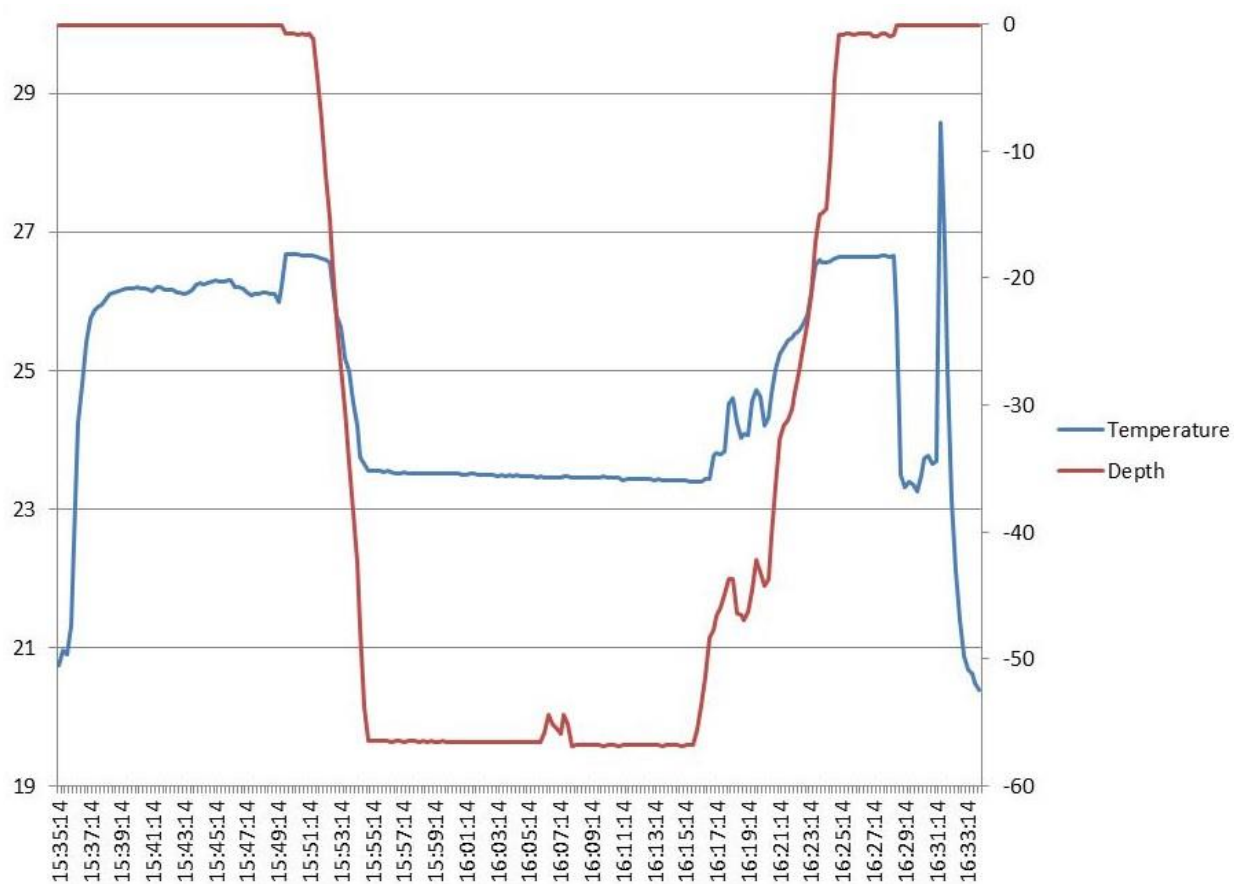
No. Hard Drive: 1

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-01, UNCW 571; 12-V-18-1

Dive Data:

Minimum Bottom Depth (m): 55	Total Transect Length (km): 0.000
Maximum Bottom Depth (m): 55	Surface Current (kn): 1.1
On Bottom (Time- EDST): 15:54	On Bottom (Lat/Long): 30.3837°N; -80.2186°W
Off Bottom (Time- EDST): 16:17	Off Bottom (Lat/Long): 30.3837°N; -80.2186°W
Physical (bottom); Temp (°C): 23.7	Salinity: N/A Visibility (m): 15 Current (kn): 0.5

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-01 are as follows: Depth Maximum: 56.8 m, Temperature: 23.4-23.8 °C.

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-01, UNCW 571; 12-V-18-1

CPCe Percent Cover Analysis:

Camera failed, no images for Point Count analysis.

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-01, UNCW 571; 12-V-18-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 12-V-18-1; ROV 18-01, UNCW Dive 571; Florida, North Florida MPA, Target FL-1, 70 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (F. Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Digital still images were shot in Program Mode, ISO auto, White Balance- fish symbol, auto focus, strobe on, height 1.0 m, photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, 1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo- screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Both cameras had 10-cm parallel lasers for scale (green- Still; red- Video). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

Dive aborted early, no tracking, no photos.

ROV depth off by -2.0 m (2 m too shallow). All depths noted below are actual depth (added 2 m to ROV readout).

Site Description/Habitat/Biota:

Depth range: 58 m

MB map shows a narrow, N-S linear ridge, ~150 m wide; depth- 70 m east base, 65 m top. Transect along ridge, heading N.

Weather- Cloudy, seas 2 ft from SE, wind 12 kn from 160 dg, air- 26.5, surface water- 26.69, salinity- 36.26, current- 1.3 kn to 339 dg.

15:48- Launch

15:54- On bottom; depth- 58 m, visibility- 15 m, current- 3/4 kn from SE.

Flat sand, 50-100 cm relief flat boulders, long line. 1 m relief, flat rock slabs; 90% soft bottom. Hydroids, *Tanacetipathes*, blue angel, amberjack, grey trigger.

No ROV tracking. ROV down weight caught on ledge on bottom.

16:15- abort dive, no tracking

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-01, UNCW 571; 12-V-18-1

CPCe Percent Cover Analysis:

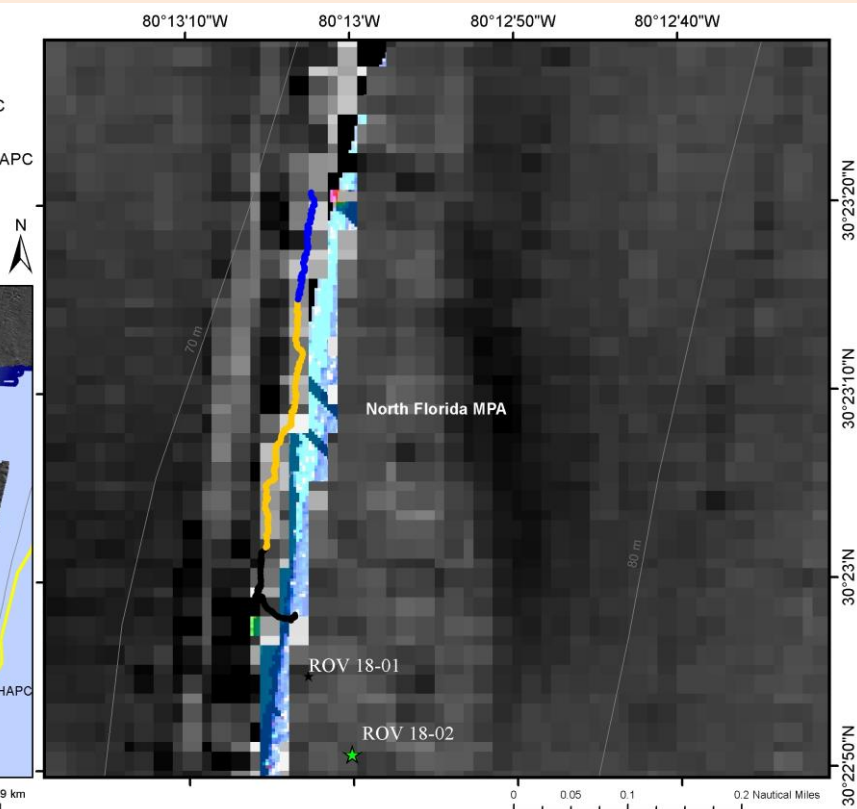
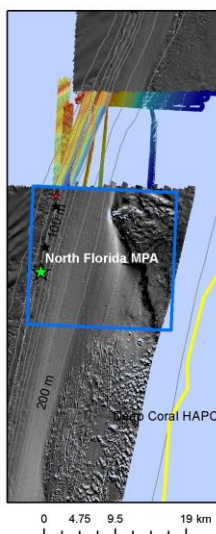
Camera failed, no images for Point Count analysis.

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-02, UNCW 572; 12-V-18-2

General Location and Dive Track:

Florida, North Florida MPA;
Target FL-1; 70 m; ROV 18-02,
UNCW 572; 12-V-18-2

- ★ ROV 18-02
 - ★ Mohawk ROV
 - ★ CTD
 - 201805122 - Transect 02
 - 201805122 - Transect 01
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Navy_2011_CONFIDENTIAL_US WTR_Tif

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/12/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 112

No. DVD: 2

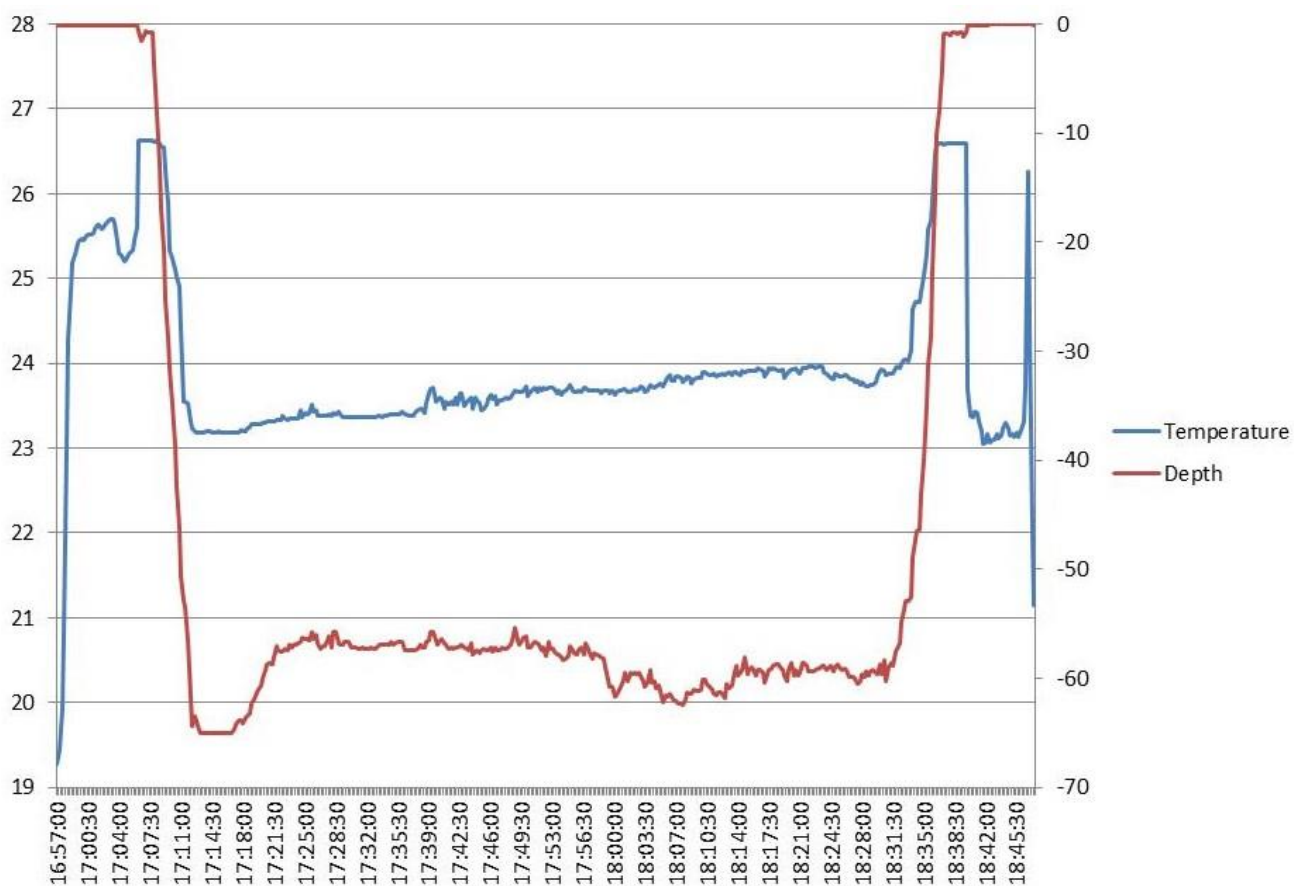
No. Hard Drive: 1

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-02, UNCW 572; 12-V-18-2

Dive Data:

Minimum Bottom Depth (m): 55.7	Total Transect Length (km): 0.754
Maximum Bottom Depth (m): 65.9	Surface Current (kn): 1.3
On Bottom (Time- EDST): 17:12	On Bottom (Lat/Long): 30.3828°N; -80.2177°W
Off Bottom (Time- EDST): 18:30	Off Bottom (Lat/Long): 30.389°N; -80.2174°W
Physical (bottom); Temp (°C): 23.2	Salinity: N/A Visibility (m): 10 Current (kn): 0

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-02 are as follows: Depth Maximum: 65.1 m, Temperature: 23.2-24 °C.

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-02, UNCW 572; 12-V-18-2

Dive Imagery:



Figure 1: -62.3 m
Male scamp grouper (gray head color phase) on rock boulder habitat.

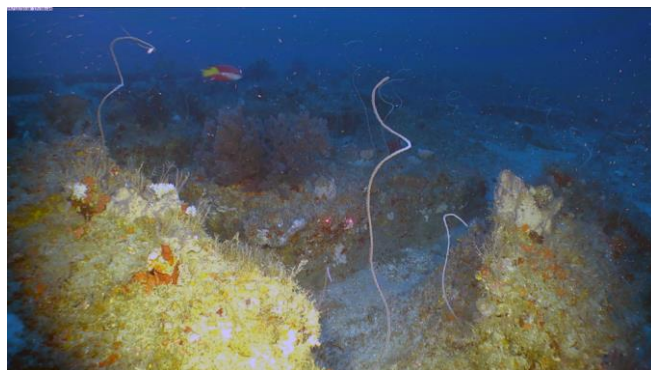


Figure 2: -60 m
1-m rock boulders with *Stichopathes* black coral and sponges.



Figure 3: -59.4 m
School of tomtoe.



Figure 4: -59.5 m
East slope of ridge with 1-m boulders, sponges, and tomtoe.



Figure 5: -61.6 m
Bushy black coral (*Tanacetipathes* sp.)



Figure 6: -62.3 m
Base of east slope of ridge with a graysby underneath the rock outcrop.

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-02, UNCW 572; 12-V-18-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 12-V-18-2; ROV 18-02, UNCW Dive 572; Florida, North Florida MPA, Target FL-1, 70 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Digital still images were shot in Program Mode, ISO auto, White Balance- fish symbol, auto focus, strobe on, height 1.0 m, photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, 1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo- screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Both cameras had 10-cm parallel lasers for scale (green- Still; red- Video). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

Conducted photo test series- 1.3 m, 1.0 m, .75 m; first with P Mode as in first dive; second photo test with TV mode, ISO 100, 1/250 Sec, White Balance- fish symbol, auto focus, strobe on at 1.3 m, 3 photos each. Keep rest of dive on TV mode. Still camera failed; used screengrabs for most of the photo transect.

ROV depth off by -2.0 m (2 m too shallow). All depths noted below are actual depth (added 2 m to ROV readout).

Site Description/Habitat/Biota:

Depth range: 61- 68 m

MB map shows a narrow, N-S linear ridge, ~150 m wide; depth- 70 m east base, 65 m top. Transect along ridge, heading N.

Weather- Cloudy, seas 2 ft from SE, wind 12 kn from 160 dg, air- 26.4, surface water- 26.68, salinity- 36.30, current- 1.3 kn to 339 dg.

17:04- Launch

17:12- On bottom; depth- 67.9 m, visibility- 10 m, current- 0 kn.

Flat sediment, 95% cover, small rubble, hydroids, *Stichopathes* sp. MB- east base of ridge, 66 m.

17:19- base of east slope. 66 m, flat rock slabs. 30dg slope, 2-3 m relief, flat rocks rock slabs on top, 61 m. Dense biota- *Tanacetipathes*, *Stichopathes*, *Ircinia campana*, *Spirastrella*, DMST sponge, dense tomtate, long line.

18:00- Camera failure, flash will not go off

18:12- High relief hard bottom, moderate slope, 3 m relief, 80% cover of rock/boulders, lots of *Stichopathes*, *Tanacetipathes*, *Madracis* 15 cm common in one area along ledge.

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-02, UNCW 572; 12-V-18-2

18:14- start screen grabs for photo transect, every 2 minutes. XS along east slope. 1-2 m relief, flat rock slabs. Dense sponges- *Ircinia*, *Spirastrella*, *Madracis* common along edge. Lots fishing line. *Cinachyrella*, *Tanacetipathes*, DMST, *Stichopathes*, *Antipathes furcata*, orange Octocoral, Clathriidae, *Filograna*.

18:30- end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- *Madracis myriaster* (looks like *Oculina varicosa*) (10-15 cm, common in one area)

Antipatharia coral- *Tanacetipathes* (bushy, 30 cm, abundant), *Stichopathes* (abundant)

Gorgonia coral- Purple Plexauridae, *Diodogorgia* sp.

Porifera- *Ircinia campana*, *Ircinia* spp., Spirastrellidae, DMST, Clathriidae, *Cinachyrella*, many other species, large spherical yellow.

Ascidiacea- Didemnidae

Annelida- *Filograna*

Algae- none observed

Human Debris:

Longline, fishing line common.

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-02, UNCW 572; 12-V-18-2

CPCe Percent Cover Analysis:

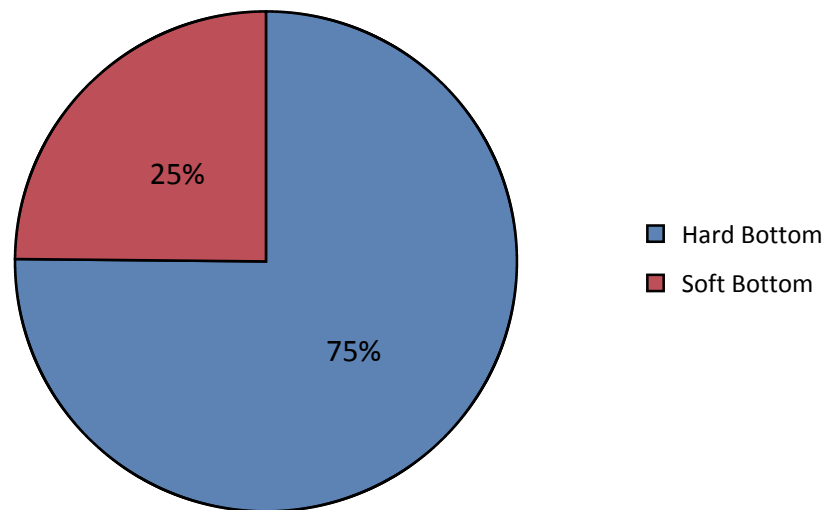


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-02. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

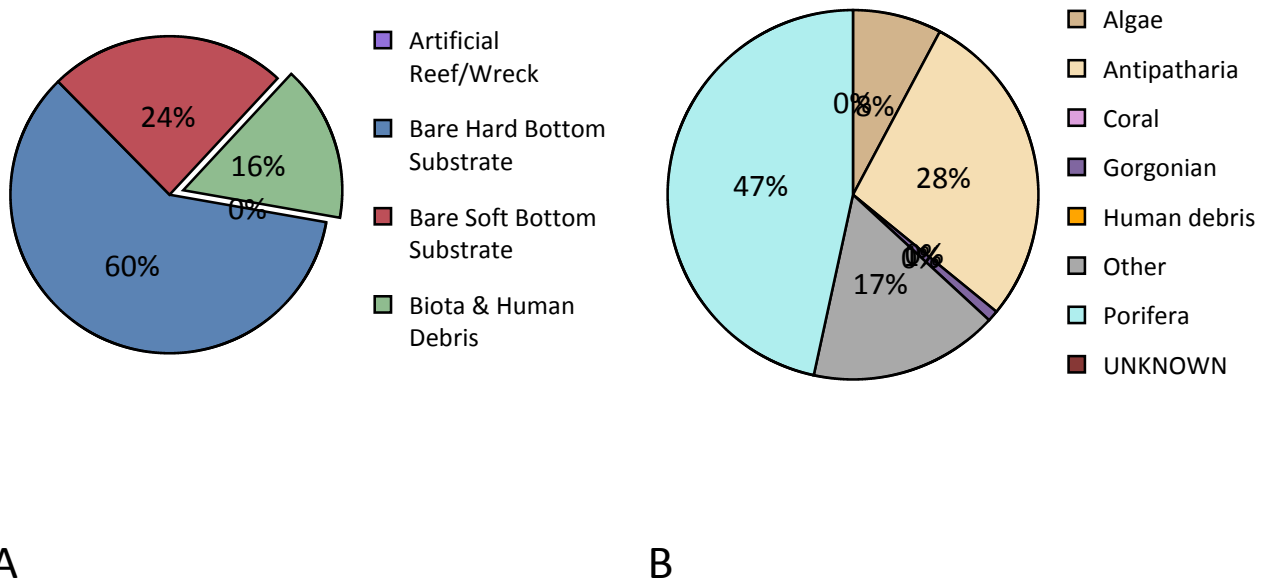


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-02. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-02, UNCW 572; 12-V-1 8-2

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-02.

	ROV 18-02	Note
	%	
Biota	15.90%	X
Algae	1.23%	
Cyanobacteria	0.31%	
Rhodophyta	0.93%	
Corallinales	0.77%	
Rhodophyta	0.15%	
Porifera	7.41%	X
Demospongiae	7.41%	X
<i>Aplysina</i> sp.	0.15%	
<i>Cinachyrella</i> sp.		X
Demospongiae- DMST	0.77%	X
Demospongiae- unid. sp.	4.01%	X
<i>Erylus</i> sp.	0.31%	
<i>Ircinia campana</i> (Lamarck, 1814)		X
<i>Ircinia</i> sp.	1.70%	
Microcionidae syn. Clathriidae		X
Spirastrellidae	0.46%	X
Coral		X
Coral- Scleractinia		X
Madracis myriaster (Milne Edwards & Haime, 1850)		X
Gorgonian	0.15%	X
Alcyonacea - gorgonian	0.15%	X
Alcyonacea- gorgonian	0.15%	X
<i>Diodogorgia</i> sp.		X
Antipatharia	4.48%	X
Antipatharia	4.48%	X
<i>Antipatharia</i> unid. sp.	0.31%	X
<i>Antipathes furcata</i> Gray, 1857	0.15%	X
<i>Stichopathes luetkeni</i> Brook, 1889	2.47%	X
<i>Tanacetipathes</i> sp.		X
<i>Tanacetipathes</i> sp.- bushy	1.54%	
Other	2.62%	X
Hydrozoa	1.85%	X
Annelida		X
<i>Filograna</i> sp.		X

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-02, UNCW 572; 12-V-1 8-2

Chordata - Invertebrate		X
Didemnidae		X
Chordata - Vertebrate	0.77%	X
Actinopterygii	0.77%	X
Bare Substrate	84.10%	
Bare Hard Bottom	59.88%	
Bare Hard Bottom	59.88%	
Bare rock, pavement, boulder, ledge	59.41%	
Bare rubble/cobble	0.46%	
Bare Soft Bottom	24.23%	
Human debris		X
Human debris		X
Human debris- fishing line		X
Human debris- long line		X
Grand Total	100.00%	X

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-02, UNCW 572; 12-V-1 8-2

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-02.

Taxa, Author- Common name	ROV 18-02
Actinopterygii	
Anguilliformes	
<i>Gymnothorax funebris</i> Ranzani, 1839- green moray	0.24
<i>Gymnothorax</i> sp.- moray eel	0.24
Beryciformes	
Holocentridae- squirrelfish	4.28
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	8.31
<i>Myripristis jacobus</i> Cuvier, 1829- blackbar soldierfish	33.49
<i>Plectrypops retrospinis</i> (Guichenot, 1853)- cardinal soldierfish	0.71
Perciformes	
<i>Acanthurus</i> sp.- surgeonfish	1.66
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	15.68
<i>Calamus</i> sp.- porgy	0.24
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	1.66
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	0.71
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	22.09
<i>Chromis enchrysurus</i> Jordan & Gilbert, 1882- yellowtail reeffish	12.83
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	20.67
<i>Chromis scotti</i> Emery, 1968- purple reeffish	22.80
<i>Chromis</i> sp.- damselfish	51.31
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	481.00
<i>Haemulon plumierii</i> (Lacepède, 1801)- white grunt	0.24
<i>Haemulon striatum</i> (Linnaeus, 1758)- striped grunt	90.26
<i>Halichoeres garnoti</i> (Valenciennes, 1839)- yellowhead wrasse	5.23
<i>Halichoeres</i> sp.- wrasse	4.75
<i>Holacanthus</i> sp.- angelfish	16.86
<i>Holacanthus tricolor</i> (Bloch, 1795)- rock beauty	0.95
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	2.85
<i>Lutjanus analis</i> (Cuvier, 1828)- mutton snapper	0.48
<i>Lutjanus griseus</i> (Linnaeus, 1758)- grey snapper	0.71
<i>Lutjanus</i> sp.- snapper	0.48
<i>Mycteroperca bonaci</i> (Poey, 1860)- black grouper	0.24
<i>Mycteroperca microlepis</i> (Goode & Bean, 1879)- gag grouper	1.66
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	1.90
<i>Paranthias furcifer</i> (Valenciennes, 1828)- creolefish	3.56
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	19.24
<i>Pomacanthus paru</i> (Bloch, 1787)- french angelfish	0.24
<i>Prognathodes aculeatus</i> (Poey, 1860)- longsnout butterflyfish	0.24

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-02, UNCW 572; 12-V-1 8-2

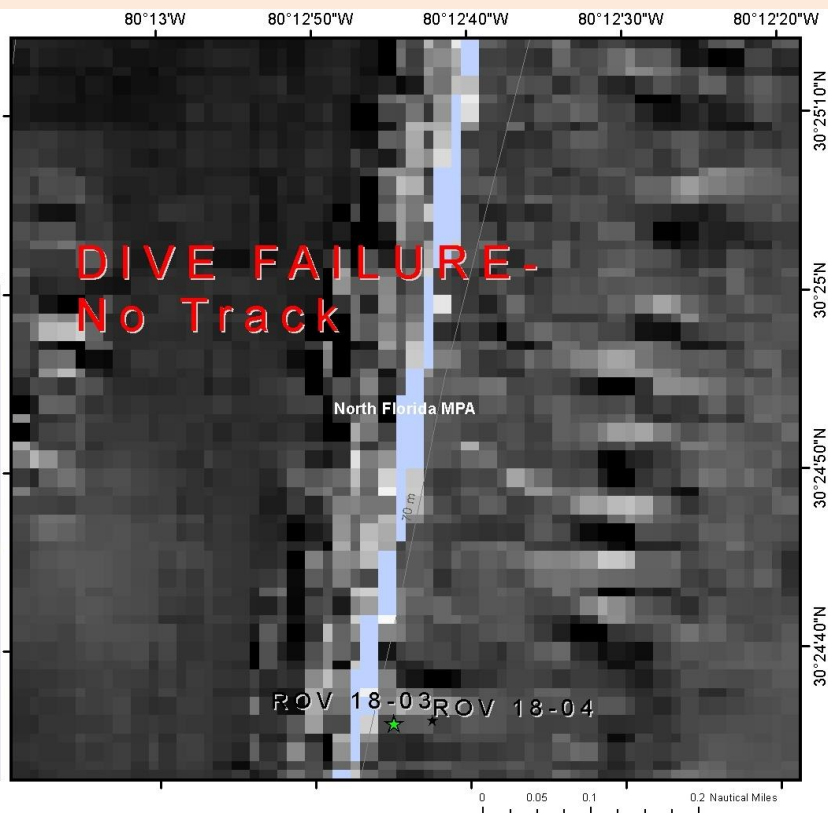
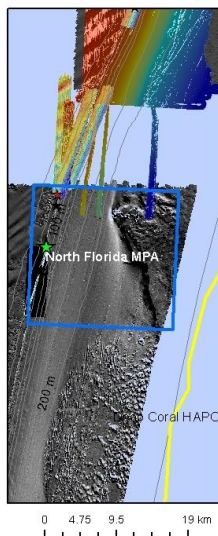
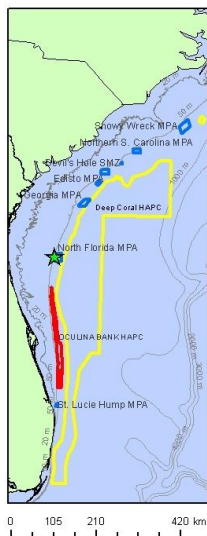
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	4.51
<i>Pseudupeneus maculatus</i> (Bloch, 1793)- spotted goatfish	0.71
<i>Rhomboplites aurorubens</i> (Cuvier, 1829)- vermilion snapper	207.84
<i>Rypticus saponaceus</i> (Bloch & Schneider, 1801)- greater soapfish	0.71
<i>Seriola dumerili</i> (Risso, 1810)- greater amberjack	0.48
<i>Seriola rivoliana</i> Valenciennes, 1833- almaco jack	0.71
<i>Seriola</i> sp.- amberjack	0.24
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	3.80
<i>Serranus baldwini</i> (Evermann & Marsh, 1899)- lantern bass	1.19
<i>Serranus phoebe</i> Poey, 1851- tattler	1.66
Sparidae- porgy	0.48
<i>Sparisoma atomarium</i> (Poey, 1861)- greenblotch parrotfish	0.71
<i>Sphyræna barracuda</i> (Edwards, 1771)- barracuda	0.48
<i>Stegastes partitus</i> (Poey, 1868)- bicolor damselfish	1.19
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	10.93
Scorpaenidae- scorpionfish	0.71
Tetraodontiformes	
<i>Balistes capriscus</i> Gmelin, 1789- grey triggerfish	0.95
<i>Balistes vetula</i> Linnaeus, 1758- queen triggerfish	0.24
<i>Canthigaster</i> sp.- puffer	22.33
<i>Sphoeroides spengleri</i> (Bloch, 1785)- bandtail puffer	0.24
UNKNOWN	4.28

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-03, UNCW 573; 13-V-18-1

General Location and Dive Track:

Florida, North Florida MPA;
Target FL-2; 70 m; ROV 18-03,
UNCW 573; 13-V-18-1

- ★ ROV 18-03
- ★ Mohawk ROV
- ★ CTD
- Oculina HAPC
- MPA
- Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Navy_2011_CONFIDENTIAL_US WTR_Tif

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/13/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 0

No. DVD: 1

No. Hard Drive: 1

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-03, UNCW 573; 13-V-18-1

Dive Data:

Minimum Bottom Depth (m): 62	Total Transect Length (km): 0.000
Maximum Bottom Depth (m): 63	Surface Current (kn): 1.1
On Bottom (Time- EDST): 7:51	On Bottom (Lat/Long): 30.4107°N; -80.2132°W
Off Bottom (Time- EDST): 7:55	Off Bottom (Lat/Long): 30.4108°N; -80.2132°W
Physical (bottom); Temp (°C): N/A	Salinity: N/A Visibility (m): 10 Current (kn): N/A

Physical Environment:

ROV Temperature Gauge Failed

Dive Site: Florida, North Florida MPA; Target FL-1; 70 m; ROV 18-01, UNCW 571; 12-V-18-1

Dive Imagery:

Dive aborted. No images collected.

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-03, UNCW 573; 13-V-18-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 13-V-18-1; ROV 18-03, UNCW Dive 573; Florida, North Florida MPA, Target FL-2, 60 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Digital still images were shot in Program Mode, ISO auto, White Balance- fish symbol, auto focus, strobe on, height 1.0 m, photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, 1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo- screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Both cameras had 10-cm parallel lasers for scale (green- Still; red- Video). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

Digital still camera not working, no flash. Dive aborted, no tracking.

ROV depth off by -2.0 m (2 m too shallow). All depths noted below are actual depth (added 2 m to ROV readout).

Site Description/Habitat/Biota:

Depth range: 63 m

MB map shows a narrow, N-S linear ridge, ~150 m wide; depth- 65 m east base, 58 m top. Transect along ridge, heading N.

Weather- Cloudy, seas 1-2 ft from SE, wind 10 kn from 108 dg, air- 25.4, surface water- 26.28, salinity- 36.38, current- 1.1 kn to 330 dg.

7:46- Launch

7:52- On bottom; depth- 63 m, visibility- 10 m.

Flat, 90-% sediment, rubble, cobble, 25 cm boulders.

75% cover, low relief, flat rock slabs.

7:55- abort dive; no tracking.

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-03, UNCW 573; 13-V-18-1

CPCe Percent Cover Analysis:

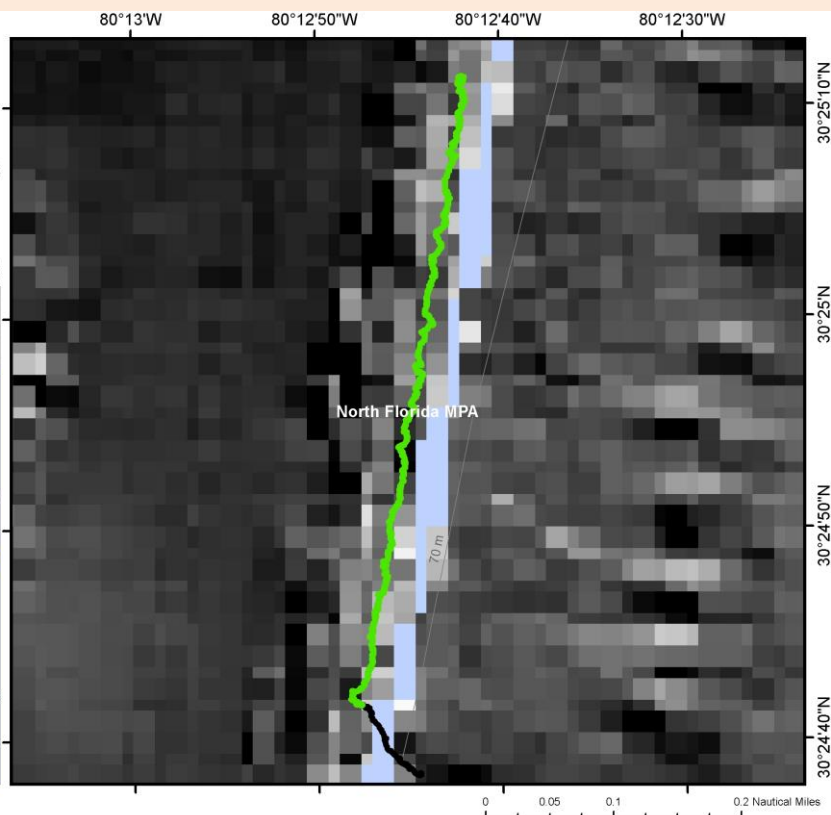
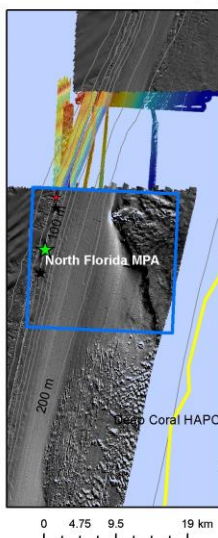
Camera failed, no images for Point Count analysis.

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-04, UNCW 574; 13-V-18-2

General Location and Dive Track:

Florida, North Florida MPA;
Target FL-2; 70 m; ROV 18-04,
UNCW 574; 13-V-18-2

- ★ ROV 18-04
 - ★ Mohawk ROV
 - ★ CTD
 - 201805132 - Transect 01
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Navy_2011_CONFIDENTIAL_US WTR_Tif

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/13/2018

Data Management: Access Database

No. Specimens: 3

No. Photos: 984

No. DVD: 3

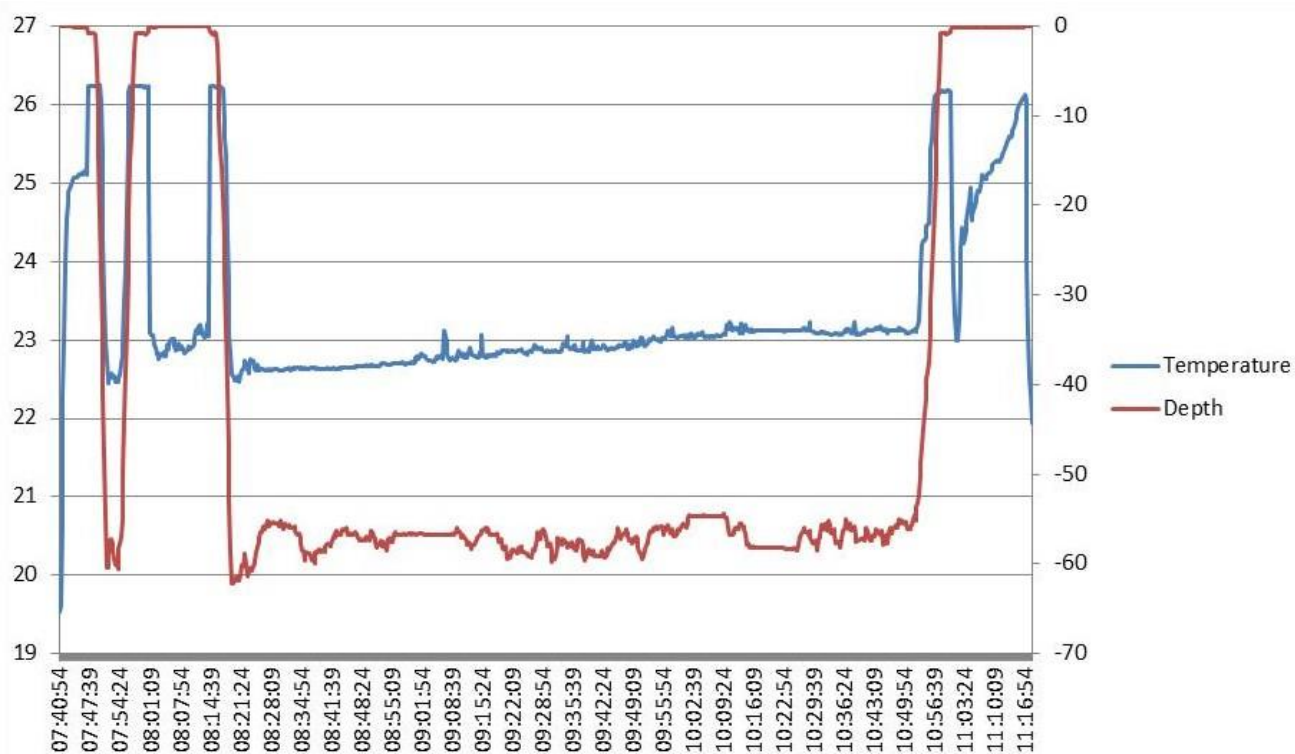
No. Hard Drive: 1

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-04, UNCW 574; 13-V-18-2

Dive Data:

Minimum Bottom Depth (m): 55	Total Transect Length (km): 1.039
Maximum Bottom Depth (m): 62.8	Surface Current (kn): 0.8
On Bottom (Time- EDST): 8:19	On Bottom (Lat/Long): 30.4116°N; -80.2124°W
Off Bottom (Time- EDST): 10:51	Off Bottom (Lat/Long): 30.4198°N; -80.2117°W
Physical (bottom); Temp (°C): 22.5	Salinity: N/A Visibility (m): 10 Current (kn): 0.1

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-04 are as follows: Depth Maximum: 62.1 m, Temperature: 22.5-23.2 °C.

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-04, UNCW 574; 13-V-18-2

Dive Imagery:

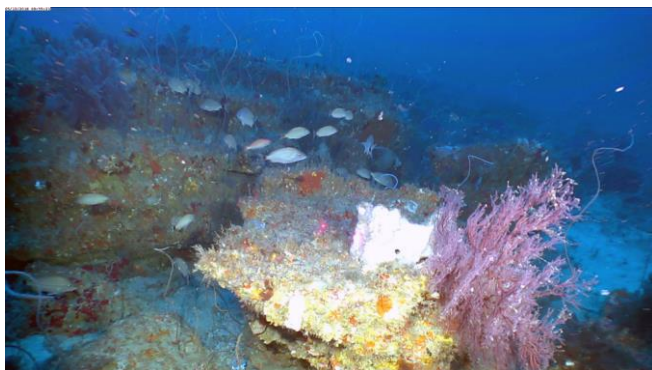


Figure 1: -60.7 m
School of tomtate, large vase sponge (*Iricinia campana*), and purple gorgonian (*Muricea* sp.)

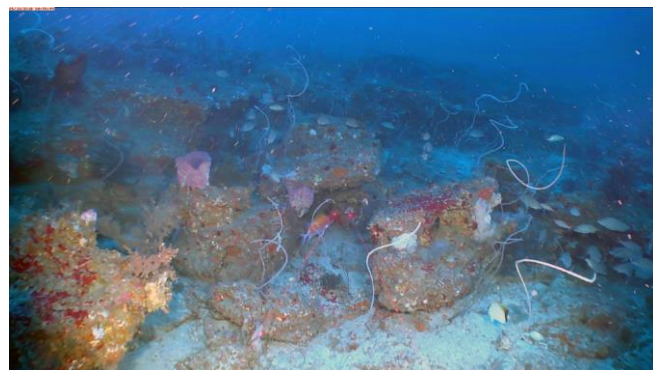


Figure 2: -60.4 m
East slope of ridge with 1-m boulders.



Figure 3: -59.3 m
Bushy black coral (*Tanacetipathes* sp.), wire coral (*Stichopathes luetkeni*). Lasers 10 cm.

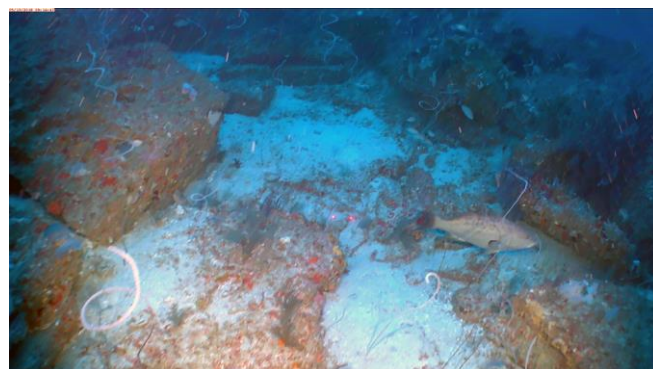


Figure 4: -59.4 m
Scamp grouper.



Figure 5: -61 m
Large *Tanacetipathes* black coral, and tail of lionfish. 60 lionfish were counted on this dive.



Figure 6: -59.4 m
Azooxanthellate *Madracis myriaster* coral (white and pink) may be confused with *Oculina*. *Madracis* were sampled and verified on this dive.

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-04, UNCW 574; 13-V-18-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 13-V-18-2; ROV 18-04, UNCW Dive 574; Florida, North Florida MPA, Target FL-2, 60 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Digital still images were shot in Program Mode, ISO auto, White Balance- fish symbol, auto focus, strobe on, height 1.0 m, photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, 1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo- screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Both cameras had 10-cm parallel lasers for scale (green- Still; red- Video). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

Digital still camera not working, no flash. Used screen grabs.

ROV depth off by -2.0 m (2 m too shallow). All depths noted below are actual depth (added 2 m to ROV readout).

Site Description/Habitat/Biota:

Depth range: 57- 65 m

MB map shows a narrow, N-S linear ridge, ~150 m wide; depth- 65 m east base, 58 m top. Transect along ridge, heading N. 3 km north of FI-01 site.

Weather- Cloudy, seas 1-2 ft from SE, wind 8 kn from 115 dg, air- 25.5, surface water- 26.28, salinity- 36.38, current- 0.8 kn to 342 dg.

8:14- Launch

8:18- On bottom; depth- 64.8 m, visibility-10- 15 m, current 1/10 kn from NW.

Flat, hard bottom pavement, 50% exposed rock, smooth, no ledges, boulders ½ m. Dominant biota- 30 cm *Tanacetipathes*, *Stichopathes*, Didemnidae, purple gorgonian, hydroids, orange encrusting sponges.

8:25- east base, 63 m, 1 m flat rock slabs, high rugosity, 20o slope, 100% cover biota. *Ircinia campana*, 20 cm *Muricea*, dense encrusting sponges. Dense tomtate, purple *Aplysina*, scamp, blue angel, *Spirastrellidae*.

8:29- Heading N along east slope. Gag, *Cinachyrella*, Depth 58.5 m, top edge of slope.

8:42- Madracis 10 cm on vertical rock. 2 m relief blocks. *Schizoporella*.

8:45- top of ridge, flat 100% rock, fractured rock slabs, DMST sponge common, *Aplysina*, *Madracis* 10 cm, Lionfish- few, *Filograna*.

8:57- Sample 1, 59 m, top edge, flat rock, 20 cm *Tanacetipathes*.

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-04, UNCW 574; 13-V-18-2

9:19- 10 cm Hypnogorgia, orange Clathriidae, Madracis 15 cm
9:15- fishing line, 30 cm *Muricea*, Parazoanthid on dead gorgonian, tomtate and vermilion snapper dense, *Erylus*, stout eel.
9:28- 20 cm *Madracis* on vertical rock, longline, 40 cm *Ircinia* with *Filograna* and fishing line,
9:31- east base, 62 m, *Antipathes atlantica*, *Diodogorgia*, no apparent algae.
9:44- to of ridge, 60 m, same habitat, grey snapper, red snapper,
10:04- Sample 2- Tan starlet sponge, 15 cm, 57m, top of ridge, flat rock.
10:15- Sample 3- *Madracis myriaster* (looks like *Oculina*- purple and white), 20cm purple, on vertical rock, east slope, 61 m, *Prognathodes aya*,
10:40- 59 m, East slope, same habitat, stinging hydroid, *Panulirus argus*, anchor line, *Swiftia exserta*.
10:52- 58 m, top east edge of ridge, end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- *Madracis myriaster* (looks like *Oculina varicosa* in video) (10-20 cm, patchy on vertical rock)

Antipatharia coral- *Tanacetipathes* (bushy, 30 cm, abundant), *Stichopathes* (abundant)

Gorgonia coral- Purple Plexauridae, *Diodogorgia* sp., *Muricea* sp., *Swiftia exserta* (1)

Porifera- *Ircinia campana*, *Ircinia* spp., Spirastrellidae, DMST, Clathriidae, Cinachyrella, many other species, large spherical yellow, *Erylus*, *Aplysina*

Asciacea- Didemnidae

Annelida- *Filograna*

Decapoda- *Panulirus argus* (1)

Algae- none observed

Human Debris:

Longline, fishing line, anchor line.

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-04, UNCW 574; 13-V-18-2

CPCe Percent Cover Analysis:

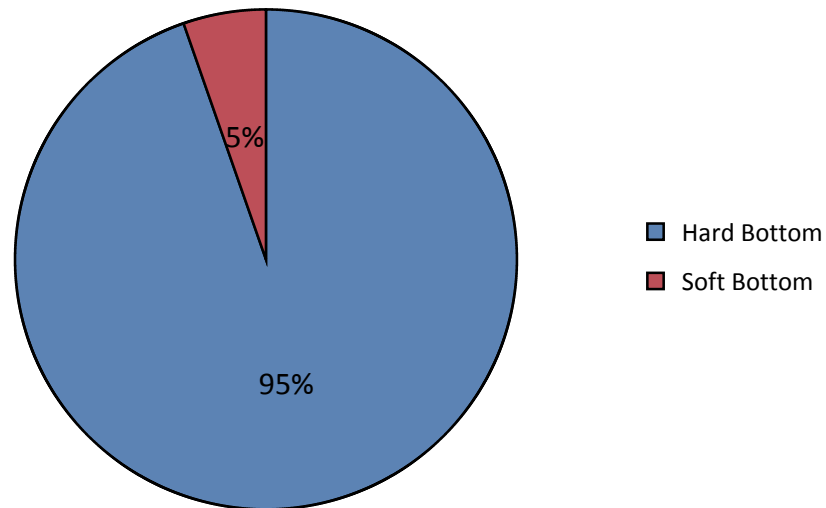


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-04. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

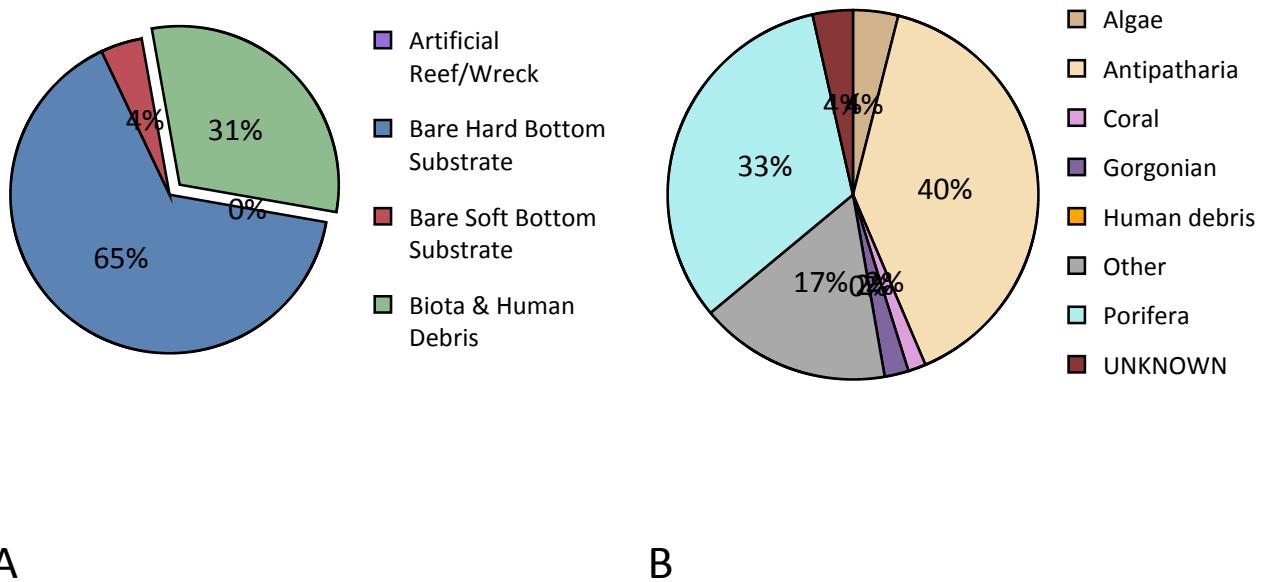


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-04. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-04, UNCW 574; 13-V-18-2

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-04.

	ROV 18-04 %	Note
Biota	30.59%	X
Algae	1.20%	
Cyanobacteria	0.04%	
Rhodophyta	1.16%	
Corallinales	1.16%	
Porifera	9.95%	X
Demospongiae	9.91%	X
<i>Agelas</i> sp.		X
<i>Aplysina</i> sp.		X
Axinellidae		X
<i>Cinachyrella</i> sp.		X
Demospongiae- DMST		X
Demospongiae- orange encrusting porous		X
Demospongiae- unid. sp.	4.55%	X
Dictyoceratida	0.26%	
<i>Erylus</i> sp.	0.30%	X
<i>Geodia</i> sp.	0.09%	
<i>Ircinia campana</i> (Lamarck, 1814)	0.39%	X
<i>Ircinia</i> sp.	1.50%	X
Microcionidae syn. Clathriidae		X
<i>Niphates</i> sp.	0.09%	
Spirastrellidae	2.75%	X
Porifera	0.04%	
Coral	0.47%	X
Coral- Scleractinia	0.47%	X
<i>Madracis myriaster</i> (Milne Edwards & Haime, 1850)	0.34%	X
<i>Oculina varicosa</i> Le Sueur, 1820	0.04%	
Scleractinia- unid cup	0.09%	
Gorgonian	0.64%	X
Alcyonacea - gorgonian	0.64%	X
Alcyonacea- gorgonian	0.09%	X
<i>Diodogorgia</i> sp.	0.26%	X
<i>Hypnogorgia</i> sp.		X
<i>Muricea</i> sp.	0.21%	X
<i>Swiftia exserta</i> (Ellis & Solander, 1786)		X

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-04, UNCW 574; 13-V-18-2

<i>Telesto</i> sp.	0.09%	
Antipatharia	12.14%	X
Antipatharia	12.14%	X
Antipatharia unid. sp.	0.51%	X
<i>Antipathes atlantica</i> Gray, 1857	0.26%	X
<i>Antipathes furcata</i> Gray, 1857		X
<i>Stichopathes luetkeni</i> Brook, 1889	4.93%	X
<i>Tanacetipathes</i> sp.		X
Tanacetipathes sp.- bushy	6.22%	
<i>Tanacetipathes tanacetum</i> (Pourtalès, 1880)	0.21%	
Other	6.18%	X
Hydrozoa	2.96%	X
Hydroidolina	2.79%	X
<i>Solanderia gracilis</i> Duchassaing & Michelin, 1846	0.17%	
Anthozoa - Non Coral		X
Zoanthidae		X
Annelida	0.04%	X
<i>Filograna</i> sp.	0.04%	X
Bryozoa	0.43%	X
<i>Schizoporella</i> sp.	0.43%	X
Arthropoda		X
<i>Panulirus argus</i> (Latreille, 1804)		X
Mollusca		X
<i>Spondylus</i> sp.		X
Echinodermata	0.04%	X
<i>Arbacia punctulata</i> (Lamarck, 1816)		X
<i>Holothuria (Vaneyothuria) lentiginosa enodis</i> Miller & Pawson, 1979		X
Ophiuroidea	0.04%	
Chordata - Invertebrate	0.17%	X
Ascidiacea	0.04%	
Didemnidae	0.13%	X
Chordata - Vertebrate	1.46%	X
Actinopterygii	1.46%	X
UNKNOWN	1.07%	
Bare Substrate	69.41%	
Bare Hard Bottom	65.21%	
Bare Hard Bottom	65.21%	
Bare rock, pavement, boulder, ledge	64.78%	
Bare rubble/cobble	0.43%	
Bare Soft Bottom	4.20%	
Human debris		X
Human debris		X

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-04, UNCW 574; 13-V-18-2

Human debris- anchor line		X
Human debris- fishing line		X
Human debris- other		X
Grand Total	100.00%	X

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-04, UNCW 574; 13-V-18-2

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-04.

Taxa, Author- Common name	ROV 18-04
Actinopterygii	
Anguilliformes	
<i>Muraena robusta</i> Osório, 1911- stout moray	0.27
Beryciformes	
Holocentridae- soldierfish/squirrelfish	0.54
Holocentridae- squirrelfish	19.07
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	24.17
<i>Myripristis jacobus</i> Cuvier, 1829- blackbar soldierfish	39.48
<i>Plectrypops retrospinis</i> (Guichenot, 1853)- cardinal soldierfish	0.54
Ostraciidae	
Ostraciidae- boxfish	0.27
Perciformes	
<i>Acanthurus</i> sp.- surgeonfish	0.81
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	27.67
<i>Calamus</i> sp.- porgy	0.81
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	3.49
<i>Cephalopholis fulva</i> (Linnaeus, 1758)- coney grouper	0.27
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	4.57
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	32.23
<i>Chromis enchrysur</i> Jordan & Gilbert, 1882- yellowtail reef fish	8.06
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	12.62
<i>Chromis scotti</i> Emery, 1968- purple reef fish	11.82
<i>Chromis</i> sp.- damselfish	3.76
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	2303.25
<i>Haemulon plumierii</i> (Lacepède, 1801)- white grunt	4.57
<i>Haemulon sciurus</i> (Shaw, 1803)- bluestriped grunt	0.27
<i>Halichoeres garnoti</i> (Valenciennes, 1839)- yellowhead wrasse	8.33
<i>Halichoeres</i> sp.- wrasse	1.34
<i>Holacanthus</i> sp.- angelfish	26.86
<i>Holacanthus tricolor</i> (Bloch, 1795)- rock beauty	0.81
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	2.15
<i>Lutjanus analis</i> (Cuvier, 1828)- mutton snapper	0.27
<i>Lutjanus apodus</i> (Walbaum, 1792)- schoolmaster	0.27
<i>Lutjanus griseus</i> (Linnaeus, 1758)- grey snapper	10.21
<i>Lutjanus</i> sp.- snapper	0.27
<i>Mycteroperca microlepis</i> (Goode & Bean, 1879)- gag grouper	0.27
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	4.57
<i>Pagrus pagrus</i> (Linnaeus, 1758)- red porgy	3.76
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	14.77

Dive Site: Florida, North Florida MPA; Target FL-2; 70 m; ROV 18-04, UNCW 574; 13-V-18-2

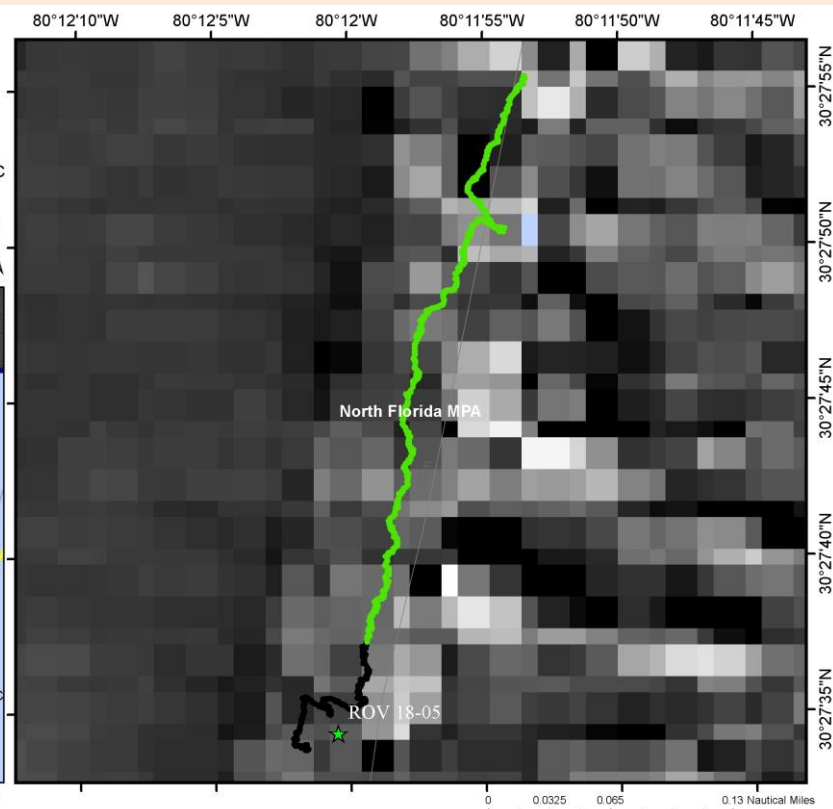
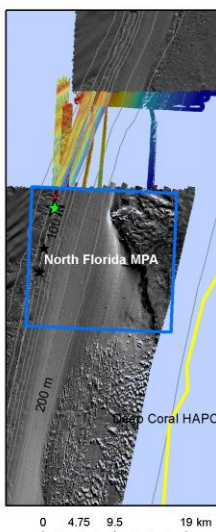
<i>Pomacanthus paru</i> (Bloch, 1787)- french angelfish	1.34
<i>Prognathodes aculeatus</i> (Poey, 1860)- longsnout butterflyfish	1.34
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	9.67
<i>Pseudupeneus maculatus</i> (Bloch, 1793)- spotted goatfish	0.27
<i>Rhomboplites aurorubens</i> (Cuvier, 1829)- vermilion snapper	819.23
<i>Seriola dumerili</i> (Risso, 1810)- greater amberjack	0.54
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	2.95
<i>Serranus baldwini</i> (Evermann & Marsh, 1899)- lantern bass	0.54
<i>Stegastes partitus</i> (Poey, 1868)- bicolor damselfish	1.07
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	19.61
Scorpaenidae- scorpionfish	0.27
Syngnathiformes	
<i>Aulostomus maculatus</i> Valenciennes, 1841- trumpetfish	1.88
Tetraodontiformes	
<i>Acanthostracion quadricornis</i> (Linnaeus, 1758)- scrawled cowfish	0.27
<i>Balistes capriscus</i> Gmelin, 1789- grey triggerfish	0.27
<i>Balistes vetula</i> Linnaeus, 1758- queen triggerfish	0.81
<i>Canthigaster</i> sp.- puffer	32.50
<i>Diodon hystrix</i> Linnaeus, 1758- porcupinefish	0.27
<i>Sphoeroides spengleri</i> (Bloch, 1785)- bandtail puffer	0.81
UNKNOWN	2.69

Dive Site: Florida, North Florida MPA; Target FL-3; 70 m; ROV 18-05, UNCW 575; 13-V-18-3

General Location and Dive Track:

Florida, North Florida MPA;
Target FL-3; 70 m; ROV 18-05,
UNCW 575; 13-V-18-3

- ★ ROV 18-05
 - ★ Mohawk ROV
 - ★ CTD
 - 201805133 - Transect 01
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Navy_2011_CONFIDENTIAL_US WTR_Tif

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/13/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 249

No. DVD: 1

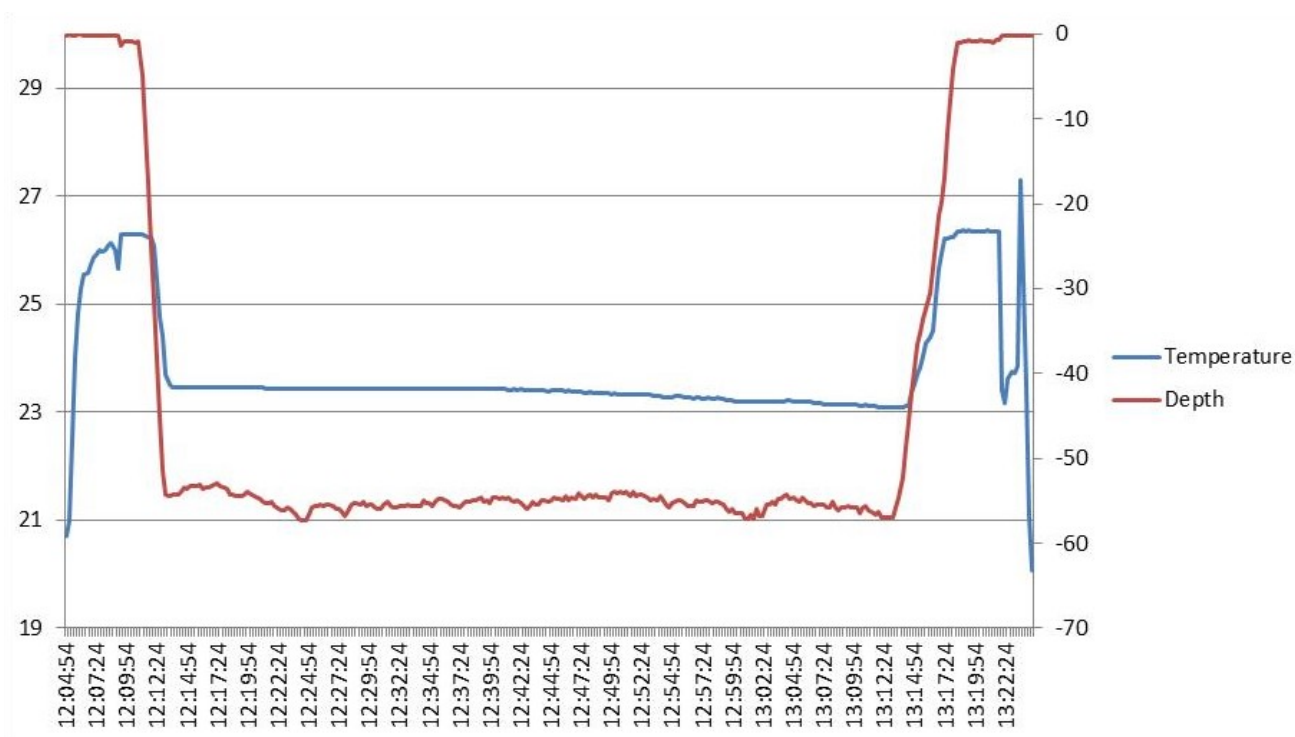
No. Hard Drive: 0

Dive Site: Florida, North Florida MPA; Target FL-3; 70 m; ROV 18-05, UNCW 575; 13-V-18-3

Dive Data:

Minimum Bottom Depth (m): 53.8	Total Transect Length (km): 0.747
Maximum Bottom Depth (m): 57.9	Surface Current (kn): 0.2
On Bottom (Time- EDST): 12:13	On Bottom (Lat/Long): 30.4593°N; -80.2005°W
Off Bottom (Time- EDST): 13:13	Off Bottom (Lat/Long): 30.4654°N; -80.1982°W
Physical (bottom); Temp (°C): 23.5	Salinity: N/A Visibility (m): 15 Current (kn): 0.25

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-05 are as follows: Depth Maximum: 57.2 m, Temperature: 23.1-23.5 °C.

Dive Site: Florida, North Florida MPA; Target FL-3; 70 m; ROV 18-05, UNCW 575; 13-V-18-3

Dive Imagery:



Figure 1: -58 m
Multibeam shows ridge but ROV only found scattered low relief boulders on sand.

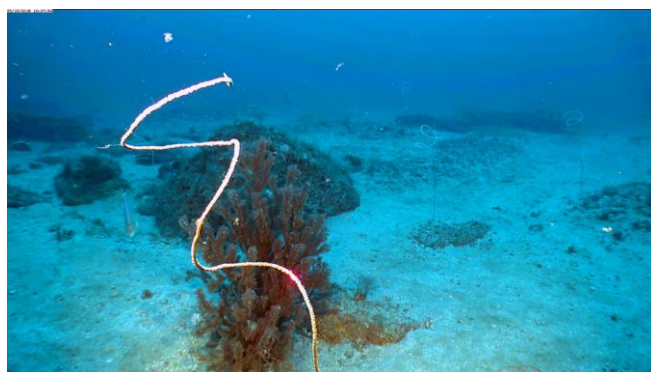


Figure 2: -59.7 m
Wire coral (*Stichopathes luetkeni*) and bushy black coral (*Tanacetipathes* sp.)



Figure 3: -57.9 m
Greater amberjack over low relief rock habitat.

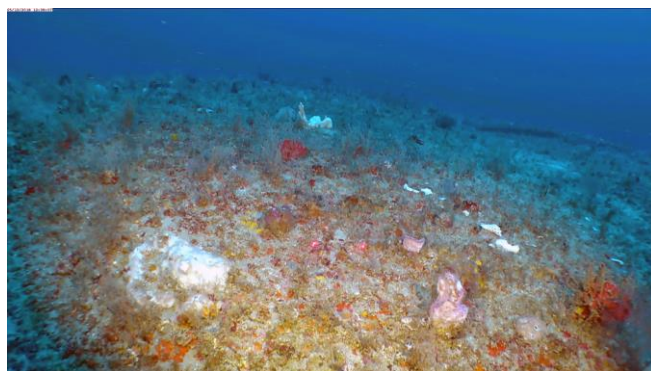


Figure 4: -57.8 m
Smooth rock pavement with cover of small algae, sponges, and hydroids.



Figure 5: -57.5 m
Blue angelfish, *Ircinia* sp. sponges.



Figure 6: -58.3 m
Rock ledge with vase sponges (*Ircinia campana*).

Dive Site: Florida, North Florida MPA; Target FL-3; 70 m; ROV 18-05, UNCW 575; 13-V-18-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 13-V-18-3; ROV 18-05, UNCW Dive 575; Florida, North Florida MPA, Target FL-3, 60 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization. Collect samples for HBOI taxonomy.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Digital still images were shot in Program Mode, ISO auto, White Balance- fish symbol, auto focus, strobe on, height 1.0 m, photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, 1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo- screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Both cameras had 10-cm parallel lasers for scale (green- Still; red- Video). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

Digital still camera not working, no flash. Used screen grabs for photo transects.

ROV depth off by -2.0 m (2 m too shallow). All depths noted below are actual depth (added 2 m to ROV readout).

Site Description/Habitat/Biota:

Depth range: 56- 59 m

MB map shows a narrow, N-S linear ridge, ridge appears wider and less pronounced than FL-1 and FL-2 sites; depth- 65 m east base, 58 m top. Transect along ridge, heading N. 5.6 km north of FI-02 site.

Weather- Cloudy, seas 1-2 ft swell from SE, wind 8 kn from 54 dg, air- 25.8, surface water- 26.36, salinity- 36.37, current- 0.2 kn to 341 dg.

12:09- Launch

12:13- On bottom- 57 m; visibility- 15 m, current 0.25 kn from E.

Target 80 m to N. Flat sediment, rubble, flat rock slabs >1/2 m. Pavement with sediment veneer, sand, rubble, small rock. *Stichopathes*, hydroids.

12:17- West base of ridge, 56 m. Rock slabs ½ m relief. DMST sponge, 15 cm yellow *Cinachyrella*.

12:20- looking for looking for ledge, pavement w/ sediment veneer, ½ m rock, 50% cover, low density of macrobiota. Few fish. No real ledge system here.

12:26- Heading N. No ledge system. 57 m, ½ m flat rock slabs, 50% cover, 0 slope, low rugosity, low density and diversity, few fish. *Stichopathes*, *Tanacetipathes*, *Ircinia campana*, *Filograna*, hydroid, no algae, 50 cm *Tanacetipathes*, school red porgy, lionfish. Clathriidae, 20 cm yellow *Cinachyrella*, Spirastrellidae, Axinellida

Dive Site: Florida, North Florida MPA; Target FL-3; 70 m; ROV 18-05, UNCW 575; 13-V-18-3

12:39- top of ridge, 57 m, no drop-off, scattered flat slabs and sand, ½ relief. Stingray, purple gorgonian, scamp, AJ,

12:50- Fishing line, *Muricea* common, *Aplysina* tubes,

13:09- end of dive, 59 m, same habitat.

Dominant Benthic Macrobiota:

Scleractinia coral- none

Antipatharia coral- *Tanacetipathes* (bushy, 30 cm, abundant), *Stichopathes* (abundant)

Gorgonia coral- Purple Plexauridae, *Muricea* sp.,

Porifera- *Ircinia campana*, *Ircinia* spp., Spirastrellidae, DMST, Clathriidae, *Cinachyrella*, *Aplysina*

Ascidiacea- Didemnidae

Annelida- *Filograna*

Algae- none observed

Samples:

1. *Tanacetipathes*

2. Demosponge tan starlet

3. *Madracis myriaster*

Human Debris:

Longline, fishing line

Dive Site: Florida, North Florida MPA; Target FL-3; 70 m; ROV 18-05, UNCW 575; 13-V-18-3

CPCe Percent Cover Analysis:

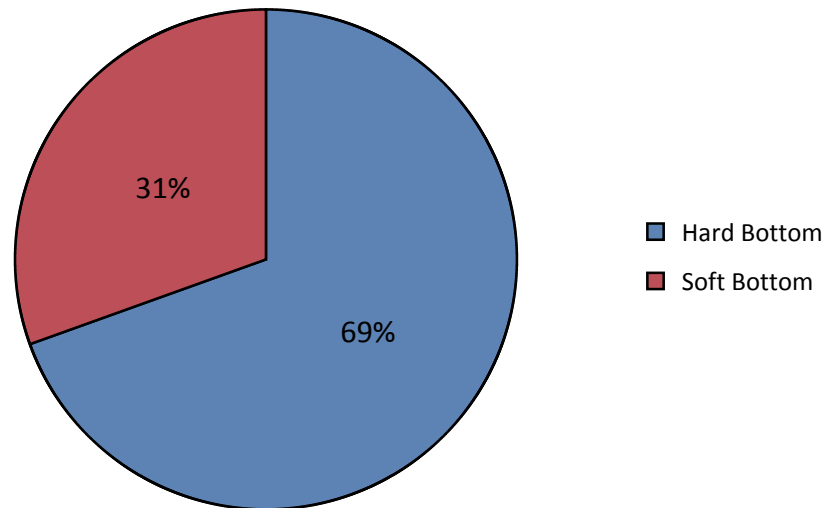


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-05. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

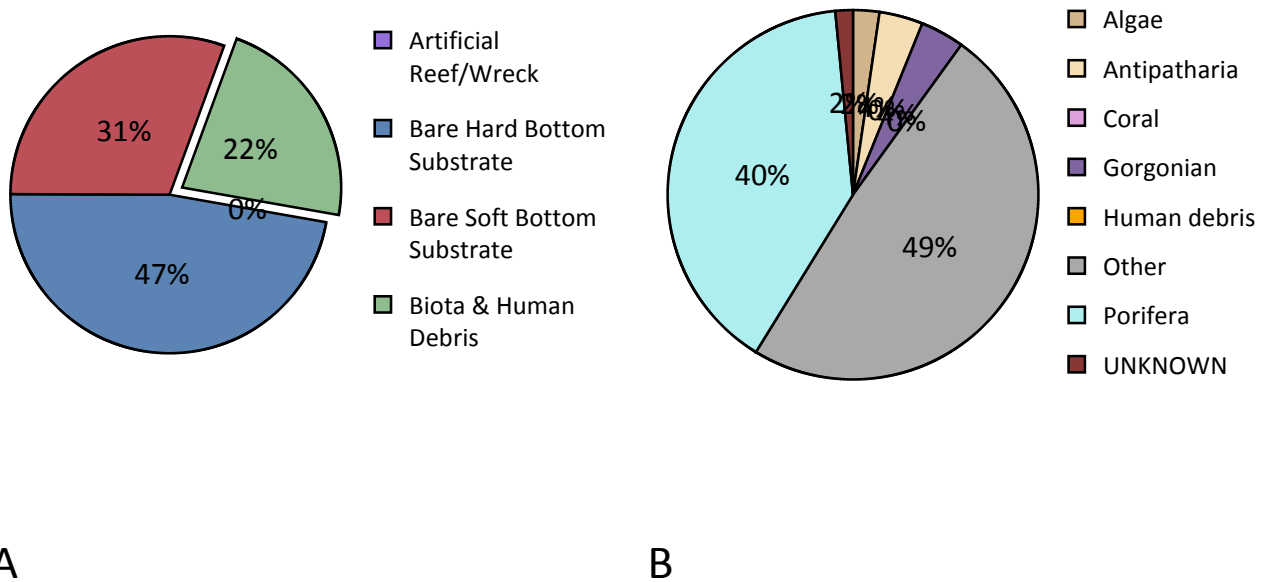


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-05. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: Florida, North Florida MPA; Target FL-3; 70 m; ROV 18-05, UNCW 575; 13-V-18-3

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-05.

	ROV 18-05	Note
	%	
Biota	22.20%	X
Algae	0.51%	
Rhodophyta	0.51%	
Corallinales	0.51%	
Porifera	8.81%	X
Demospongiae	8.81%	X
<i>Aplysina</i> sp.		X
Axinellidae		X
<i>Cinachyrella</i> sp.		X
<i>Clathria</i> sp.	0.17%	
Demospongiae- DMST	1.19%	X
Demospongiae- unid. sp.	2.71%	
<i>Ircinia campana</i> (Lamarck, 1814)	0.17%	X
<i>Ircinia</i> sp.	3.56%	X
<i>Ircinia strobilina</i> (Lamarck, 1816)	0.34%	
Microcionidae syn. Clathriidae		X
Spirastrellidae	0.68%	
<i>Xestospongia</i> sp.		X
Gorgonian	0.85%	X
Alcyonacea - gorgonian	0.85%	X
Alcyonacea- gorgonian	0.17%	
<i>Muricea</i> sp.	0.68%	X
Antipatharia	0.85%	X
Antipatharia	0.85%	X
<i>Stichopathes luetkeni</i> Brook, 1889	0.34%	X
<i>Tanacetipathes</i> sp.		X
<i>Tanacetipathes</i> sp.- bushy	0.51%	
Other	11.19%	X
Hydrozoa	9.83%	X
Hydroidolina	9.83%	X
Annelida	0.34%	X
<i>Filograna</i> sp.	0.34%	X
Bryozoa	0.34%	X
<i>Schizoporella</i> sp.	0.34%	X
Chordata - Invertebrate		X

Dive Site: Florida, North Florida MPA; Target FL-3; 70 m; ROV 18-05, UNCW 575; 13-V-18-3

Didemnidae		X
Chordata - Vertebrate	0.34%	X
Actinopterygii	0.34%	X
UNKNOWN	0.34%	
Bare Substrate	77.80%	X
Bare Hard Bottom	47.29%	X
Bare Hard Bottom	47.29%	X
Bare rock, pavement, boulder, ledge	46.78%	
Bare rubble/cobble	0.51%	
Octopus garden		X
Bare Soft Bottom	30.51%	
Human debris		X
Human debris		X
Human debris- fishing line		X
Grand Total	100.00%	X

Dive Site: Florida, North Florida MPA; Target FL-3; 70 m; ROV 18-05, UNCW 575; 13-V-18-3

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-05.

Taxa, Author- Common name	ROV 18-05
Actinopterygii	
Anguilliformes	
<i>Gymnothorax moringa</i> (Cuvier, 1829)- spotted moray	0.27
Beryciformes	
Holocentridae- squirrelfish	0.27
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	6.26
<i>Myripristis jacobus</i> Cuvier, 1829- blackbar soldierfish	5.17
<i>Plectrypops retrospinis</i> (Guichenot, 1853)- cardinal soldierfish	0.27
Perciformes	
<i>Acanthurus</i> sp.- surgeonfish	0.82
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	8.16
<i>Calamus</i> sp.- porgy	0.54
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	0.54
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	2.45
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	23.40
<i>Chromis enchrysur</i> Jordan & Gilbert, 1882- yellowtail reeffish	20.14
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	10.88
<i>Chromis scotti</i> Emery, 1968- purple reeffish	2.72
<i>Chromis</i> sp.- damselfish	1.09
<i>Equetus lanceolatus</i> (Linnaeus, 1758)- jackknife fish	0.82
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	49.52
<i>Halichoeres cyanocephalus</i> (Bloch, 1791)- yellowcheek wrasse	1.36
<i>Halichoeres garnoti</i> (Valenciennes, 1839)- yellowhead wrasse	5.99
<i>Halichoeres</i> sp.- wrasse	21.22
<i>Holacanthus</i> sp.- angelfish	4.90
<i>Holacanthus tricolor</i> (Bloch, 1795)- rock beauty	0.27
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	0.82
<i>Lutjanus analis</i> (Cuvier, 1828)- mutton snapper	1.90
<i>Lutjanus</i> sp.- snapper	0.54
<i>Malacanthus plumieri</i> (Bloch, 1786)- sand tilefish	0.82
<i>Mycteroperca microlepis</i> (Goode & Bean, 1879)- gag grouper	0.54
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	0.82
<i>Pagrus pagrus</i> (Linnaeus, 1758)- red porgy	7.07
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	0.82
<i>Pomacanthus paru</i> (Bloch, 1787)- french angelfish	0.82
<i>Priacanthus arenatus</i> Cuvier, 1829- bigeye	0.27
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye	0.27
<i>Pseudupeneus maculatus</i> (Bloch, 1793)- spotted goatfish	0.27
<i>Seriola dumerili</i> (Risso, 1810)- greater amberjack	1.09

Dive Site: Florida, North Florida MPA; Target FL-3; 70 m; ROV 18-05, UNCW 575; 13-V-18-3

<i>Seriola rivoliana</i> Valenciennes, 1833- almaco jack	0.54
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	2.45
<i>Serranus baldwini</i> (Evermann & Marsh, 1899)- lantern bass	1.63
<i>Serranus phoebe</i> Poey, 1851- tattler	5.71
<i>Stegastes partitus</i> (Poey, 1868)- bicolor damselfish	0.27
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	8.71
Tetraodontiformes	
<i>Balistes capriscus</i> Gmelin, 1789- grey triggerfish	5.99
<i>Balistes vetula</i> Linnaeus, 1758- queen triggerfish	0.82
<i>Canthigaster</i> sp.- puffer	9.52
Elasmobranchii	
Myliobatiformes	
<i>Dasyatis</i> sp.- sting ray	0.27
UNKNOWN	2.45

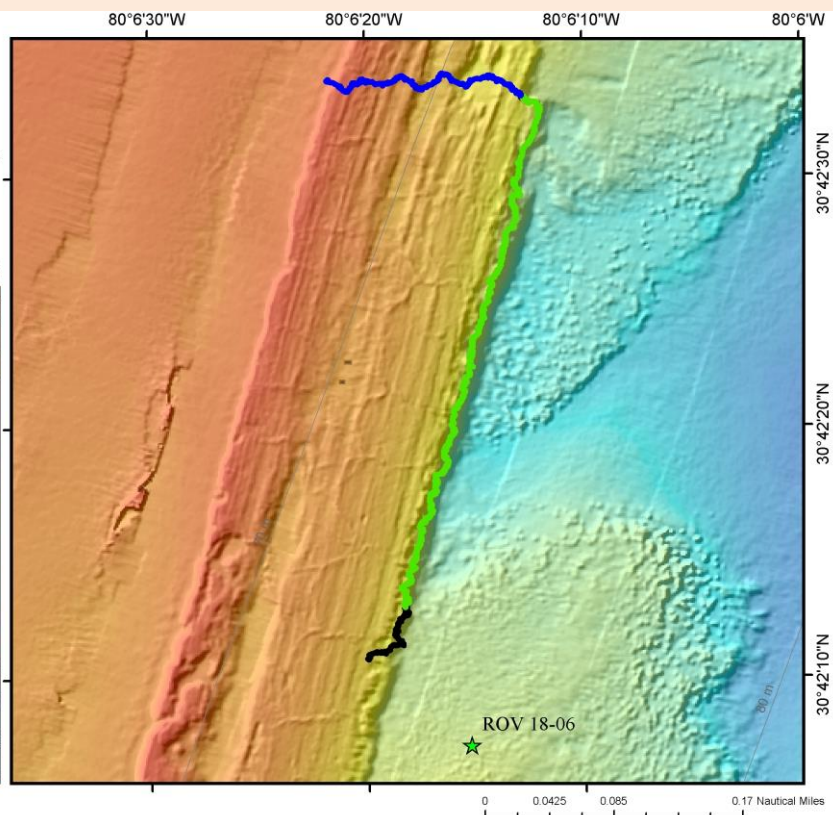
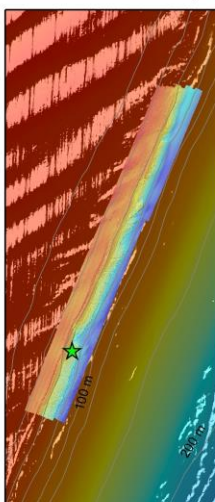
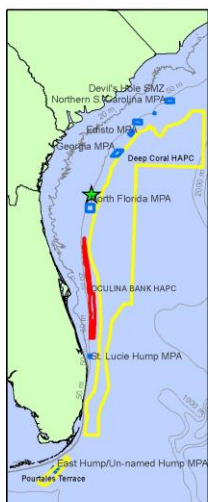
Dive Site: Florida, Outside North Florida MPA; Target FL-07; 60 m; ROV 18-06, UNCW 576; 13-V-18-4

General Location and Dive Track:

Florida, Outside North Florida MPA;
Target FL-07; 60 m; ROV 18-06,
UNCW 576; 13-V-18-4

- ★ ROV 18-06
- ★ Mohawk ROV
- ★ CTD
- 201805134 - Transect 01
- 201805134 - Transect 02
- ROV Track

- Oculina HAPC
- MPA
- Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: NancyFoster_14_08_MPA_Fernandina

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/13/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 558

No. DVD: 2

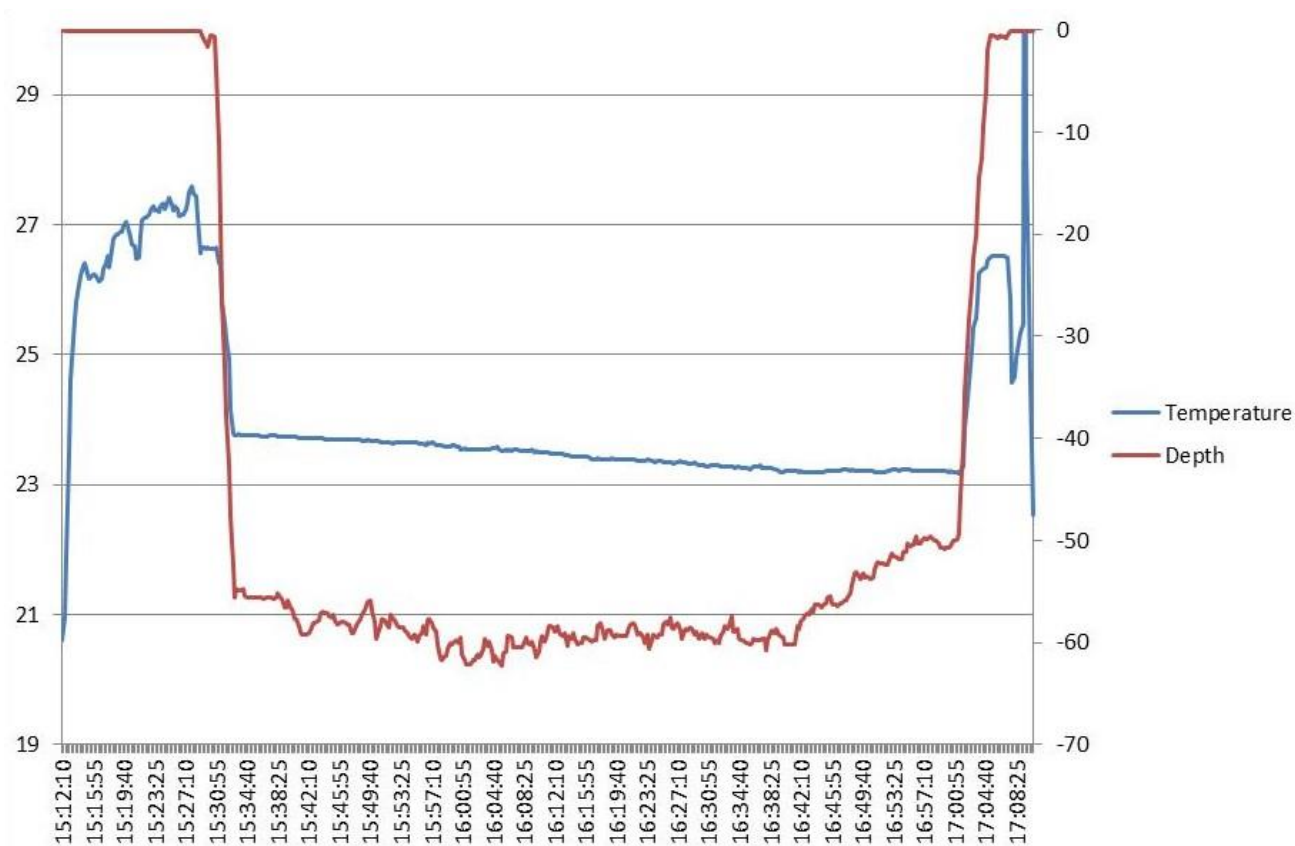
No. Hard Drive: 1

Dive Site: Florida, Outside North Florida MPA; Target FL-07; 60 m; ROV 18-06, UNCW 576; 13-V-18-4

Dive Data:

Minimum Bottom Depth (m):	50.2	Total Transect Length (km):	0.992
Maximum Bottom Depth (m):	63.2	Surface Current (kn):	1.3
On Bottom (Time- EDST):	15:33	On Bottom (Lat/Long):	30.703°N; -80.1056°W
Off Bottom (Time- EDST):	16:59	Off Bottom (Lat/Long):	30.7094°N; -80.1061°W
Physical (bottom); Temp (°C):	23.8	Salinity: N/A	Visibility (m): 10
		Current (kn):	0.75

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-06 are as follows: Depth Maximum: 62.3 m, Temperature: 23.2-23.8 °C.

Dive Site: Florida, Outside North Florida MPA; Target FL-07; 60 m; ROV 18-06, UNCW 576; 13-V-18-4

Dive Imagery:



Figure 1: -58.4 m
Patch of *Icilogorgia schrammi* gorgonian.



Figure 2: -62.1 m
School of tomtate and vermilion snapper on east slope of ridge.



Figure 3: -60.9 m
Tomtate and cubbyu.



Figure 4: -60 m
Hogfish.



Figure 5: -60.4 m
Fractured rock slabs on east slope of ridge.



Figure 6: -61.2 m
Wire coral (*Stichopathes luetkeni*), bushy black coral (*Tanacetipathes* sp.), and encrusting sponges.

Dive Site: Florida, Outside North Florida MPA; Target FL-07; 60 m; ROV 18-06, UNCW 576; 13-V-18-4

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 13-V-18-4; ROV 18-06, UNCW Dive 576; Florida, outside North Florida MPA, 60 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Digital still images were shot in Program Mode, ISO auto, White Balance- fish symbol, auto focus, strobe on, height 1.0 m, photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, 1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo- screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Both cameras had 10-cm parallel lasers for scale (green- Still; red- Video). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

Digital still camera not working, no flash. Used screen grabs for photo transects.

ROV depth off by -2.0 m (2 m too shallow). All depths noted below are actual depth (added 2 m to ROV readout).

Site Description/Habitat/Biota:

Depth range: 52- 62 m

MB map shows a NNE-SSW linear ridge, depth- 61 m east base, 52 m top. Appears as double ridge, east ridge, then flat terrace to west, then second west ridge. Transect along ridge, heading N. WP 1 at base of East ridge. West ridge, 50.6 m top, 51.6 m west base.

Weather- Cloudy, seas 1-2 ft swell from SE, wind 11 kn from 108 dg, air- 25.7, surface water- 26.62, salinity- 36.34, current- 1.3 kn to 328 dg.

15:27- Launch

15:32- On bottom- 58 m; visibility- 10 m, current 0.75 kn from SE; 50 m SW of WP 1.

Flat, pavement sediment veneer, ½ m flat rock slabs. *Stichopathes*, *Ircinia*, purple gorgonacea, *Muricea*, *Didemnidae*.

15:38- 1 m relief rock slabs, dense field of *Icilogorgia schrammi*, dense biota, 30 cm *Tanacetipathes*, *Stichopathes*, *Ircinia campana*, purple gorgonacea, *Filograna*, *Didemnidae*.

15:42- east base and slope of ridge; 62 m at base, 20o slope, 1-2 m relief, rock slabs; dense biota, encrusting sponges, *Spirastrellidae*, dense tomtates, *Tanacetipathes*, *Prognathodes aya*, squirrelfish, *Stichopathes*, hogfish, goliath grouper- 2 ½ ft, big scamp, lionfish.

Dive Site: Florida, Outside North Florida MPA; Target FL-07; 60 m; ROV 18-06, UNCW 576; 13-V-18-4

15:49- Top ridge 59 m, 3 m total relief. Flat rock, fractured on top. East slope ~10 m wide.

Blue angelfish, reef butterfly, no algae, *Aplysina*, *Panulirus argus*, hydroids, *Madracis myriaster* (purple, white on vertical rock, 15 cm); scamp, red snapper, gag, Axinellidae, thousands of tomtate, orange *Cinachyrella*, 30 cm *Solanderia* hydroid.

16:08- east slope, high rugosity, 2-3 m relief, rock slaps, dense fish and biota. More fish here than inside MPA, more grouper, no fishing lines so far. Weird. Banded butterfly, AJ,

16:38- same habitat, east ridge slope, barracuda, jackknife fish, lionfish.

16:43- Change heading, head west to West ridge. On terrace- 59 m, rock pavement, < ½ m ledges, sparse biota, no fish. Sand and rubble, sand waves. 57 m half way across terrace, rock pavement, ½ m ledges.

16:55- top of west ridge, 52 m, flat pavement, sand. *Titanideum frauenfeldii*

16:59- base of west ridge, 53.5 m. 5 m wide zone of flat rock slabs, 30 cm relief. Flat sand to the west of the ridge.

17:01- end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- few *Madracis myriaster* (purple, white, 20 cm)

Antipatharia coral- *Tanacetipathes* (bushy, 30 cm, abundant), *Stichopathes* (abundant)

Gorgonia coral- Purple Plexauridae, *Muricea* sp., patch of *Icilogorgia schrammi*, *Titanideum frauenfeldii*

Porifera- *Ircinia campana*, *Ircinia* spp., Spirastrellidae, Clathriidae, *Cinachyrella*, *Aplysina*

Asciacea- Didemnidae

Annelida- *Filograna*

Decapoda- *Panulirus argus* (1)

Algae- none observed

Human Debris:

1 rope; no fishing line (and outside of MPA!)

Dive Site: Florida, Outside North Florida MPA; Target FL-07; 60 m; ROV 18-06, UNCW 576; 13-V-18-4

CPCe Percent Cover Analysis:

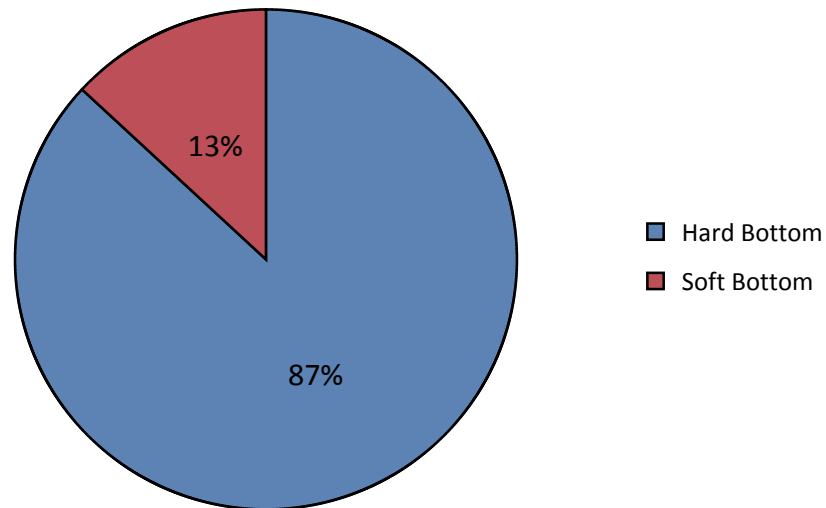


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-06. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

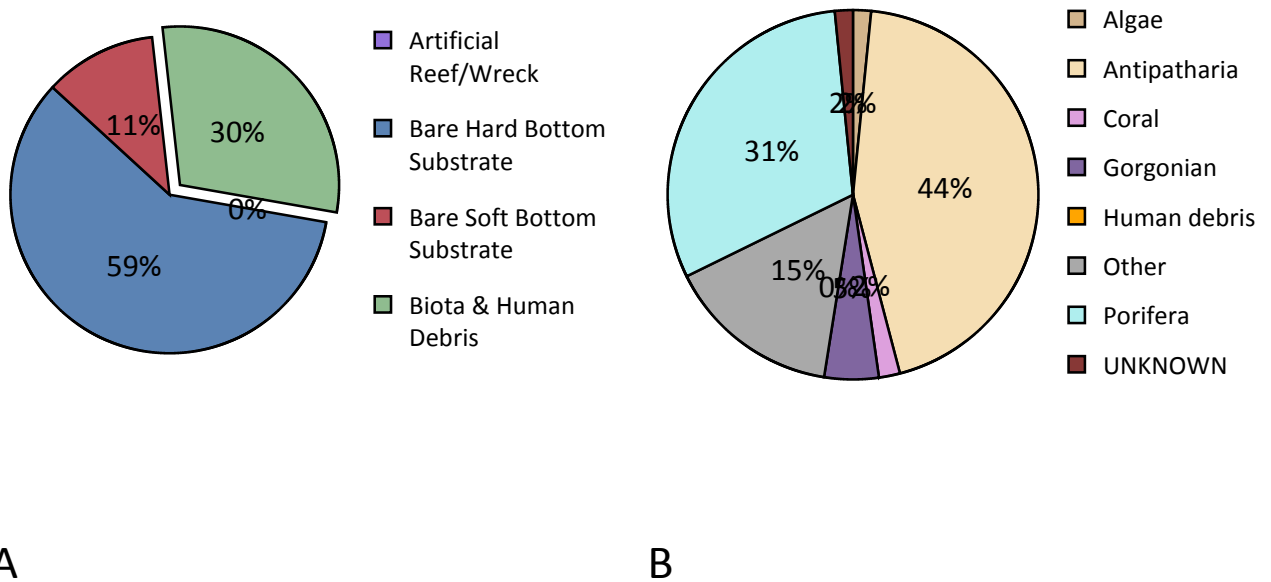


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-06. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: Florida, Outside North Florida MPA; Target FL-07; 60 m; ROV 18-06, UNCW 576; 13-V-18-4

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-06.

	ROV 18-06	
	%	Note
Biota	29.53%	X
Algae	0.47%	
Ochrophyta	0.08%	
Rhodophyta	0.39%	
Corallinales	0.39%	
Porifera	9.07%	X
Demospongiae	9.07%	X
<i>Aplysina</i> sp.	0.08%	X
Axinellidae		X
<i>Cinachyrella</i> sp.		X
<i>Cliona</i> sp.	0.08%	
Demospongiae- DMST	0.08%	
Demospongiae- orange encrusting porous		X
Demospongiae- unid. sp.	4.73%	
<i>Erylus</i> sp.	0.54%	X
<i>Ircinia campana</i> (Lamarck, 1814)	0.47%	X
<i>Ircinia</i> sp.	0.54%	
Spirastrellidae	2.56%	X
Coral	0.54%	X
Coral- Scleractinia	0.54%	X
<i>Madracis myriaster</i> (Milne Edwards & Haime, 1850)	0.47%	X
<i>Oculina varicosa</i> Le Sueur, 1820	0.08%	
Gorgonian	1.40%	X
Alcyonacea - gorgonian	1.40%	X
Alcyonacea- gorgonian	0.16%	
<i>Diodogorgia</i> sp.	0.47%	X
<i>Iciligorgia schrammi</i> Duchassaing, 1870		X
<i>Muricea</i> sp.	0.78%	X
<i>Titanideum frauenfeldii</i> (Kölliker, 1865)		X
Antipatharia	13.10%	X
Antipatharia	13.10%	X
Antipatharia unid. sp.	0.39%	
<i>Antipathes atlantica</i> Gray, 1857		X
<i>Antipathes furcata</i> Gray, 1857	0.16%	
<i>Stichopathes luetkeni</i> Brook, 1889	4.11%	X

Dive Site: Florida, Outside North Florida MPA; Target FL-07; 60 m; ROV 18-06, UNCW 576; 13-V-18-4

<i>Tanacetipathes</i> sp.		X
<i>Tanacetipathes</i> sp.- bushy	8.37%	
<i>Tanacetipathes tanacetum</i> (Pourtalès, 1880)	0.08%	
Other	4.96%	X
Hydrozoa	1.94%	X
Hydroidolina	1.94%	X
<i>Solanderia</i> sp.		X
Annelida	0.23%	X
<i>Filograna</i> sp.	0.16%	X
<i>Spirobranchus giganteus</i> (Pallas, 1766)	0.08%	
Bryozoa	0.16%	
<i>Schizoporella</i> sp.	0.16%	
Arthropoda		X
<i>Panulirus argus</i> (Latreille, 1804)		X
Echinodermata	0.08%	X
<i>Eucidaris tribuloides</i> (Lamarck, 1816)	0.08%	
Holothuroidea		X
Chordata - Invertebrate	0.16%	X
Didemnidae	0.16%	X
Chordata - Vertebrate	1.94%	X
Actinopterygii	1.94%	X
UNKNOWN	0.47%	
Bare Substrate	70.47%	
Bare Hard Bottom	59.07%	
Bare Hard Bottom	59.07%	
Bare rock, pavement, boulder, ledge	57.29%	
Bare rubble/cobble	1.71%	
dead standing Scleractinia (habitat)	0.08%	
Bare Soft Bottom	11.40%	
Human debris		X
Human debris		X
Human debris- anchor line		X
Grand Total	100.00%	X

Dive Site: Florida, Outside North Florida MPA; Target FL-07; 60 m; ROV 18-06, UNCW 576; 13-V-18-4

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-06.

Taxa, Author- Common name	ROV 18-06
Actinopterygii	
Beryciformes	
Holocentridae- squirrelfish	2.78
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	10.20
<i>Myripristis jacobus</i> Cuvier, 1829- blackbar soldierfish	9.97
<i>Plectrypops retrospinis</i> (Guichenot, 1853)- cardinal soldierfish	0.46
Ostraciidae	
Ostraciidae- boxfish	0.23
Perciformes	
<i>Apogon pseudomaculatus</i> Longley, 1932- twospot cardinalfish	0.23
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	14.61
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	0.70
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	4.17
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	21.57
Chaetodontidae- butterflyfish	0.69
<i>Chromis enchrysurus</i> Jordan & Gilbert, 1882- yellowtail reef fish	1.62
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	3.25
<i>Chromis scotti</i> Emery, 1968- purple reef fish	4.64
<i>Chromis</i> sp.- damselfish	1.86
<i>Clepticus parrae</i> (Bloch & Schneider, 1801)- creole wrasse	0.46
<i>Epinephelus itajara</i> (Lichtenstein, 1822)- goliath grouper	0.23
<i>Equetus lanceolatus</i> (Linnaeus, 1758)- jackknife fish	2.78
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	1517.86
<i>Halichoeres cyanocephalus</i> (Bloch, 1791)- yellowcheek wrasse	0.93
<i>Halichoeres garnoti</i> (Valenciennes, 1839)- yellowhead wrasse	14.38
<i>Halichoeres</i> sp.- wrasse	14.61
<i>Holacanthus</i> sp.- angelfish	9.97
<i>Holacanthus tricolor</i> (Bloch, 1795)- rock beauty	0.23
<i>Lachnolaimus maximus</i> (Walbaum, 1792)- hogfish	0.46
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	0.70
<i>Lutjanus analis</i> (Cuvier, 1828)- mutton snapper	0.93
<i>Lutjanus apodus</i> (Walbaum, 1792)- schoolmaster	0.70
<i>Lutjanus buccanella</i> (Cuvier, 1828)- blackfin snapper	0.23
<i>Lutjanus griseus</i> (Linnaeus, 1758)- grey snapper	6.49
<i>Lutjanus</i> sp.- snapper	1.16
<i>Mycteroperca microlepis</i> (Goode & Bean, 1879)- gag grouper	0.46
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	3.25
<i>Pagrus pagrus</i> (Linnaeus, 1758)- red porgy	1.62

Dive Site: Florida, Outside North Florida MPA; Target FL-07; 60 m; ROV 18-06, UNCW 576; 13-V-18-4

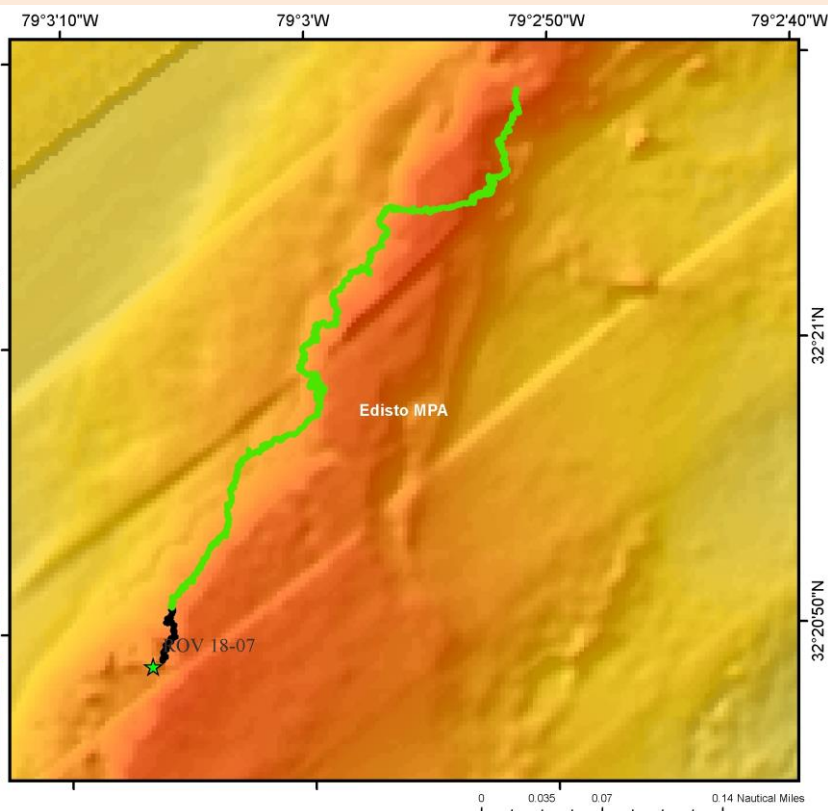
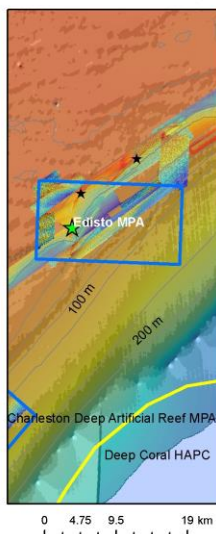
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	9.97
<i>Pomacanthus paru</i> (Bloch, 1787)- french angelfish	2.32
<i>Pomacanthus</i> sp.- angelfish	0.46
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	4.87
<i>Pseudupeneus maculatus</i> (Bloch, 1793)- spotted goatfish	3.01
<i>Rhomboplites aurorubens</i> (Cuvier, 1829)- vermilion snapper	768.78
<i>Rypticus saponaceus</i> (Bloch & Schneider, 1801)- greater soapfish	1.16
<i>Seriola dumerili</i> (Risso, 1810)- greater amberjack	0.46
<i>Seriola rivoliana</i> Valenciennes, 1833- almaco jack	0.46
<i>Seriola</i> sp.- amberjack	1.86
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	1.39
<i>Serranus baldwini</i> (Evermann & Marsh, 1899)- lantern bass	0.23
<i>Serranus phoebe</i> Poey, 1851- tattler	0.70
Sparidae- porgy	0.23
<i>Sphyræna barracuda</i> (Edwards, 1771)- barracuda	1.86
<i>Stegastes partitus</i> (Poey, 1868)- bicolor damselfish	0.23
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	8.35
Syngnathiformes	
<i>Aulostomus maculatus</i> Valenciennes, 1841- trumpetfish	0.46
<i>Fistularia tabacaria</i> Linnaeus, 1758- bluespotted cornetfish	0.70
Tetraodontiformes	
<i>Acanthostracion polygonius</i> Poey, 1876- honeycomb cowfish	0.23
<i>Acanthostracion</i> sp.	
Bleeker, 1865- cowfish	0.46
<i>Balistes capriscus</i> Gmelin, 1789- grey triggerfish	1.62
<i>Balistes</i> sp.- triggerfish	0.46
<i>Balistes vetula</i> Linnaeus, 1758- queen triggerfish	0.70
<i>Canthigaster</i> sp.- puffer	16.00
UNKNOWN	34.79

Dive Site: South Carolina, Edisto MPA; Target ED-02; 50 m; ROV 18-07, UNCW 577; 14-V-18-1

General Location and Dive Track:

South Carolina, Edisto MPA;
Target ED-02; 50 m; ROV 18-07,
UNCW 577; 14-V-18-1

- ★ ROV 18-07
 - ★ Mohawk ROV
 - ★ CTD
 - 201805141 - Transect 01
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Sedberry_OEBlock345_5m_UT M17N_MB

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/14/2018

Data Management: Access Database

No. Specimens: 6

No. Photos: 362

No. DVD: 3

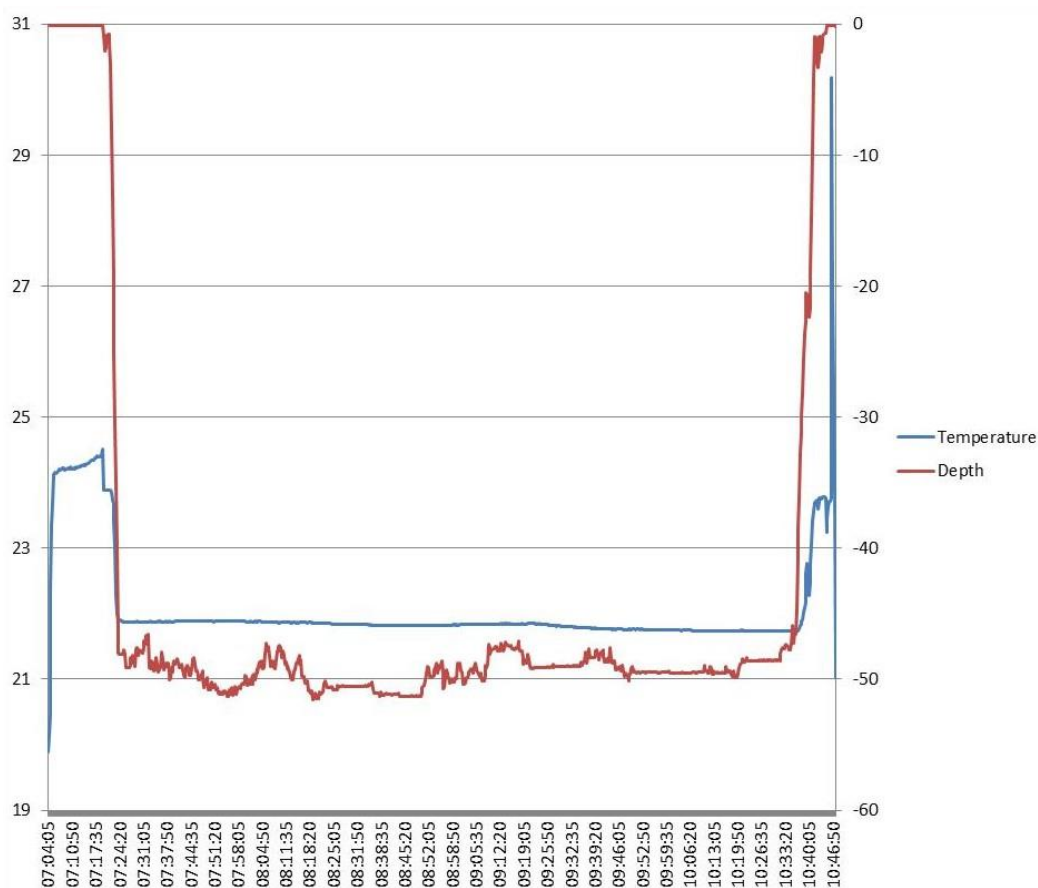
No. Hard Drive: 1

Dive Site: South Carolina, Edisto MPA; Target ED-02; 50 m; ROV 18-07, UNCW 577; 14-V-18-1

Dive Data:

Minimum Bottom Depth (m):	47	Total Transect Length (km):	0.899
Maximum Bottom Depth (m):	52.2	Surface Current (kn):	.4
On Bottom (Time- EDST):	7:23	On Bottom (Lat/Long):	32.347°N; -79.0517°W
Off Bottom (Time- EDST):	10:34	Off Bottom (Lat/Long):	32.3525°N; -79.0476°W
Physical (bottom); Temp (°C):	21.7	Salinity: N/A	Visibility (m): 10 Current (kn): 0.25

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-07 are as follows: Depth Maximum: 51.6 m, Temperature: 21.7-21.9 °C.

Dive Site: South Carolina, Edisto MPA; Target ED-02; 50 m; ROV 18-07, UNCW 577; 14-V-18-1

Dive Imagery:



Figure 1: -51.5 m
Scamp grouper on top of mound.



Figure 2: -53.3 m
Bluespotted cornetfish.



Figure 3: -51.7 m
Pair of sandbar sharks.



Figure 4: -52.4 m
Undercut rock ledge on slope of reef.



Figure 5: -52.5 m
Rock beauty, squirrelfish, and school of striped grunt.



Figure 6: -53 m
Rock beauty and school of striped grunt. Rock pavement on top of ridge.

Dive Site: South Carolina, Edisto MPA; Target ED-02; 50 m; ROV 18-07, UNCW 577; 14-V-18-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 14-V-18-1; ROV 18-07, UNCW Dive 577; South Carolina, Edisto MPA, ED-2, 50 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization. Objective to collect *Swiftia exserta* for NOAA Deep Sea Coral Program.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Digital still images were shot in Program Mode, ISO auto, White Balance- fish symbol, auto focus, strobe on, height 1.0 m, photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, 1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo- screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Both cameras had 10-cm parallel lasers for scale (green- Still; red- Video). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

Digital still camera not working, no flash. Used screen grabs for photo transects.

ROV depth off by -2.0 m (2 m too shallow). All depths noted below are actual depth (added 2 m to ROV readout).

Site Description/Habitat/Biota:

Depth range: 48-53 m

MB map shows oval mound, 48 m top, 55 m base. Transect N along top of mound.

Weather- Cloudy, seas 1 ft calm, wind 7 kn from 171 dg, air- 24.9, surface water- 23.93, salinity- 36.39, current- 0.4 kn to 55 dg.

7:18- Launch

7:24- On bottom- 52 m; visibility- 10 m, current 0.5 kn from W.

On bottom at target. Upper west edge of mound. 1-2 m relief, flat rock slabs, dense Didemnidae, purple gorgonians, *Tanacetipathes*, hydroids, scamp common, tomtate. High rugosity, *Ircinia*, *Antipathes atlantica*, *Diodogorgia*, Lionfish, CCA, *Spirastrellidae*, *Stichopathes*,

7:48- west base of mound, 53 m, 25 cm to 1 m boulders, flat, Plexauridae, *Filograna*, 5-10 spp. Demosponges, *Diodogorgia* common, *Callyspongia vaginalis*.

8:18- looking for *Swiftia*, can't find any. *Ellisella* orange sparse branching, *Ircinia campana* common,

8:22- Sample 1, *Swiftia exserta*, 15 cm, on edge of rock, 51 m, rare, polyps exsert,

8:36- Sample 2, *Swiftia*, 10 cm, 52 m, base of west slope, rock slabs.

Fishing line,

8:53- green bushy looks like *Dictyota*, but is not, may be hydroid, has polyps,

8:54- 2 sandbar sharks, *Prognathodes aya*, rock beauty, squirrel fish, lionfish, tomtate, scamp.

3 m relief, west slope, *Ircinia strobilina*.

In ROV 16-11 dive bottom 50% relative cover of algae (7% *Dictyota*), now no fleshy algae, and biota not dense. What happened?

9:08- Transect NE across of top of ridge, 48 m, flat rock pavement, sparse biota, 100% rock, 30 cm *Muricea*, *Stichopathes*, *Plexauridae*, *Didemnidae*, no algae, cup corals, *Spirastrellidae*, low relief ledges 25 cm, *Ellisella*, *Diodogorgia*, few fish, goatfish, *Ircinia campana*, squirrel fish, *Filograna*, *Callyspongia vaginalis*,

9:20- east edge, top 48 m; slope 10 dg, ½ to 1 m rock slabs, 10 m wide; base rubble and sediment.

9:21- Sample 3- *Swiftia*, 52 m, east base, rock slabs, rare, 15 cm; orange, polyps exsert.

9:35- *Schizoporella*, blue angel, jack, spanish hogfish, reef butterfly, very dense *Didemnidae*

9:40- Heading N along east slope, 1 m relief, low slope, low rugosity. Spotfin butterfly,

9:50- Sample 4- *Swiftia*, 10 cm, orange, polyps exsert, 52 m, east slope.

10:05- Sample 5- single stalk *Tanacetipathes*, 15 cm, light brown, near S- 4, 52 m, east base.

10:14- Continue N along east slope, DMST sponge,

10:22- Sample 6- *Swiftia*, 15 cm, orange, polyps exsert, 51 m, east slope.

Rhodophyta- dark purple, thin flat branches, bifurcate. *Agelas clathrodes*.

10:34- end dive, 50 m, east slope.

Dominant Benthic Macrobiota:

Scleractinia coral- none

Antipatharia coral- *Tanacetipathes* (bushy, uncommon), *Stichopathes* (common)

Gorgonia coral- Purple *Plexauridae*, *Muricea* sp., *Swiftia exserta* (uncommon), *Ellisella* spp.

Porifera- *Ircinia campana*, *Ircinia* spp., *Spirastrellidae*, DMST, *Callyspongia vaginalis*, *Agelas clathrodes* (rare)

Asciacea- *Didemnidae* (dense)

Annelida- *Filograna*

Algae- sparse (abundant in 2016, *Dictyota* abundant), Rhodophyta (thin flat blades), CCA, no *Dictyota*

Samples:

Swiftia exserta (6- for Peter Etnoyer, NOAA DSCE Program)

Tanacetipathes (1- single stalk for HBOI taxonomy)

Human Debris:

Fishing line- 1

Dive Site: South Carolina, Edisto MPA; Target ED-02; 50 m; ROV 18-07, UNCW 577; 14-V-18-1

CPCe Percent Cover Analysis:

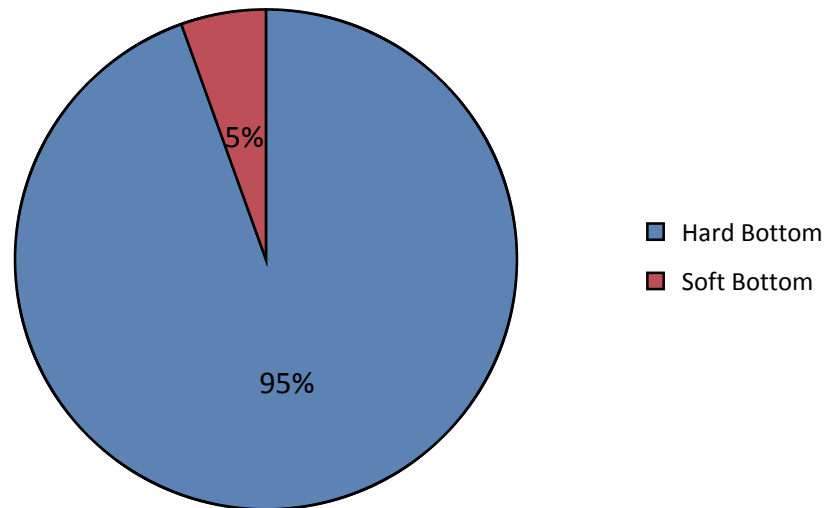


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-07. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

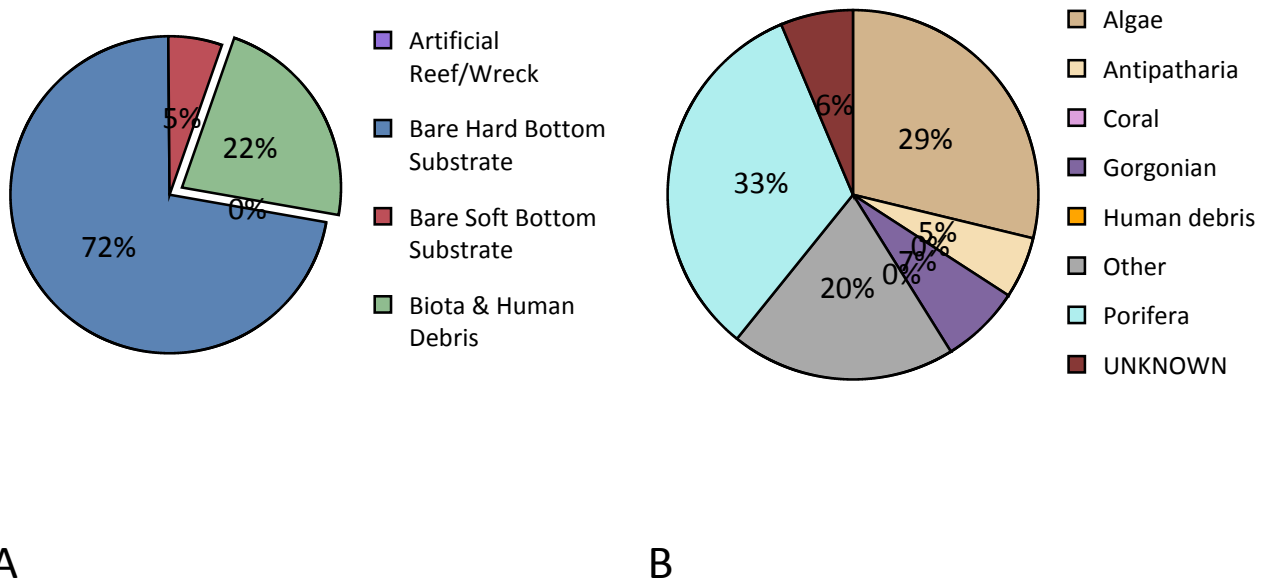


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-07. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: South Carolina, Edisto MPA; Target ED-02; 50 m; ROV 18-07, UNCW 577; 14-V-18-1

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-07.

	ROV 18-07 %	Note
Biota	22.44%	X
Algae	6.46%	X
Algae- Unid.	0.07%	
Ochrophyta	1.28%	
<i>Dictyota</i> sp.	0.64%	
Ochrophyta	0.64%	
Rhodophyta	5.11%	X
Corallinales	3.91%	
Corallinophycidae		X
Rhodophyta	1.21%	X
Porifera	7.39%	X
Demospongiae	7.39%	X
<i>Agelas clathrodes</i> (Schmidt, 1870)	0.07%	X
<i>Agelas</i> sp.	0.07%	
<i>Aiolochoira crassa</i> (Hyatt, 1875)	0.07%	
<i>Aplysina</i> sp.	0.28%	
Axinellidae		X
<i>Callyspongia (Cladochalina) vaginalis</i> (Lamarck, 1814)		X
Demospongiae- DMST	0.07%	X
Demospongiae- unid. sp.	3.62%	
Erylus sp.	0.07%	
<i>Geodia neptuni</i> complex (Sollas, 1886)	0.57%	
<i>Geodia</i> sp.	0.14%	
<i>Ircinia campana</i> (Lamarck, 1814)	0.21%	X
<i>Ircinia</i> sp.	0.36%	
<i>Ircinia strobilina</i> (Lamarck, 1816)		X
<i>Niphates</i> sp.	0.14%	
Spirastrellidae	1.70%	X
Gorgonian	1.56%	X
Alcyonacea - gorgonian	1.56%	X
<i>Diodogorgia</i> sp.	0.85%	X
<i>Ellisella</i> sp.	0.07%	X
Ellisellidae	0.36%	
<i>Muricea</i> sp.	0.14%	X

Dive Site: South Carolina, Edisto MPA; Target ED-02; 50 m; ROV 18-07, UNCW 577; 14-V-18-1

Plexauridae		X
<i>Swiftia exserta</i> (Ellis & Solander, 1786)	0.14%	X
Antipatharia	1.21%	X
Antipatharia	1.21%	X
Antipatharia unid. sp.	0.21%	
<i>Antipathes atlantica</i> Gray, 1857	0.64%	X
<i>Antipathes furcata</i> Gray, 1857	0.07%	
<i>Stichopathes luetkeni</i> Brook, 1889	0.21%	X
<i>Tanacetipathes</i> sp.		X
<i>Tanacetipathes</i> sp.- bushy	0.07%	
Other	5.82%	X
Hydrozoa	1.35%	X
Hydroidolina	1.35%	X
Annelida	0.43%	X
<i>Filograna</i> sp.	0.43%	X
Bryozoa		X
<i>Schizoporella</i> sp.		X
Mollusca		X
<i>Spondylus</i> sp.		X
Chordata - Invertebrate	1.49%	X
Asciacea	0.07%	
Didemnidae	1.42%	X
Chordata - Vertebrate	1.14%	X
Actinopterygii	1.14%	X
UNKNOWN	1.42%	
Bare Substrate	77.56%	
Bare Hard Bottom	72.09%	
Bare Hard Bottom	72.09%	
Bare rock, pavement, boulder, ledge	71.95%	
Bare rubble/cobble	0.14%	
Bare Soft Bottom	5.47%	
Human debris		X
Human debris		X
Human debris- fishing line		X
Grand Total	100.00%	X

Dive Site: South Carolina, Edisto MPA; Target ED-02; 50 m; ROV 18-07, UNCW 577; 14-V-18-1

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-07.

Taxa, Author- Common name	ROV 18-07
Actinopterygii	
Anguilliformes	
<i>Gymnothorax moringa</i> (Cuvier, 1829)- spotted moray	0.59
<i>Muraena robusta</i> Osório, 1911- stout moray	0.20
Aulopiformes	
<i>Synodus</i> sp.- lizardfish	0.20
Beryciformes	
Holocentridae- squirrelfish	4.51
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	19.22
<i>Holocentrus rufus</i> (Walbaum, 1792)- longspine squirrelfish	0.20
<i>Myripristis jacobus</i> Cuvier, 1829- blackbar soldierfish	2.16
<i>Plectrypops retrospinis</i> (Guichenot, 1853)- cardinal soldierfish	0.20
Ostraciidae	
Ostraciidae- boxfish	0.39
Perciformes	
<i>Acanthurus</i> sp.- surgeonfish	1.37
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	9.41
<i>Bodianus rufus</i> (Linnaeus, 1758)- spanish hogfish	0.98
<i>Calamus</i> sp.- porgy	2.35
Carangidae- jack	3.33
<i>Centropyge argi</i> Woods & Kanazawa, 1951- cherubfish	2.16
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	7.06
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	4.51
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	25.69
<i>Chromis cyanea</i> (Poey, 1860)- blue chromis	0.20
<i>Chromis enchrysur</i> Jordan & Gilbert, 1882- yellowtail reefish	0.39
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	29.22
<i>Chromis scotti</i> Emery, 1968- purple reefish	16.86
<i>Chromis</i> sp.- damselfish	5.69
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	205.88
<i>Haemulon</i> sp.- grunt	536.27
<i>Haemulon striatum</i> (Linnaeus, 1758)- striped grunt	153.92
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	0.78
<i>Halichoeres garnoti</i> (Valenciennes, 1839)- yellowhead wrasse	8.63
<i>Halichoeres</i> sp.- wrasse	4.71
<i>Holacanthus</i> sp.- angelfish	11.57
<i>Holacanthus tricolor</i> (Bloch, 1795)- rock beauty	2.35
<i>Lachnolaimus maximus</i> (Walbaum, 1792)- hogfish	0.20
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	1.37

Dive Site: South Carolina, Edisto MPA; Target ED-02; 50 m; ROV 18-07, UNCW 577; 14-V-18-1

<i>Lutjanus campechanus</i> (Poey, 1860)- red snapper	0.20
<i>Lutjanus griseus</i> (Linnaeus, 1758)- grey snapper	1.96
<i>Lutjanus</i> sp.- snapper	0.59
<i>Mulloidichthys martinicus</i> (Cuvier, 1829)- yellow goatfish	1.57
<i>Mycteroperca interstitialis</i> (Poey, 1860)- yellowmouth grouper	0.20
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	4.90
<i>Mycteroperca</i> sp.- grouper	0.39
<i>Ocyurus chrysurus</i> (Bloch, 1791)- yellowtail snapper	0.20
<i>Paranthias furcifer</i> (Valenciennes, 1828)- creolefish	0.20
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	17.65
<i>Pomacanthus paru</i> (Bloch, 1787)- french angelfish	0.59
<i>Priacanthus arenatus</i> Cuvier, 1829- bigeye	0.20
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye	0.59
<i>Prognathodes aculeatus</i> (Poey, 1860)- longsnout butterflyfish	0.98
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	2.55
<i>Pseudupeneus maculatus</i> (Bloch, 1793)- spotted goatfish	5.69
<i>Rhomboplites aurorubens</i> (Cuvier, 1829)- vermilion snapper	44.12
<i>Rypticus saponaceus</i> (Bloch & Schneider, 1801)- greater soapfish	1.96
Scaridae Rafinesque, 1810- parrotfish	0.20
<i>Seriola dumerili</i> (Risso, 1810)- greater amberjack	1.18
<i>Seriola rivoliana</i> Valenciennes, 1833- almaco jack	0.78
<i>Seriola</i> sp.- amberjack	0.20
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	3.73
<i>Serranus baldwini</i> (Evermann & Marsh, 1899)- lantern bass	1.18
<i>Serranus tigrinus</i> (Bloch, 1790)- harlequin bass	1.18
<i>Sparisoma atomarium</i> (Poey, 1861)- greenblotch parrotfish	5.88
<i>Sphyaena barracuda</i> (Edwards, 1771)- barracuda	2.75
<i>Stegastes partitus</i> (Poey, 1868)- bicolor damselfish	3.53
<i>Thalassoma bifasciatum</i> (Bloch, 1791)- bluehead wrasse	0.20
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	12.75
Scorpaenidae- scorpionfish	0.20
Syngnathiformes	
<i>Fistularia tabacaria</i> Linnaeus, 1758- bluespotted cornetfish	0.39
Tetraodontiformes	
<i>Acanthostracion quadricornis</i> (Linnaeus, 1758)- scrawled cowfish	0.59
<i>Cantherhines pullus</i> (Ranzani, 1842)- orangespotted filefish	0.20
<i>Canthigaster</i> sp.- puffer	36.08
<i>Sphoeroides spengleri</i> (Bloch, 1785)- bandtail puffer	0.20
Elasmobranchii	
Carcharhiniformes	
<i>Carcharhinus plumbeus</i> (Nardo, 1827)- sandbar shark	0.39
UNKNOWN	2.16

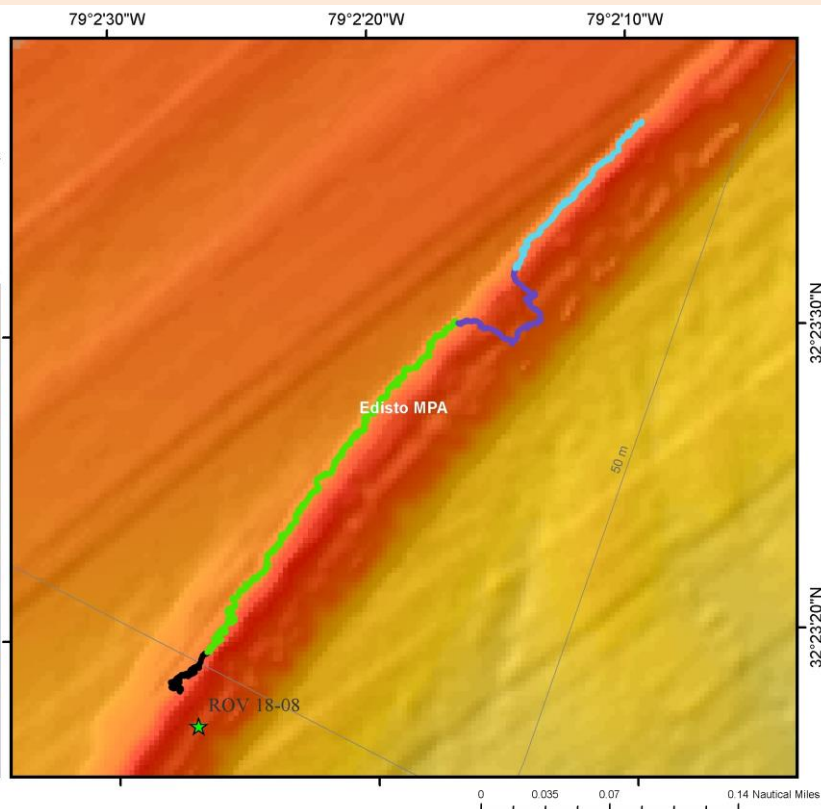
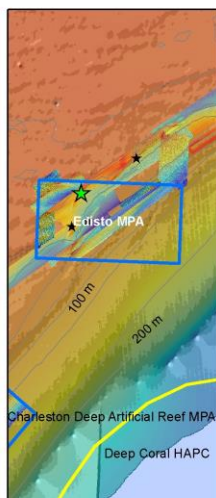
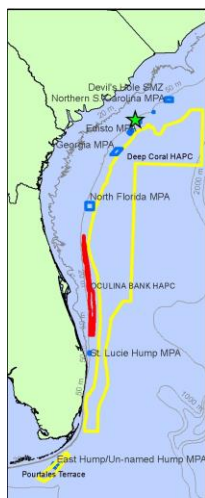
Dive Site: South Carolina, Edisto MPA; Target ED-01; 50 m; ROV 18-08, UNCW 578; 14-V-18-2

General Location and Dive Track:

South Carolina, Edisto MPA;
Target ED-01; 50 m; ROV 18-08,
UNCW 578; 14-V-18-2

- ★ ROV 18-08
- ★ Mohawk ROV
- ★ CTD
- 201805142 - Transect 01
- 201805142 - Transect 02
- 201805142 - Transect 03
- ROV Track

- Oculina HAPC
- MPA
- Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Sedberry_OEBlock345_5m_UT M17N_MB

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/14/2018

Data Management: Access Database

No. Specimens: 8

No. Photos: 363

No. DVD: 3

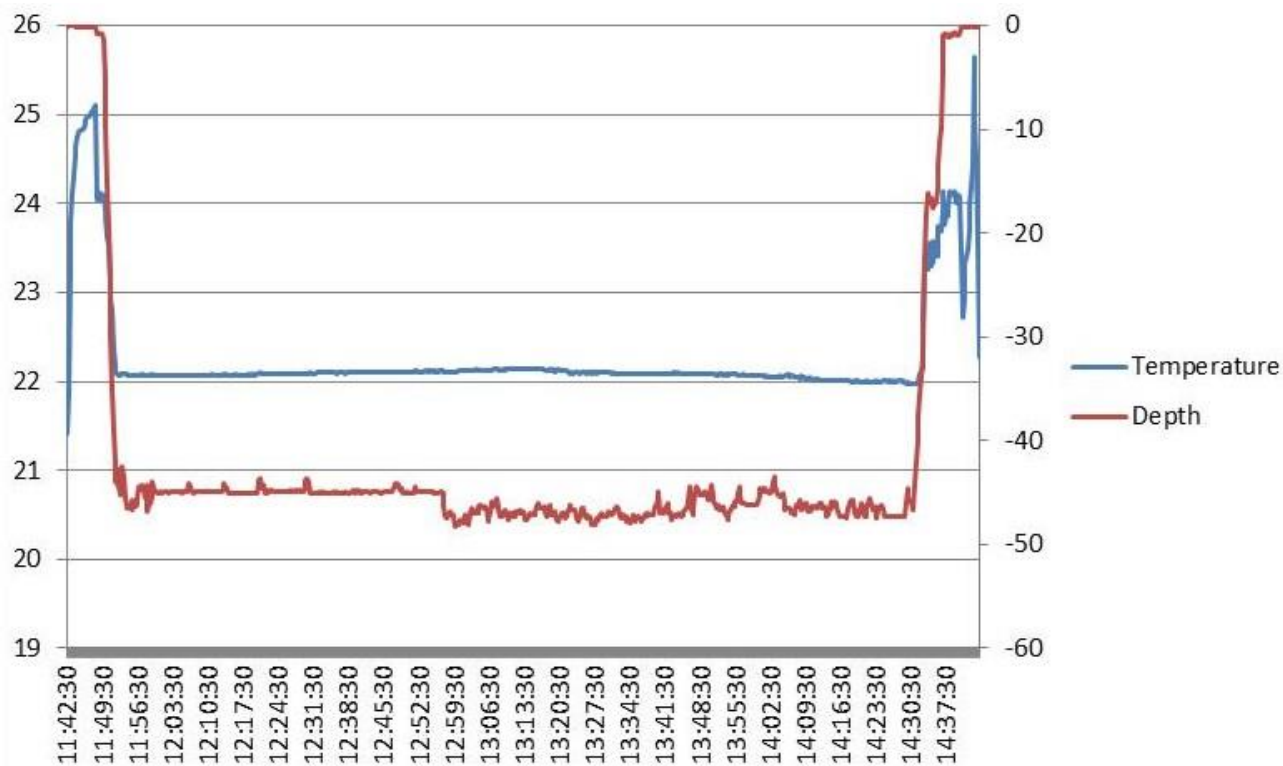
No. Hard Drive: 1

Dive Site: South Carolina, Edisto MPA; Target ED-01; 50 m; ROV 18-08, UNCW 578; 14-V-18-2

Dive Data:

Minimum Bottom Depth (m):	43.6	Total Transect Length (km):	0.849				
Maximum Bottom Depth (m):	49.2	Surface Current (kn):	0.5				
On Bottom (Time- EDST):	11:52	On Bottom (Lat/Long):	32.3884°N; -79.0411°W				
Off Bottom (Time- EDST):	14:29	Off Bottom (Lat/Long):	32.3936°N; -79.036°W				
Physical (bottom); Temp (°C):	22.1	Salinity:	N/A	Visibility (m):	10	Current (kn):	0.25

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-08 are as follows: Depth Maximum: 48.2 m, Temperature: 22-22.1 °C.

Dive Site: South Carolina, Edisto MPA; Target ED-01; 50 m; ROV 18-08, UNCW 578; 14-V-18-2

Dive Imagery:



Figure 1: -47.8 m
1-m rock boulders on west slope of ridge.



Figure 2: -47.6 m
Swiftia exserta (white-polyps exsert) were abundant at this site.



Figure 3: -48.9 m
School of greater amberjack and almaco jack.



Figure 4: -49.9 m
Layered rock ledges on west slope of ridge.

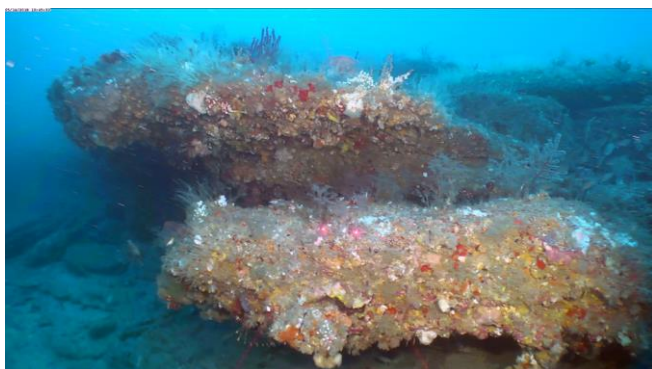


Figure 5: -48.8 m
Fractured rock slabs on west slope.



Figure 6: -48.9 m
2-3 m relief on west slope of ridge. School of vermilion snapper, and blackbar soldierfish.

Dive Site: South Carolina, Edisto MPA; Target ED-01; 50 m; ROV 18-08, UNCW 578; 14-V-18-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 14-V-18-2; ROV 18-08, UNCW Dive 578; South Carolina, Edisto MPA, ED-1, 50 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization. Objective to collect *Swiftia exserta* for NOAA Deep Sea Coral Program.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Digital still images were shot in Program Mode, ISO auto, White Balance- fish symbol, auto focus, strobe on, height 1.0 m, photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, 1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo- screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Both cameras had 10-cm parallel lasers for scale (green- Still; red- Video). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

Digital still camera not working, no flash. Used screen grabs for photo transects.

ROV depth off by -2.0 m (2 m too shallow). All depths noted below are actual depth (added 2 m to ROV readout).

Site Description/Habitat/Biota:

Depth range: 47-51.2 m

MB map shows NNE-SSW narrow ridge; transect heading N along ridge. In 2016 dense *Swiftia* (ROV 16-11) at 32o 23.808'N, 79o 01.886.

Weather- Cloudy, seas 1 ft calm, wind 5 kn from 179 dg, air- 25.9, surface water- 23.79, salinity- 36.37, current- 0.5 kn to 213 dg.

11:50- Launch

11:53- On bottom- 50 m; visibility- 10 m, current 0.25 kn from N.

On west slope of ridge, near WP. Large square rock blocks, 2-3 m relief slope, high rugosity, 30o slope. Top edge, flat rock pavement, 48 m. Didemnidae, *Swiftia* common, orange sponges, purple gorgonians, cup corals on overhangs, *Diodogorgia* and hydroids common, *Filograna*, *Ellisella*,

12:00- Sample 1- *Swiftia exserta*, 20 cm, orange, polyps exsert, Suction 2.

12:07- Patch of *Swiftia*, 12+, 47.5 m, top edge, rock pavement.

12:08- Sample 2- *Swiftia*, 15 cm, orange; Suction 3.

12:14- Sample 3- *Swiftia*, 15 cm, orange, exsert, Suction 4; 47 m, top edge, flat pavement; abundant. Scamp,

french angel, bicolor damsel.

12:21- start Photo XS, top edge, *Callyspongia vaginalis*.

12:23- Sample 4- *Swiftia exserta*, 20 cm, yellow, polyps in; Suction 5. Top edge, 47 m, pavement.

12:31- Sample 5- *Swiftia*, 15 cm, orange, exsert, 47 m, top edge, pavement; Suction 1. *Solanderia* hydroids, hairy hydroids, orange axinellids, DMTS sponge, Rhodophyta- thin flat branched.

12:41- Sample 6- *Swiftia*, 15 cm, orange, polyps exsert, top edge of ridge, 47.5 m; Bin 2.

12:49- Sample 7- *Swiftia*, 10 cm, orange, polyps exsert, top of ridge, 47.5 m, pavement; Bin 1.

12:54- Continue transect to N along west slope. *Scyllarides nodifer*, 40 cm *Muricea*. Base of slope about 50 m, stair step rock slabs 45o slope, 3 m relief, width ~15 m. Fairly barren on the slope, *Swiftia* abundant, Didemnidae, *Diodogorgia*, *Filograna*, ¾ m *Swiftia*, Lionfish, scorpionfish, trumpet fish, squirrel fish, *Ircinia* sp., tomtate, *Ircinia campana*, Spirastrellidae, *Carijoa* along edge, *Cinachyrella*, scamp, black bar soldier, *Agelas clathrodes*, short bigeye, *Schizoporella*, CCA.

13:21- beautiful geology, stair steps rock slabs, pyramid-like, but fairly barren, small fish, but few scamps. *Swiftia* common, Base of slope on sand, 51.2 m; hogfish, *Aplysina* tubes, *Swiftia*, graysby; area of dense lionfish, grey snapper, vermilion snapper,

13:45- Transect E across top of ridge; top 48 m; flat rock fractured pavement, few 25 cm ledges; *Muricea* abundant, *Swiftia* common, Didemnidae, Lionfish, pavement with sediment; DMST, 40 cm *Muricea*, Amberjack, and Almaco.

13:54- East base, 50.2 m; low relief rock slabs and pavement, <1/2 m relief, sediment. Low density and diversity; *Muricea* abundant, *Swiftia* common. Few fish.

13:55- Transect N back across ridge top. Dense school of scamp (12), on top with little habitat, 49 m.

14:00- Transect N along west slope, 47.5 m. Dense lionfish under ledges, hogfish, porgy, anchor line, 10 cm clumps, light green, *Dictyota*? Human debris- cloth.

14:21- West slope, less relief. 3 m ledge, flat sand at base; 50 m; still low diversity and density, fewer fish,

14:27- Sample 8- Hydroida (spherical bushy, light green, looks like *Dictyota*); 50 m, west slope, Suction 1.

14:28- end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- cup corals

Antipatharia coral- No *Tanacetipathes*, *Stichopathes* (few)

Gorgonia coral- Purple Plexauridae, *Muricea* sp. (abundant to 40 cm, *Swiftia exserta* (abundant), *Ellisella* spp., *Diodogorgia* (common)

Hydroida- hairy hydroid (*Halopteris carinata*), *Solanderia* sp.

Porifera- *Ircinia campana*, *Ircinia* spp., Spirastrellidae, DMST, *Callyspongia vaginalis*, *Agelas clathrodes* (rare), *Cinachyrella*,

Asciacea- Didemnidae (dense)

Annelida- *Filograna*

Algae-Rhodophyta (thin flat blades), CCA

Samples:

Swiftia exserta (7- for Peter Etnoyer, NOAA DSCE Program)

Hydroida (1 for HBOI taxonomy)

Human Debris:

Anchor line- 1

Dive Site: South Carolina, Edisto MPA; Target ED-01; 50 m; ROV 18-08, UNCW 578; 14-V-18-2

CPCe Percent Cover Analysis:

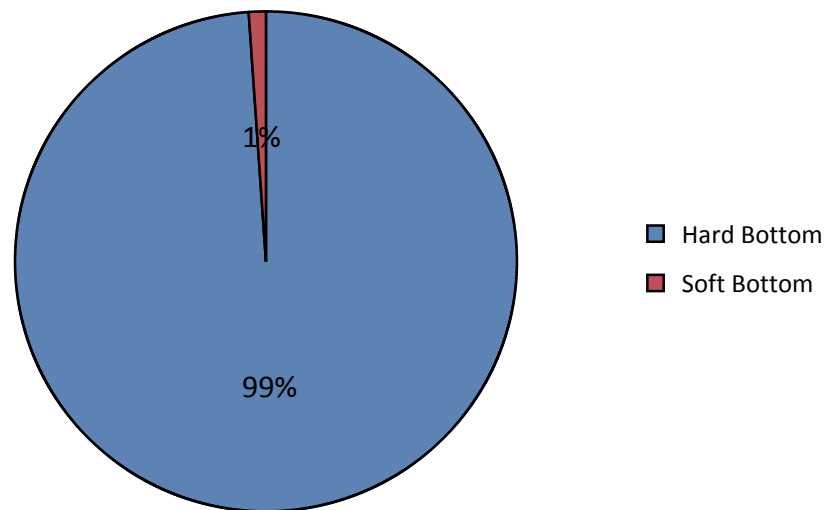


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-08. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

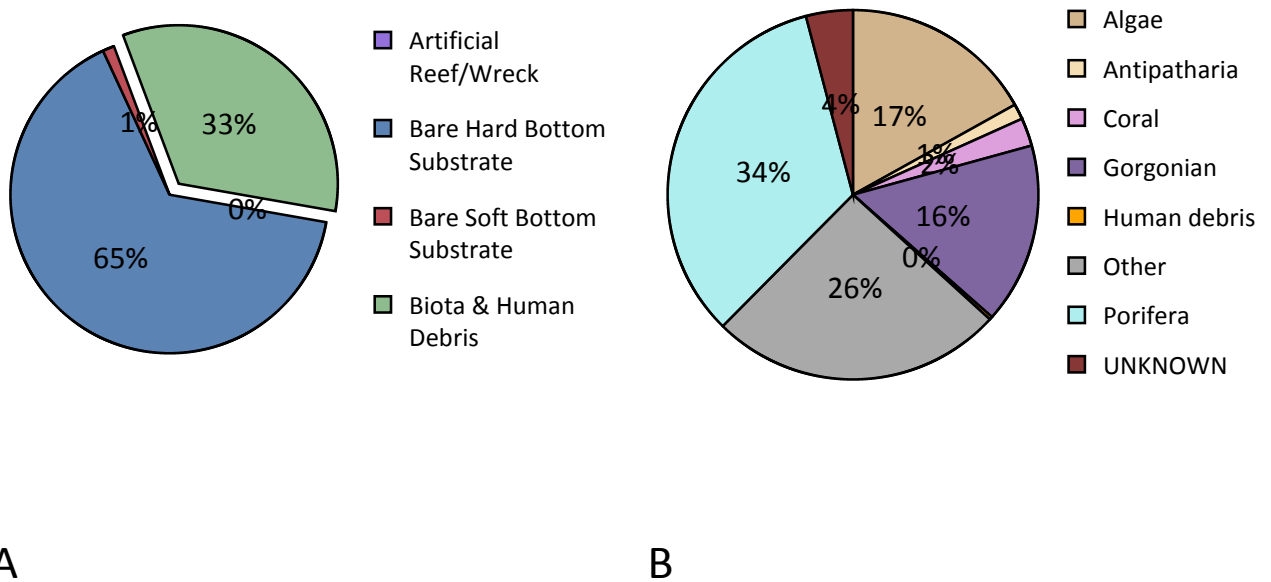


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-08. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: South Carolina, Edisto MPA; Target ED-01; 50 m; ROV 18-08, UNCW 578; 14-V-18-2

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-08.

	ROV 18-08	Note
	%	
Biota	33.36%	X
Algae	5.65%	X
Ochrophyta	2.55%	
<i>Dictyota</i> sp.	1.46%	
Ochrophyta	1.09%	
Rhodophyta	3.10%	X
Corallinales	2.73%	
Corallinophycidae		X
Rhodophyta	0.36%	X
Porifera	11.21%	X
Demospongiae	11.21%	X
<i>Agelas clathrodes</i> (Schmidt, 1870)	0.09%	X
<i>Aplysina</i> sp.	0.09%	X
Axinellidae		X
<i>Callyspongia (Cladochalina) vaginalis</i> (Lamarck, 1814)	0.46%	X
<i>Callyspongia</i> sp.	0.09%	
Cinachyrella sp.		X
Demospongiae- DMST		X
Demospongiae- unid. sp.	7.11%	X
<i>Geodia</i> sp.	0.09%	
<i>Ircinia campana</i> (Lamarck, 1814)		X
<i>Ircinia</i> sp.	0.64%	
<i>Niphates</i> sp.	0.09%	
Spirastrellidae	2.55%	X
Coral	0.82%	X
Coral- Scleractinia	0.82%	X
Scleractinia- unid cup	0.82%	X
Gorgonian	5.29%	X
Alcyonacea - gorgonian	5.29%	X
Alcyonacea- gorgonian	0.64%	
<i>Carijoa</i> sp.		X
<i>Diodogorgia</i> sp.	0.36%	X
<i>Ellisella</i> sp.	0.09%	
<i>Muricea</i> sp.	1.09%	X
<i>Nicella</i> sp.	0.36%	

Dive Site: South Carolina, Edisto MPA; Target ED-01; 50 m; ROV 18-08, UNCW 578; 14-V-18-2

<i>Swiftia exserta</i> (Ellis & Solander, 1786)	2.64%	X
<i>Telesto</i> sp.	0.09%	
Antipatharia	0.46%	X
Antipatharia	0.46%	X
Antipatharia unid. sp.	0.09%	
<i>Antipathes atlantica</i> Gray, 1857	0.18%	
<i>Stichopathes luetkeni</i> Brook, 1889	0.09%	X
<i>Tanacetipathes</i> sp.- bushy	0.09%	
Other	9.94%	X
Hydrozoa	3.74%	X
Hydroidolina	3.37%	X
<i>Solanderia gracilis</i> Duchassaing & Michelin, 1846	0.36%	
<i>Solanderia</i> sp.		X
Anthozoa - Non Coral	0.09%	
Corallimorpharia	0.09%	
Annelida	0.46%	X
<i>Filograna</i> sp.	0.46%	X
Bryozoa	0.18%	X
<i>Schizoporella</i> sp.	0.18%	X
Arthropoda	0.09%	X
Scyllaridae	0.09%	
<i>Scyllarides</i> sp.		X
Chordata - Invertebrate	1.00%	X
Didemnidae	1.00%	X
Chordata - Vertebrate	3.01%	X
Actinopterygii	3.01%	X
UNKNOWN	1.37%	
Bare Substrate	66.55%	
Bare Hard Bottom	65.36%	
Bare Hard Bottom	65.36%	
Bare rock, pavement, boulder, ledge	65.18%	
Bare rubble/cobble	0.18%	
Bare Soft Bottom	1.19%	
Human debris	0.09%	X
Human debris	0.09%	X
Human debris- anchor line		X
Human debris- fishing line		X
Human debris- other	0.09%	X
Grand Total	100.00%	X

Dive Site: South Carolina, Edisto MPA; Target ED-01; 50 m; ROV 18-08, UNCW 578; 14-V-18-2

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-08.

Taxa, Author- Common name	ROV 18-08
Actinopterygii	
Anguilliformes	
<i>Gymnothorax</i> sp.- moray eel	0.38
<i>Muraena robusta</i> Osório, 1911- stout moray	0.38
Beryciformes	
Holocentridae- squirrelfish	2.28
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	16.35
<i>Myripristis jacobus</i> Cuvier, 1829- blackbar soldierfish	30.42
<i>Plectropops retrospinis</i> (Guichenot, 1853)- cardinal soldierfish	4.18
Perciformes	
<i>Acanthurus</i> sp.- surgeonfish	3.42
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	47.15
<i>Calamus</i> sp.- porgy	9.89
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	17.49
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	3.42
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	37.64
<i>Chaetodon striatus</i> Linnaeus, 1758- banded butterflyfish	1.52
<i>Chromis enchrysurus</i> Jordan & Gilbert, 1882- yellowtail reef fish	7.60
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	13.69
<i>Chromis scotti</i> Emery, 1968- purple reef fish	47.91
<i>Chromis</i> sp.- damselfish	14.07
Gobiidae- goby	0.76
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	1541.44
<i>Haemulon plumierii</i> (Lacepède, 1801)- white grunt	0.76
<i>Haemulon striatum</i> (Linnaeus, 1758)- striped grunt	114.07
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	3.42
<i>Halichoeres garnoti</i> (Valenciennes, 1839)- yellowhead wrasse	18.63
<i>Halichoeres</i> sp.- wrasse	41.83
<i>Holacanthus</i> sp.- angelfish	27.00
<i>Holacanthus tricolor</i> (Bloch, 1795)- rock beauty	0.38
<i>Lachnolaimus maximus</i> (Walbaum, 1792)- hogfish	1.14
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	11.03
<i>Lutjanus campechanus</i> (Poey, 1860)- red snapper	0.38
<i>Lutjanus griseus</i> (Linnaeus, 1758)- grey snapper	17.87
<i>Mycteroperca interstitialis</i> (Poey, 1860)- yellowmouth grouper	0.38
<i>Mycteroperca microlepis</i> (Goode & Bean, 1879)- gag grouper	0.38
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	17.49
<i>Mycteroperca</i> sp.- grouper	0.38
<i>Pagrus pagrus</i> (Linnaeus, 1758)- red porgy	0.76

Dive Site: South Carolina, Edisto MPA; Target ED-01; 50 m; ROV 18-08, UNCW 578; 14-V-18-2

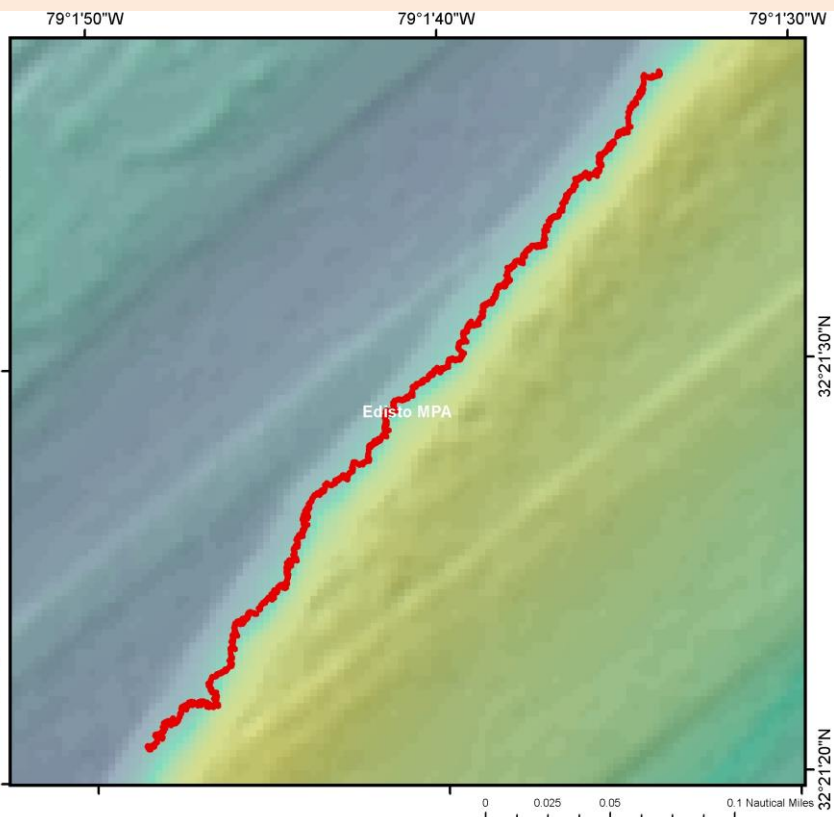
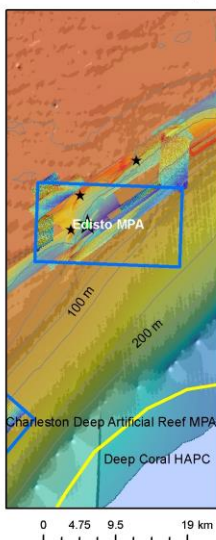
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	23.57
<i>Pomacanthus arcuatus</i> (Linnaeus, 1758)- gray angelfish	0.76
<i>Pomacanthus paru</i> (Bloch, 1787)- french angelfish	1.90
<i>Priacanthus arenatus</i> Cuvier, 1829- bigeye	0.38
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye	10.27
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	2.28
<i>Pseudupeneus maculatus</i> (Bloch, 1793)- spotted goatfish	6.84
<i>Rhomboplites aurorubens</i> (Cuvier, 1829)- vermilion snapper	2718.63
<i>Rypticus maculatus</i> Holbrook, 1855- whitespotted soapfish	3.80
<i>Rypticus saponaceus</i> (Bloch & Schneider, 1801)- greater soapfish	0.76
<i>Rypticus</i> sp.- soapfish	0.38
Scaridae Rafinesque, 1810- parrotfish	0.38
<i>Seriola rivoliana</i> Valenciennes, 1833- almaco jack	10.27
<i>Seriola</i> sp.- amberjack	26.62
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	2.28
<i>Serranus baldwini</i> (Evermann & Marsh, 1899)- lantern bass	2.28
<i>Serranus phoebe</i> Poey, 1851- tattler	2.28
<i>Serranus tigrinus</i> (Bloch, 1790)- harlequin bass	0.38
<i>Sparisoma atomarium</i> (Poey, 1861)- greenblotch parrotfish	2.28
<i>Sparisoma aurofrenatum</i> (Valenciennes, 1840)- redband parrotfish	1.14
<i>Sphyræna barracuda</i> (Edwards, 1771)- barracuda	3.04
<i>Stegastes partitus</i> (Poey, 1868)- bicolor damselfish	3.04
<i>Thalassoma bifasciatum</i> (Bloch, 1791)- bluehead wrasse	0.76
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	245.63
<i>Scorpaena plumieri</i> Bloch, 1789- spotted scorpionfish	2.28
Syngnathiformes	
<i>Aulostomus maculatus</i> Valenciennes, 1841- trumpetfish	0.38
<i>Fistularia tabacaria</i> Linnaeus, 1758- bluespotted cornetfish	1.90
Tetraodontiformes	
<i>Acanthostracion quadricornis</i> (Linnaeus, 1758)- scrawled cowfish	0.38
<i>Acanthostracion</i> sp. - cowfish	0.38
<i>Balistes</i> sp.- triggerfish	0.38
<i>Balistes vetula</i> Linnaeus, 1758- queen triggerfish	1.90
<i>Cantherhines pullus</i> (Ranzani, 1842)- orangespotted filefish	1.14
<i>Canthigaster</i> sp.- puffer	98.48
<i>Sphoeroides spengleri</i> (Bloch, 1785)- bandtail puffer	7.22
schooling fish	836.50
Elasmobranchii	
Carcharhiniformes	
<i>Carcharhinus</i> sp.- shark	0.38
UNKNOWN	2.28

Dive Site: South Carolina, Edisto MPA; Target ED-03; 60 m; ROV 18-09, UNCW 579; 14-V-18-3

General Location and Dive Track:

South Carolina, Edisto MPA;
Target ED-03; 60 m; ROV 18-09,
UNCW 579; 14-V-18-3

- ★ ROV 18-09
 - ★ Mohawk ROV
 - ★ CTD
 - 201805143 - Transect 01
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Sedberry_OEBlock345_5m_UT M17N_MB

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/14/2018

Data Management: Access Database

No. Specimens: 8

No. Photos: 245

No. DVD: 3

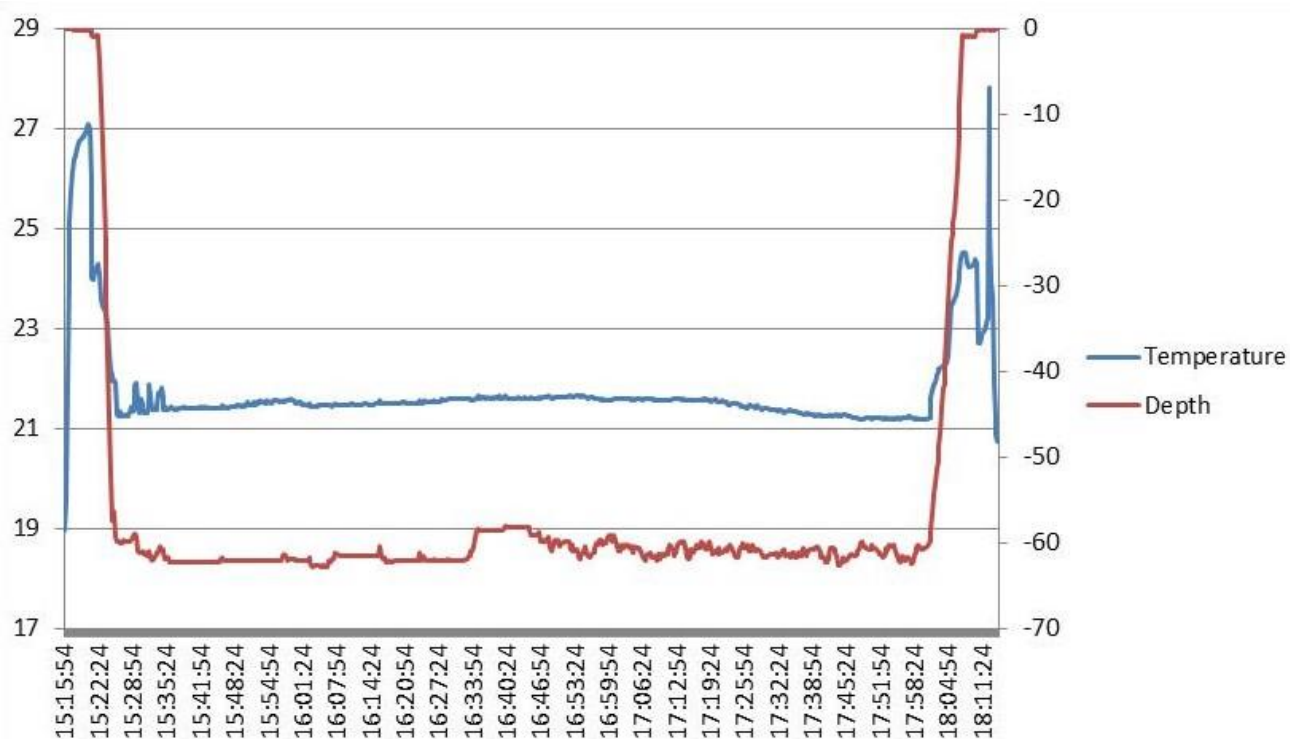
No. Hard Drive: 1

Dive Site: South Carolina, Edisto MPA; Target ED-03; 60 m; ROV 18-09, UNCW 579; 14-V-18-3

Dive Data:

Minimum Bottom Depth (m):	58.6	Total Transect Length (km):	0.666				
Maximum Bottom Depth (m):	63.4	Surface Current (kn):	0.5				
On Bottom (Time- EDST):	15:25	On Bottom (Lat/Long):	32.355°N; -79.0304°W				
Off Bottom (Time- EDST):	18:00	Off Bottom (Lat/Long):	32.3603°N; -79.026°W				
Physical (bottom); Temp (°C):	21.9	Salinity:	N/A	Visibility (m):	15	Current (kn):	0.25

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-09 are as follows: Depth Maximum: 62.7 m, Temperature: 21.2-21.9 °C.

Dive Site: South Carolina, Edisto MPA; Target ED-03; 60 m; ROV 18-09, UNCW 579; 14-V-18-3

Dive Imagery:



Figure 1: -64 m
West slope of ridge with school of tomtate.



Figure 2: -64.2 m
Rocky habitat with wire coral (*Stichopathes luetkeni*), white fan black coral (*Antipathes atlantica*), white branching *Filograna* annelid tubes.



Figure 3: -63.7 m
Rugged west slope of ridge.



Figure 4: -63.2 m
Spiny lobster (*Panulirus argus*), and *Swiftia exserta* gorgonian.



Figure 5: -64.1 m
Jumbled rock boulders on west slope. Fishing line snarled on rock.



Figure 6: -63.5 m
spotted moray eel.

Dive Site: South Carolina, Edisto MPA; Target ED-03; 60 m; ROV 18-09, UNCW 579; 14-V-18-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 14-V-18-3; ROV 18-09, UNCW Dive 579; South Carolina, Edisto MPA, ED-3, 60 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization. Objective to collect *Swiftia exserta* for NOAA Deep Sea Coral Program.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Digital still images were shot in Program Mode, ISO auto, White Balance- fish symbol, auto focus, strobe on, height 1.0 m, photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, 1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo- screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Both cameras had 10-cm parallel lasers for scale (green- Still; red- Video). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

Digital still camera not working, no flash. Used screen grabs for photo transects.

ROV depth off by -2.0 m (2 m too shallow). All depths noted below are actual depth (added 2 m to ROV readout).

Site Description/Habitat/Biota:

Depth range: 61-65 m

MB map shows NE-SW ridge, top 58 m, east base- 63 m, west base- 63.7 m; transect heading N along ridge.

Weather- Sunny, seas 1 ft calm, wind 5 kn from 184 dg, air- 25.9, surface water- 24.21, salinity- 36.37, current- 0.5 kn to 304 dg.

15:21- Launch

15:24- On bottom- 63.3 m; visibility- 15 m, current 0.25 kn from SE.

At WP, west slope of ridge, rock cobble, boulders ½ m, 1 m ledges, 10-20 dg slope, 15 m wide, moderate rugosity. Low density and diversity of biota.

15:30- Start photo xs, lower west slope, Spirastrellidae, Didemnidae, *Filograna*, *Stichopathes*, *Swiftia exserta*, tomtate, goat fish, fuzzy balls (Hydroids?), *Panulirus argus*, low density of fish, Lionfish.

15:36- Sample 1- *Swiftia exserta*, 15 cm, orange, polyps in, 65 m, base of west slope; Suction 1. *Antipathes atlantica*, *Antipatharia*, scamp, blue angel, bigeye, single stalk *Tanacetipathes*.

15:46- Sample 2- orange, polyps in, base west slope, rock boulders, 64.7 m, Suction 2. *Prognathodes aya*.

Dive Site: South Carolina, Edisto MPA; Target ED-03; 60 m; ROV 18-09, UNCW 579; 14-V-18-3

15:58- Sample 3- *Swiftia*, 10 cm orange, polyps out, Suction 3. 64.5 m, west slope, rock boulders. Suction 3. CCA, platy Peyssonneliales?, hydroids, depth at base of west slope- 65.4 m, sand, reef butterfly.

16:08- Sample 4- *Swiftia*, 10 cm, orange, polyps out, base of west slope, 64 m, Suction 4.

16:17- Sample 5- *Swiftia*, 20 cm, orange, polyps out, base of west slope, 65 m, Suction 5.

16:25- Sample 6- *Swiftia*, 15 cm, orange, polyps out, base of west slope, 64.7 m, small rock boulders, Bin 5.

16:35- Sample 7- *Swiftia*, 15 cm, orange, polyps out, base of west slope, 61.3 m, rock boulders, Bin 4.

16:41- Sample 8- *Swiftia*, 10 cm, orange, polyps out, base of west slope, small rock boulders, 61 m, Bin 2.

16:44- End collections, continue photo xs along west slope. School of AJ, *Ellisella*, DMST, *Titanideum frauenfeldii*, scamp, *Geodia neptuni* (25 cm diam), CCA, tomtate dense.

Top edge of west slope, 62.7 m, *Diodogorgia*,

16:55- more rugged, 2-3 m eroded rock, ledges,

17:57- West slope, 63 m, ½- 1 m boulders, low slope, lobster, same biota, scamp, along lower slope. Upper slope 1-2 relief, boulders and ledges, fishing line, *Swiftia*, high rugosity, dense tomtate, *Antipathes atlantica*, *Filograna*, Spirastrellidae, *Diodogorgia*, spotted moray.

18:01- end of dive, 63 m.

Dominant Benthic Macrobiota:

Scleractinia coral- cup corals

Antipatharia coral- Single stalk *Tanacetipathes*, *Stichopathes*, *Antipathes atlantica* (common)

Gorgonia coral- Purple Plexauridae, *Muricea* sp., *Swiftia exserta* (common), *Ellisella* spp., *Diodogorgia* (common), *Titanideum frauenfeldii* (rare)

Hydroida

Porifera- *Ircinia campana*, *Ircinia* spp., Spirastrellidae, DMST, *Geodia neptuni*

Asciacea- Didemnidae (dense)

Annelida- *Filograna*

Algae- CCA

Samples:

Swiftia exserta (8- for Peter Etnoyer, NOAA DSCE Program)

Human Debris:

Fishing line- 1

Dive Site: South Carolina, Edisto MPA; Target ED-03; 60 m; ROV 18-09, UNCW 579; 14-V-18-3

CPCe Percent Cover Analysis:

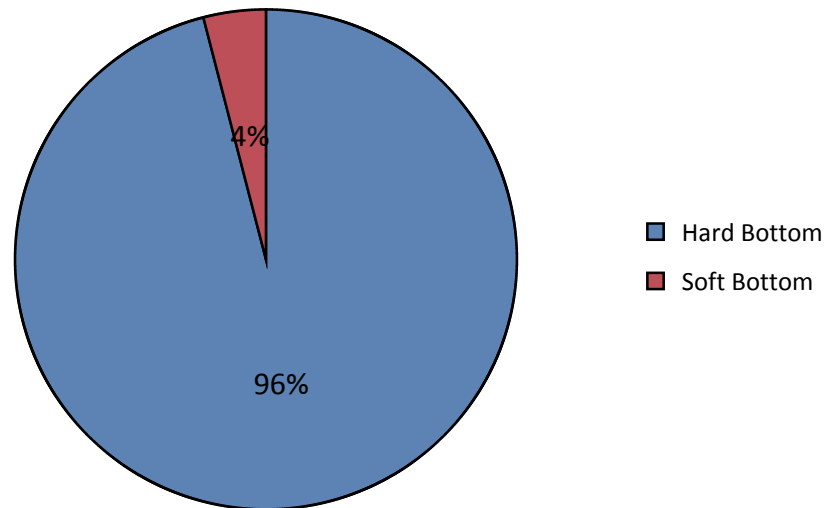


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-09. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

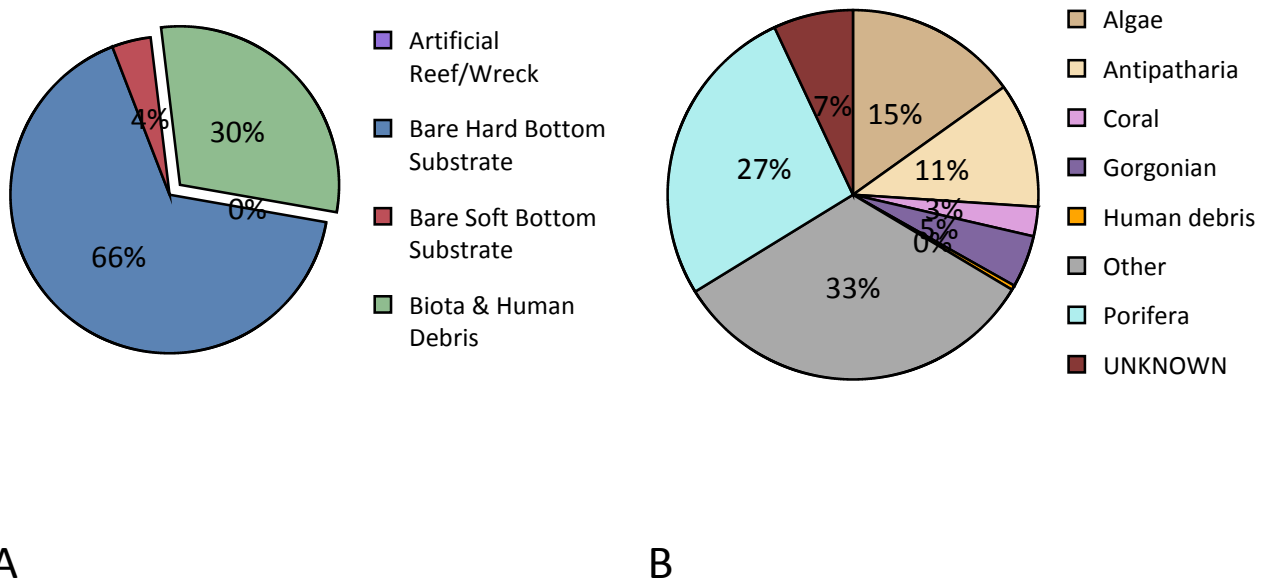


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-09. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: South Carolina, Edisto MPA; Target ED-03; 60 m; ROV 18-09, UNCW 579; 14-V-18-3

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-09.

	ROV 18-09 %	Note
Biota	29.56%	X
Algae	4.48%	X
Ochrophyta	0.65%	
<i>Dictyota</i> sp.	0.35%	
Ochrophyta	0.29%	
Rhodophyta	3.83%	X
Corallinales	3.72%	
Corallinophycidae		X
Rhodophyta	0.12%	
Porifera	7.96%	X
Demospongiae	7.91%	X
<i>Aplysina</i> sp.	0.06%	
Axinellidae		X
Demospongiae- DMST	0.06%	X
Demospongiae- unid. sp.	5.72%	
<i>Geodia neptuni</i> (Sollas, 1886)		X
<i>Geodia neptuni</i> complex (Sollas, 1886)	0.12%	
<i>Geodia</i> sp.	0.06%	
Spirastrellidae	1.89%	X
Porifera	0.06%	
Coral	0.77%	X
Coral- Scleractinia	0.77%	X
Scleractinia- unid cup	0.77%	X
Gorgonian	1.36%	X
Alcyonacea - gorgonian	1.36%	X
Alcyonacea- gorgonian	0.29%	
<i>Carijoa</i> sp.		X
<i>Diodogorgia</i> sp.	0.06%	X
<i>Ellisella</i> sp.	0.06%	X
Ellisellidae	0.24%	
<i>Muricea</i> sp.		X
<i>Swiftia exserta</i> (Ellis & Solander, 1786)	0.53%	X
<i>Titanideum frauenfeldii</i> (Kölliker, 1865)	0.18%	X
Antipatharia	3.24%	X
Antipatharia	3.24%	X

Dive Site: South Carolina, Edisto MPA; Target ED-03; 60 m; ROV 18-09, UNCW 579; 14-V-18-3

Antipatharia unid. sp.	0.53%	X
<i>Antipathes atlantica</i> Gray, 1857	1.59%	X
<i>Antipathes furcata</i> Gray, 1857	0.24%	
<i>Stichopathes luetkeni</i> Brook, 1889	0.77%	X
<i>Tanacetipathes</i> sp.- bushy	0.06%	
<i>Tanacetipathes tanacetum</i> (Pourtalès, 1880)	0.06%	X
Other	11.74%	X
Hydrozoa	7.37%	X
Hydroidolina	7.37%	X
Annelida	0.53%	X
Annelida Unid.	0.06%	
<i>Filograna</i> sp.	0.47%	X
Bryozoa	0.18%	X
<i>Schizoporella</i> sp.	0.18%	X
Arthropoda		X
<i>Panulirus argus</i> (Latreille, 1804)		X
<i>Scyllarides</i> sp.		X
Chordata - Invertebrate	0.88%	X
Asciacea	0.06%	
Didemnidae	0.83%	X
Chordata - Vertebrate	0.71%	X
Actinopterygii	0.71%	X
UNKNOWN	2.06%	
Bare Substrate	70.32%	
Bare Hard Bottom	66.37%	
Bare Hard Bottom	66.37%	
Bare rock, pavement, boulder, ledge	66.02%	
Bare rubble/cobble	0.35%	
Bare Soft Bottom	3.95%	
Human debris	0.12%	X
Human debris	0.12%	X
Human debris- fish line/gear	0.12%	
Human debris- fishing line		X
Grand Total	100.00%	X

Dive Site: South Carolina, Edisto MPA; Target ED-03; 60 m; ROV 18-09, UNCW 579; 14-V-18-3

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-09.

Taxa, Author- Common name	ROV 18-09
Actinopterygii	
Anguilliformes	
<i>Gymnothorax moringa</i> (Cuvier, 1829)- spotted moray	1.53
Beryciformes	
Holocentridae- squirrelfish	44.34
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	14.53
<i>Plectrypops retrospinis</i> (Guichenot, 1853)- cardinal soldierfish	1.15
Perciformes	
<i>Acanthurus</i> sp.- surgeonfish	0.38
<i>Apogon pseudomaculatus</i> Longley, 1932- twospot cardinalfish	0.38
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	13.38
<i>Bodianus rufus</i> (Linnaeus, 1758)- spanish hogfish	0.38
<i>Calamus</i> sp.- porgy	2.68
<i>Centropyge argi</i> Woods & Kanazawa, 1951- cherubfish	0.38
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	8.79
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	8.79
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	12.61
<i>Chromis enchrysur</i> Jordan & Gilbert, 1882- yellowtail reefish	1.91
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	74.16
<i>Chromis scotti</i> Emery, 1968- purple reefish	24.85
<i>Chromis</i> sp.- damselfish	22.94
<i>Clepticus parrae</i> (Bloch & Schneider, 1801)- creole wrasse	9.56
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	2542.05
<i>Haemulon striatum</i> (Linnaeus, 1758)- striped grunt	55.43
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	1.53
<i>Halichoeres garnoti</i> (Valenciennes, 1839)- yellowhead wrasse	1.53
<i>Holacanthus</i> sp.- angelfish	8.41
<i>Holacanthus tricolor</i> (Bloch, 1795)- rock beauty	2.68
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	5.35
<i>Lutjanus buccanella</i> (Cuvier, 1828)- blackfin snapper	1.91
<i>Lutjanus griseus</i> (Linnaeus, 1758)- grey snapper	5.73
<i>Lutjanus</i> sp.- snapper	0.76
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	10.70
<i>Paranthias furcifer</i> (Valenciennes, 1828)- creolefish	0.38
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	43.96
<i>Priacanthus arenatus</i> Cuvier, 1829- bigeye	3.82
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye	2.29
<i>Prognathodes aculeatus</i> (Poey, 1860)- longsnout butterflyfish	2.68

Dive Site: South Carolina, Edisto MPA; Target ED-03; 60 m; ROV 18-09, UNCW 579; 14-V-18-3

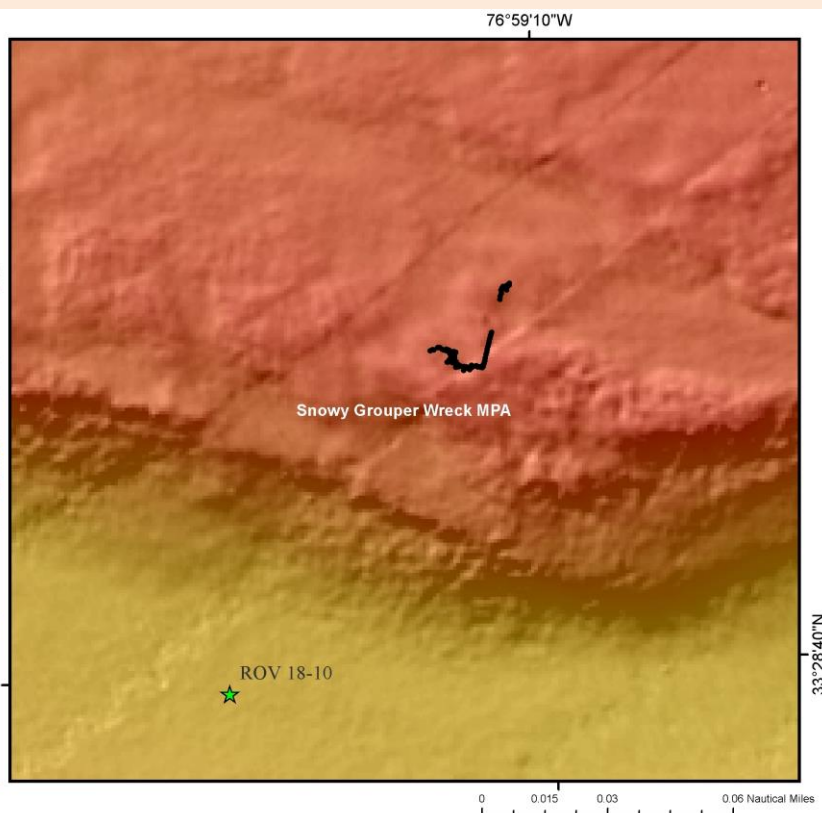
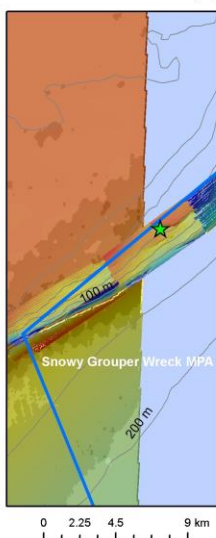
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	12.61
<i>Pseudupeneus maculatus</i> (Bloch, 1793)- spotted goatfish	9.56
<i>Rhomboplites aurorubens</i> (Cuvier, 1829)- vermilion snapper	154.82
<i>Seriola</i> sp.- amberjack	26.38
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	5.35
<i>Serranus baldwini</i> (Evermann & Marsh, 1899)- lantern bass	0.38
<i>Serranus tigrinus</i> (Bloch, 1790)- harlequin bass	0.38
<i>Stegastes partitus</i> (Poey, 1868)- bicolor damselfish	0.38
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	14.91
Scorpaenidae- scorpionfish	0.38
Syngnathiformes	
<i>Aulostomus maculatus</i> Valenciennes, 1841- trumpetfish	5.73
Tetraodontiformes	
<i>Balistes capricus</i> Gmelin, 1789- grey triggerfish	1.15
<i>Balistes vetula</i> Linnaeus, 1758- queen triggerfish	0.38
<i>Canthigaster</i> sp.- puffer	56.96
<i>Sphoeroides spengleri</i> (Bloch, 1785)- bandtail puffer	1.15
UNKNOWN	1.91

Dive Site: North Carolina, Snowy Grouper Wreck MPA Reef; Target SW-01; 70 m; ROV 18-10, UNCW 580; 15-V-18-1

General Location and Dive Track:

North Carolina, Snowy Grouper Wreck MPA Reef; Target SW-01; 70 m; ROV 18-10, UNCW 580; 15-V-18-1

- ★ ROV 18-10
- ★ Mohawk ROV
- ★ CTD
- ROV Track
- Oculina HAPC
- MPA
- Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: NancyFoster_14_08_MPA_NC_SnowyWreck

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/15/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 8

No. DVD: 1

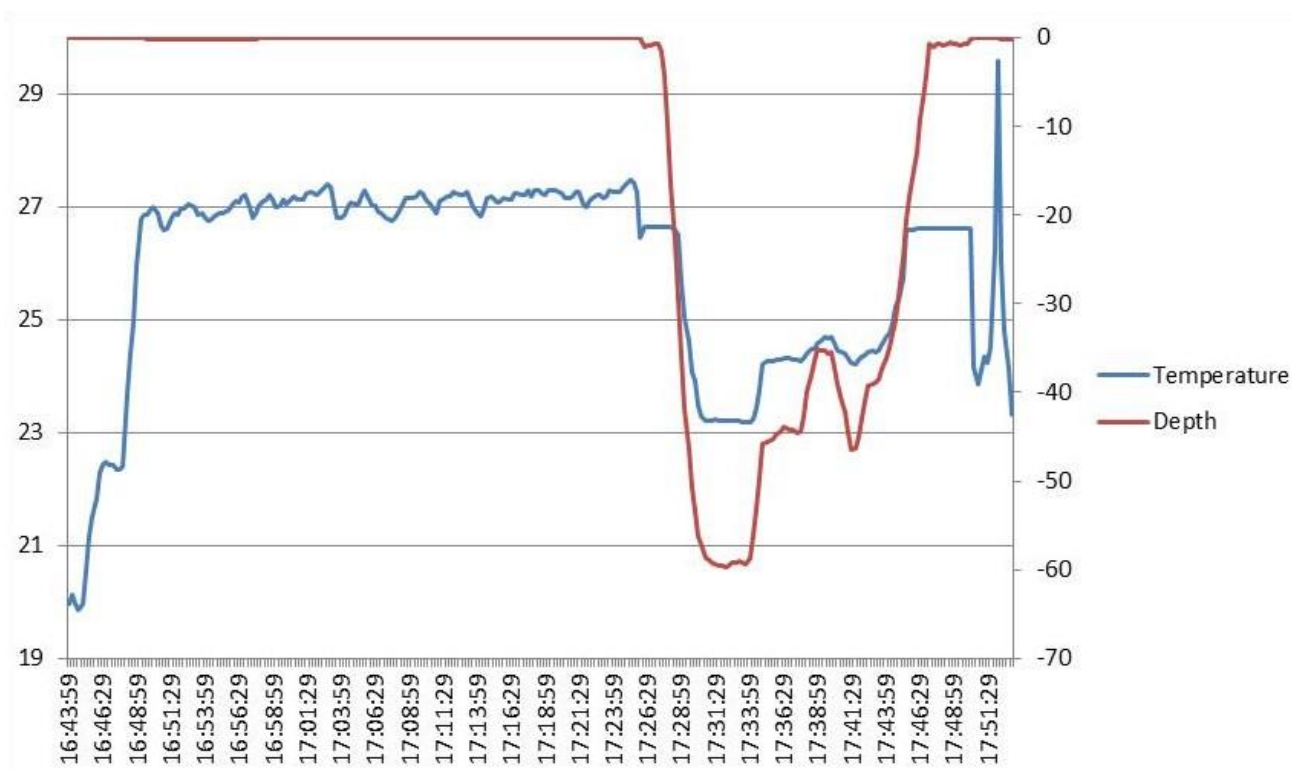
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Dive Site: North Carolina, Snowy Grouper Wreck MPA Reef; Target SW-01; 70 m; ROV 18-10, UNCW 580; 15-V-18-1

Dive Data:

Minimum Bottom Depth (m): 46.8	Total Transect Length (km): 0.005
Maximum Bottom Depth (m): 61.2	Surface Current (kn): 1.8
On Bottom (Time- EDST): 17:31	On Bottom (Lat/Long): 33.479°N; -76.9866°W
Off Bottom (Time- EDST): 17:35	Off Bottom (Lat/Long): 33.4793°N; -76.9863°W
Physical (bottom); Temp (°C): 23.2	Salinity: N/A Visibility (m): 20 Current (kn): 1

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-10 are as follows: Depth Maximum: 59.7 m, Temperature: 23.2-24.3 °C.

Dive Site: North Carolina, Snowy Grouper Wreck MPA Reef; Target SW-01; 70 m; ROV 18-10, UNCW 580; 15-V-18-1

Dive Imagery:

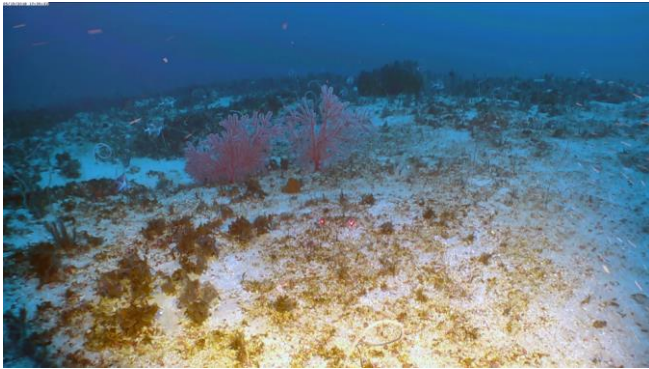


Figure 1: -63 m
Swiftia exserta on sediment veneered rock plateau.

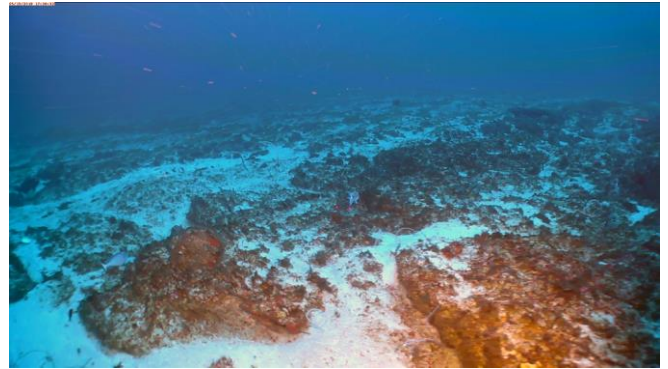


Figure 2: -62.6 m
Low relief rock and sediment on top of plateau.

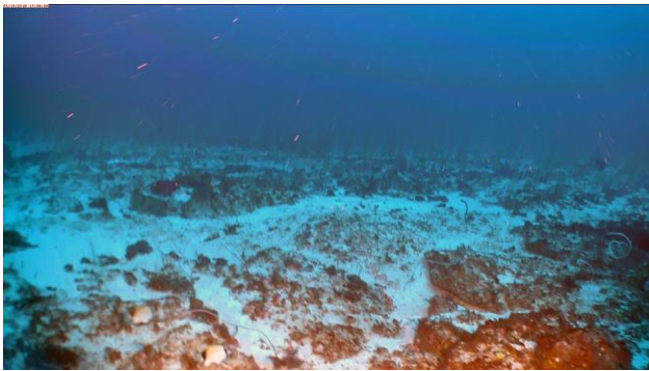


Figure 3: -62.3 m
Low relief rock covered with brown algae.

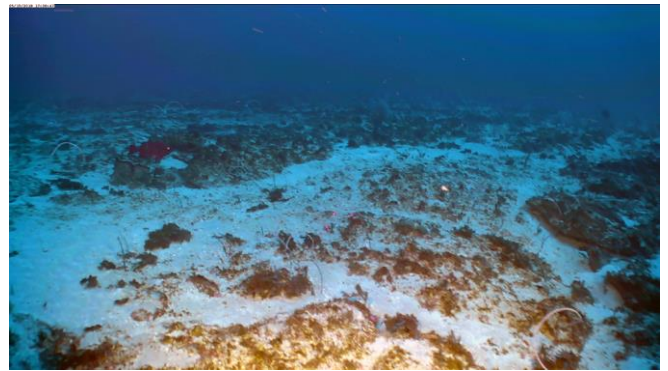


Figure 4: -62.4 m
Sediment veneered rock pavement.

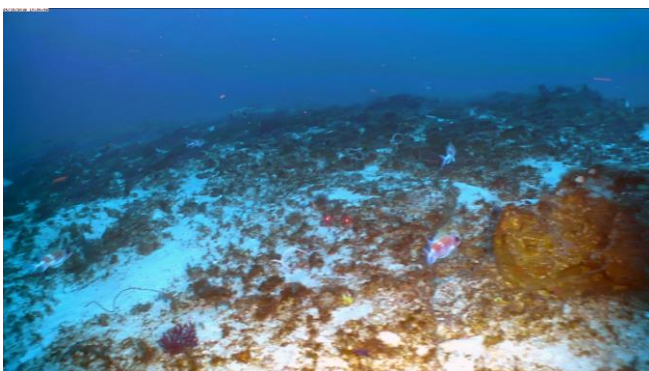


Figure 5: -63.1 m
Dive was aborted due to lost video feed. Unable to get to reef escarpment.



Figure 6: -62.9 m
Squirrelfish.

Dive Site: North Carolina, Snowy Grouper Wreck MPA Reef; Target SW-01; 70 m; ROV 18-10, UNCW 580; 15-V-18-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 15-V-18-1; ROV 18-10, UNCW Dive 580; North Carolina, Snowy Wreck MPA Reef Site, 70 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, manual focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo- screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Both cameras had 10-cm parallel lasers for scale (green- Still; red- Video). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -2.0 m (2 m too shallow). All depths noted below are actual depth (added 2 m to ROV readout).

Dive aborted early; lost video, power. No CPCE images.

Site Description/Habitat/Biota:

Depth range: 63 m

MB map shows NE-SW oriented escarpment, top plateau- 64 m, east base- 79 m.

Weather- Sunny, seas 3-5 ft from SE, wind 20 kn from 174 dg, air- 27.0, surface water- 26.63, salinity- 36.37, current- 1.8 kn to 006 dg.

17:26- Launch

17:30- On bottom- 63 m; visibility- 15 m, current 1.0 kn from S .

Top of plateau, flat rock, sediment, <25 cm rocks.

Swiftia exserta, bushy green algae, macro brown algae, *Stichopathes*.

17:35- lost video feed for minute; drifting 15 m off bottom.

17:38- lost video, lost power, wire angle bad. Abort dive.

Dive Site: North Carolina, Snowy Grouper Wreck MPA Reef; Target SW-01; 70 m; ROV 18-10, UNCW 580; 15-V-18-1

CPCe Percent Cover Analysis:

Camera failed, no images for Point Count analysis.

Dive Site: North Carolina, Snowy Grouper Wreck MPA Reef; Target SW-01; 70 m; ROV 18-10, UNCW 580; 15-V-18-1

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes of macro-biota and substrate recorded at dive site ROV 18-10. No CPCe point count due to camera failure.

Group/Major/Class/Scientific Name	ROV 18-10 Note
Biota	X
Algae	X
Chlorophyta	X
<i>Codium</i> sp.	X
Ochrophyta	X
Gorgonian	X
Alcyonacea - gorgonian	X
<i>Swiftia exserta</i> (Ellis & Solander, 1786)	X
Antipatharia	X
Antipatharia	X
<i>Stichopathes luetkeni</i> Brook, 1889	X
Grand Total	X

Dive Site: North Carolina, Snowy Grouper Wreck MPA Reef; Target SW-01; 70 m; ROV 18-10, UNCW 580; 15-V-18-1

Density of Fish:

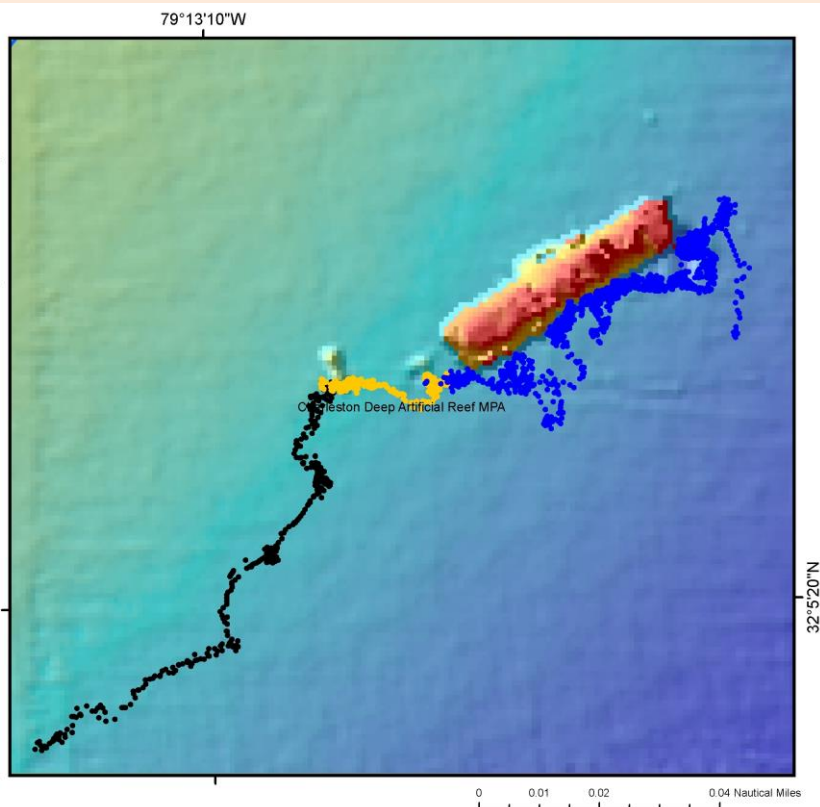
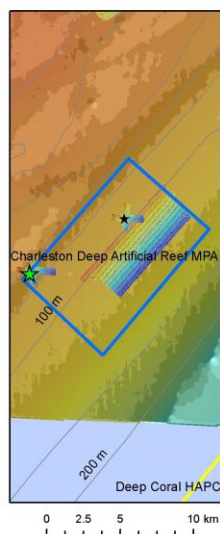
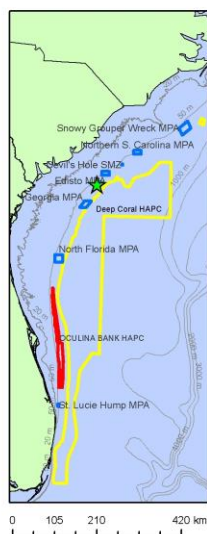
Table 2. No fish densities performed on ROV 18-11 due to camera failure.

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Shallow Barge; Target B-02; 85 m; ROV 18-11, UNCW 581; 16-V-18-1

General Location and Dive Track:

South Carolina, Charleston Deep Artificial Reef MPA; Shallow Barge; Target B-02; 85 m; ROV 18-11, UNCW 581; 16-V-18-1

- ★ ROV 18-11
 - ★ Mohawk ROV
 - ★ CTD
 - 201805161 - Transect 01
 - 201805161 - Transect 02
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: NancyFoster_14_08_Barge2

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/16/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 235

No. DVD: 2

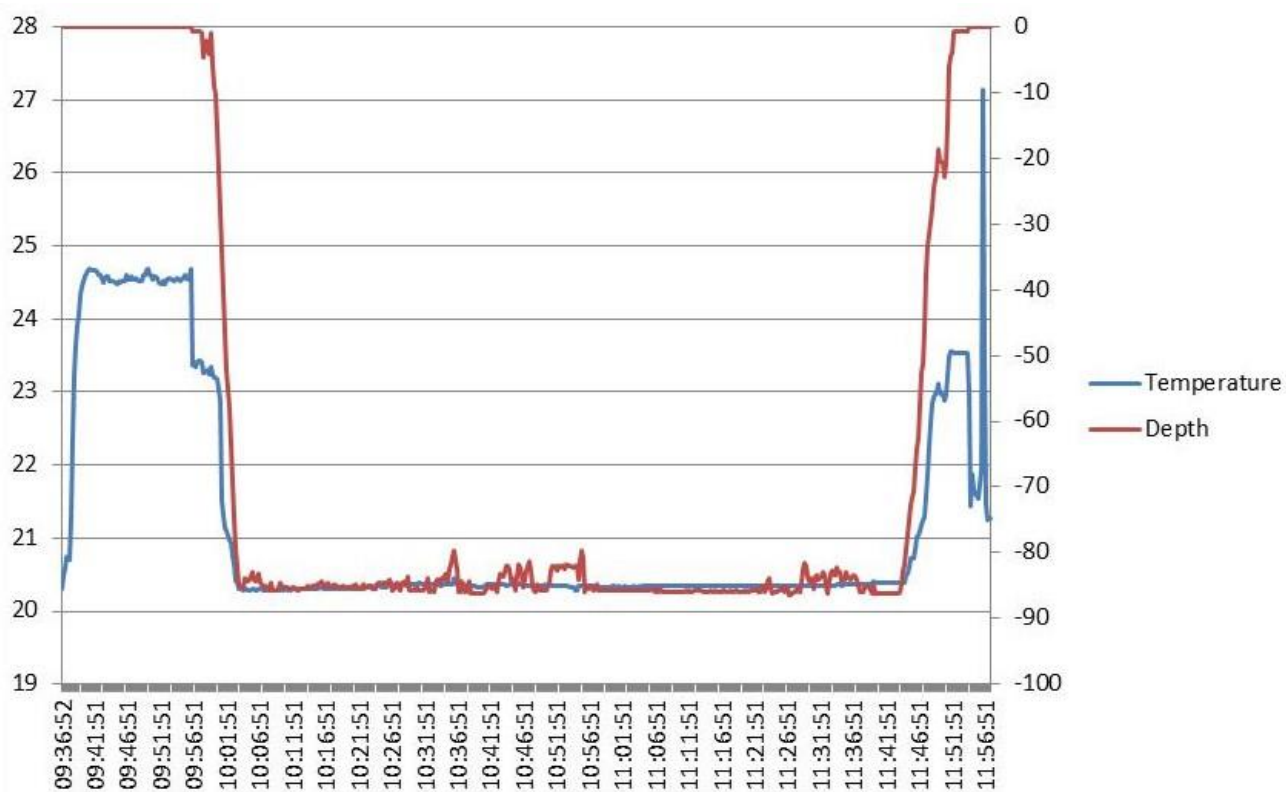
No. Hard Drive: 1

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Shallow Barge; Target B-02; 85 m; ROV 18-11, UNCW 581; 16-V-18-1

Dive Data:

Minimum Bottom Depth (m): 80.2	Total Transect Length (km): 0.353
Maximum Bottom Depth (m): 87.2	Surface Current (kn): 0.9
On Bottom (Time- EDST): 10:03	On Bottom (Lat/Long): 32.0885°N; -79.2198°W
Off Bottom (Time- EDST): 11:39	Off Bottom (Lat/Long): 32.0896°N; -79.2178°W
Physical (bottom); Temp (°C): 20.3	Salinity: N/A Visibility (m): 5 Current (kn): 0.1

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-11 are as follows: Depth Maximum: 86.4 m, Temperature: 20.3-20.4 °C.

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Shallow Barge; Target B-02; 85 m; ROV 18-11, UNCW 581; 16-V-18-1

Dive Imagery:



Figure 1: -87.3 m
School of greater amberjack and almaco jack on barge.



Figure 2: -88.1 m
Containers on barge artificial reef which was sunk in 2014.



Figure 3: -87.2 m
Mast fallen on barge, with blue angelfish.



Figure 4: -85.7 m
Most vertical surfaces of barge were encrusted with bivalves, possibly Ostreidae, and barnacles.



Figure 5: -85.2 m
Top of barge shows little settlement since deployment 4 years ago.



Figure 6: -88.5 m
Lionfish on base of barge. Total of 88 were counted.

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Shallow Barge; Target B-02; 85 m; ROV 18-11, UNCW 581; 16-V-18-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 16-V-18-1; ROV 18-11, UNCW Dive 581; South Carolina, Charleston Deep Artificial Reef MPA, Shallow Barge, 85 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, manual focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo- screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (red; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -2.0 m (2 m too shallow). All depths noted below are actual depth (added 2 m to ROV readout).

Collection skid removed for rest of cruise.

Site Description/Habitat/Biota:

Depth range: 83- 88.5 m

MB map shows shallow barge oriented NE-SW. Barge sunk in 2014.

Weather- Sunny, seas 2-3 ft from SE, wind 7 kn from 209 dg, air- 25.31 C, surface water- 23.38 C, salinity- 36.14 PSU, current- 1.0 kn to 078 dg.

9:56- Launch

10:03- On bottom- 88.5 m; visibility- 5 m, current 0.1 kn from NE.

148 m SW of barge; flat soft sediment, 100% soft bottom, scattered shells. Amberjack (dozens), *Stichopathes*, *Eucidaris tribuloides*.

10:17- At debris field, Science MB shows ROV 39 m south of barge, however, ROV nav shows the correct position on the debris field. Scamp, lionfish, blue angel, *Arbacia punctulata*, 88 m.

10:25- Digital still camera test- angle down 210, altitude 1.0 m, 1.0 m, photos manual focus set to 4', 3.8', 3.0 ft.

10:28- At SW corner of barge debris field. Science computer fixed, changed from WGS 1984 17N to NAV 1983 17N. Steel mast hanging off end of barge, laying horizontal about 10 ft off bottom. Previously was not there, was vertical. Hazard for ROV. Top of barge 83 m, sediment at S base- 88.6 m. Sediment sand/shell hash.

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Shallow Barge; Target B-02; 85 m; ROV 18-11, UNCW 581; 16-V-18-1

10:42- south side of wreck, 88.5 m on sediment. Vertical surface covered with bivalves, possibly Ostreidae, barnacles, no sponges, no corals. Top deck barren, no sediment. No snowy grouper, some Lionfish, *Arbacia punctulata*, red barbier. More superstructure hanging off the south side of barge. Baby snowy 10 cm with spots. Small anemones or zoanthids.

11:07- Container fallen off south side that wasn't there last year, pile of cable on bottom, bank seabass, *Stenorhynchus seticornis*,

11:17- southeast end of barge, radio mast fallen off since last year; blue angel fish, wrasse bass; mast sticking out at end of 15 meters from the ship laying on the bottom

11:28- east end barge, 2 grey triggerfish, 88.8 m on bottom. ROV position shows 8 m east of MB at east end of barge.

11:39- end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- none

Antipatharia coral- none

Gorgonia coral- none

Zoanthidea

Hydroida- none

Porifera- none

Mollusca- Ostreidae (on vertical surface of barge)

Decapoda- *Stenorhynchus seticornis*

Echinodermata- *Eucidaris tribuloides*, *Arbacia punctulata*

Human Debris:

Fishing line- none

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Shallow Barge; Target B-02; 85 m; ROV 18-11, UNCW 581; 16-V-18-1

CPCe Percent Cover Analysis:

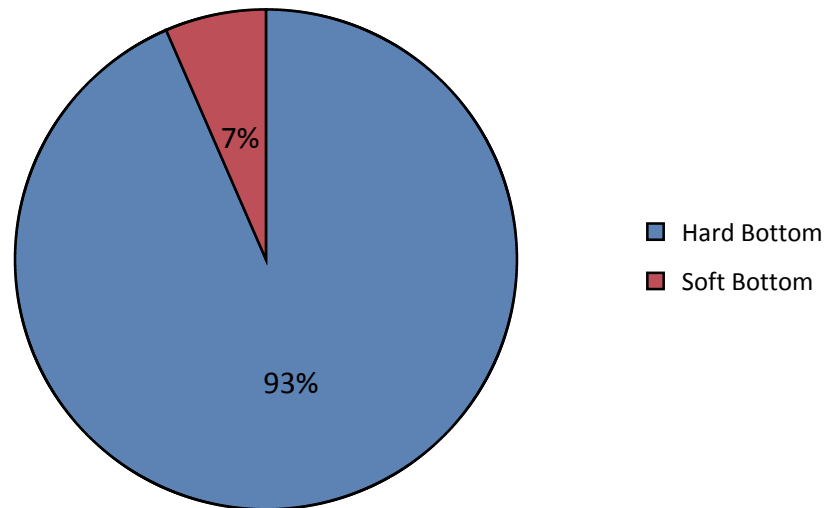


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-11. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

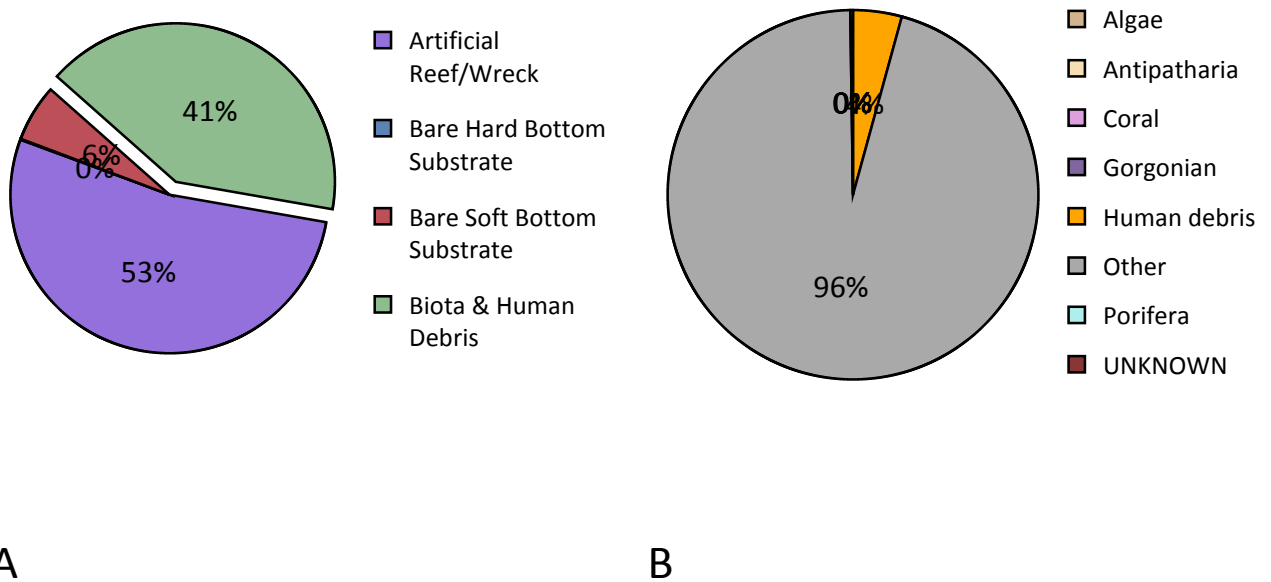


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-11. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Shallow Barge; Target B-02; 85 m; ROV 18-11, UNCW 581; 16-V-18-1

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site 18-11.

	ROV 18-11	Note
	%	
Biota	39.46%	X
Porifera	0.10%	
Demospongiae	0.10%	
Demospongiae- unid. sp.	0.10%	
Antipatharia		X
Antipatharia		X
<i>Stichopathes luetkeni</i> Brook, 1889		X
Other	39.36%	X
Ctenophora		X
Arthropoda		X
Cirripedia		X
<i>Stenorhynchus seticornis</i> (Herbst, 1788)		X
Mollusca	37.03%	X
Ostreidae	37.03%	X
Echinodermata	0.29%	X
<i>Arbacia punctulata</i> (Lamarck, 1816)	0.29%	X
<i>Eucidaris tribuloides</i> (Lamarck, 1816)		X
Chordata - Vertebrate	2.04%	X
Actinopterygii	2.04%	X
Bare Substrate	5.93%	
Bare Hard Bottom	0.10%	
Bare Hard Bottom	0.10%	
Bare rock, pavement, boulder, ledge	0.10%	
Bare Soft Bottom	5.83%	
Artificial Reef/Wreck	52.87%	
Artificial Reef/Wreck	52.87%	
Human debris	1.75%	
Human debris	1.75%	
Human debris- anchor line	1.75%	
Grand Total	100.00%	X

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Shallow Barge; Target B-02; 85 m; ROV 18-11, UNCW 581; 16-V-18-1

Density of Fish:

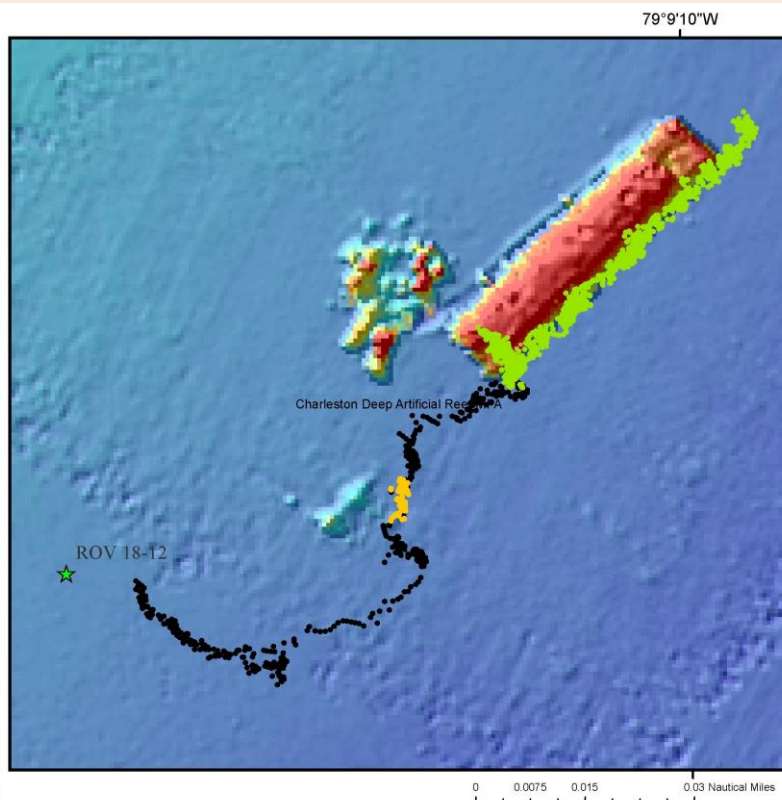
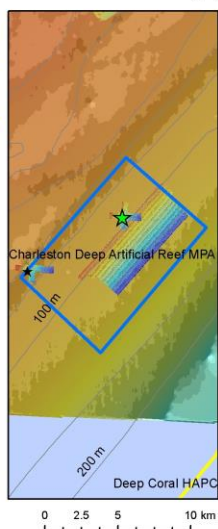
Table 2. No fish densities performed on ROV 18-11.

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Deep Barge; Target B-01; 102 m; ROV 18-12, UNCW 582; 16-V-18-2

General Location and Dive Track:

South Carolina, Charleston Deep Artificial Reef MPA; Deep Barge; Target B-01; 102 m; ROV 18-12, UNCW 582; 16-V-18-2

- ★ ROV 18-12
- ★ Mohawk ROV
- ★ CTD
- 201805162 - Transect 02
- 201805162 - Transect 01
- ROV Track
- Oculina HAPC
- MPA
- Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: NancyFoster_14_08_Barge1

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/16/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 270

No. DVD: 2

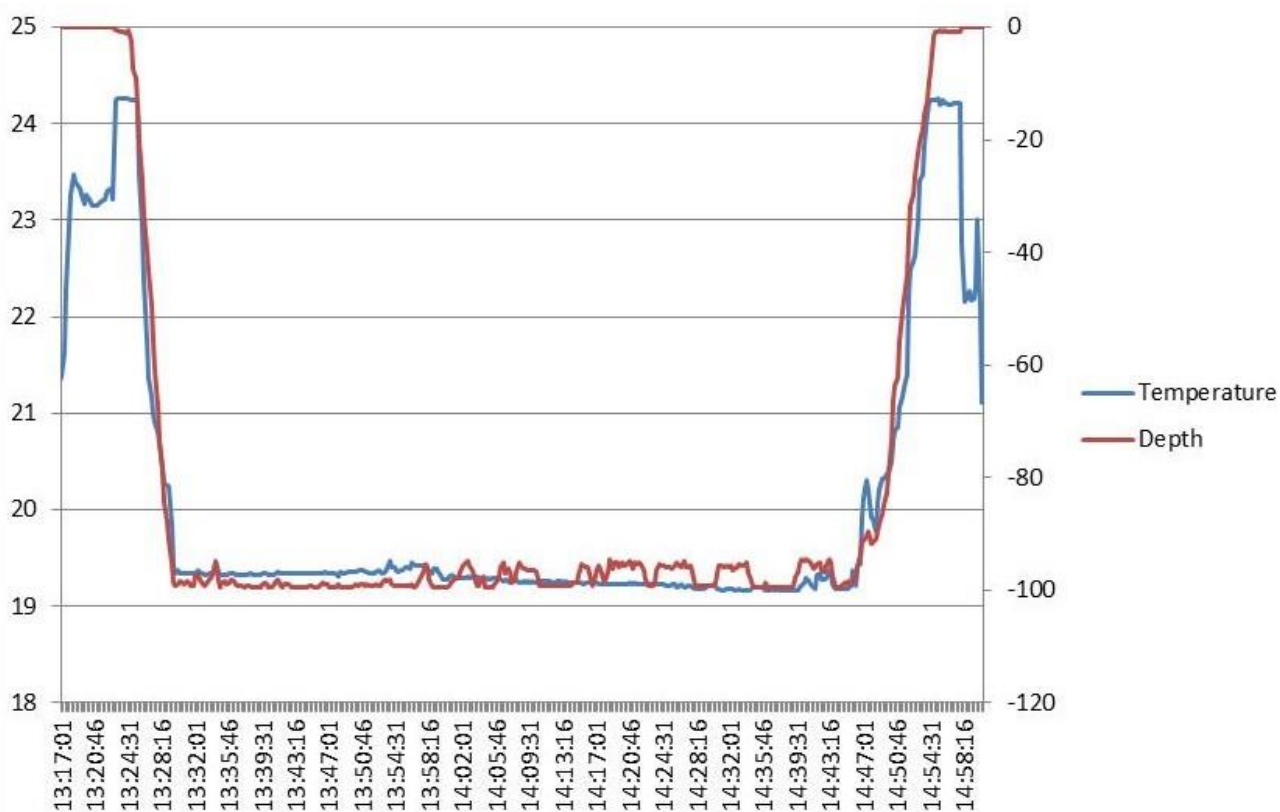
No. Hard Drive: 1

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Deep Barge; Target B-01; 102 m; ROV 18-12, UNCW 582; 16-V-18-2

Dive Data:

Minimum Bottom Depth (m):	94.8	Total Transect Length (km):	0.259
Maximum Bottom Depth (m):	100.6	Surface Current (kn):	0.4
On Bottom (Time- EDST):	13:29	On Bottom (Lat/Long):	32.1235°N; -79.1543°W
Off Bottom (Time- EDST):	14:44	Off Bottom (Lat/Long):	32.1246°N; -79.1526°W
Physical (bottom); Temp (°C):	19.3	Salinity: N/A	Visibility (m): 5
			Current (kn): 0.25

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-12 are as follows: Depth Maximum: 99.5 m, Temperature: 19.2-19.5 °C.

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Deep Barge; Target B-01; 102 m; ROV 18-12, UNCW 582; 16-V-18-2

Dive Imagery:

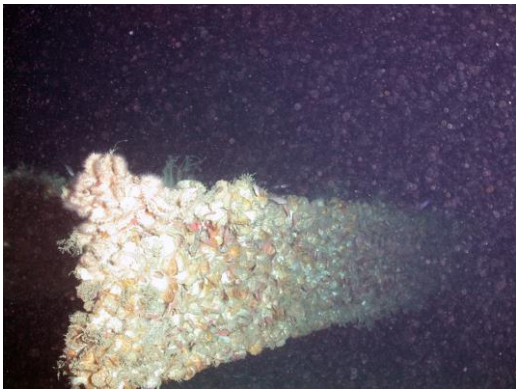


Figure 1: -101.9 m
Deep barge artificial reef is covered with bivalves, possibly Ostreidae.



Figure 2: -101.4 m
Debris fallen off barge since last year.

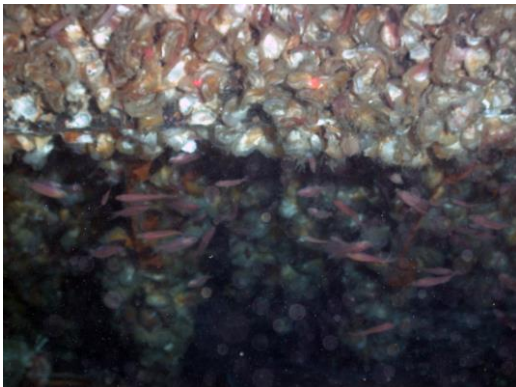


Figure 3: -102.1 m
School of Anthiids. The deep barge (100 m depth) had much more settlement of biota than the 85 m barge.



Figure 4: -102.1 m
Anthiids.



Figure 5: -102 m
Base of barge with fire worm (*Hermodice carunculata*) and hermit crabs.



Figure 6: -97.4 m
School of amberjack on top of barge.

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Deep Barge; Target B-01; 102 m; ROV 18-12, UNCW 582; 16-V-18-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 16-V-18-2; ROV 18-12, UNCW Dive 582; South Carolina, Charleston Deep Artificial Reef MPA, Deep Barge, 102 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, manual focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo- screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (red; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -2.0 m (2 m too shallow). All depths noted below are actual depth (added 2 m to ROV readout).

Collection skid removed.

Used digital still camera and screen grabs for photo transects.

Site Description/Habitat/Biota:

Depth range: 98- 102 m

MB map shows deep barge oriented NE-SW, with large debris field at SW end. Barge sunk in 2014.

Weather- Cloudy, seas 2-3 ft swell from SE, wind 5 kn from 195 dg, air- 23.64 C, surface water- 24.45 C, salinity- 36.26 PSU, current- 0.4 kn to 114 dg.

13:22- Launch

13:29- On bottom- 102.5 m; visibility- 5 m, current 0.25 from W.

90 m SW of barge, flat, 100% soft sediment, lots sediment in water column; large school of amberjack, hermit crab.

13:41- At single container SW of barge; ROV nav appears close to MB position. Ostreidae and hydroids on container, sargassum detritus, hermit crab, greenband bass, anthiid, snowy grouper, Corallimorpharia, Almaco. Container partially collapsed (45o angle).

13:54- SE corner of barge, MB jives with ROV nav. Depth 102 m on sediment. Sediment with bivalve shells, amberjack, black bar drum, vertical surface- Ostreidae, zoanthids, 100% cover; depth on top deck- 98 m; *Hermodice carunculata*, *Arbacia punctulata*, snowy, dense small red barbier.

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Deep Barge; Target B-01; 102 m; ROV 18-12, UNCW 582; 16-V-18-2

14:07- Heading NE along south side, oysters on horizontal top and vertical, lionfish, Serpulidae, red porgy, warsaw, scamp, gag, red snapper, Crinoidea- 10 cm arms yellow.

14:40- SE corner, ROV is offset 10 East of MB at east corner.

14:44- end of dive. 102 m at SE base.

Dominant Benthic Macrobiota:

Scleractinia coral- none

Antipatharia coral- none

Gorgonia coral- none

Corallimorpharia

Zoanthidea

Hydroida- none

Porifera- none

Mollusca- Ostreidae (on vertical and horizontal surface of barge)

Decapoda- *Stenorhynchus seticornis*

Echinodermata- *Arbacia punctulata*

Crinoidea

Annelida- *Hermodice carunculata*

Human Debris:

Fishing line- none

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Deep Barge; Target B-01; 102 m; ROV 18-12, UNCW 582; 16-V-18-2

CPCe Percent Cover Analysis:

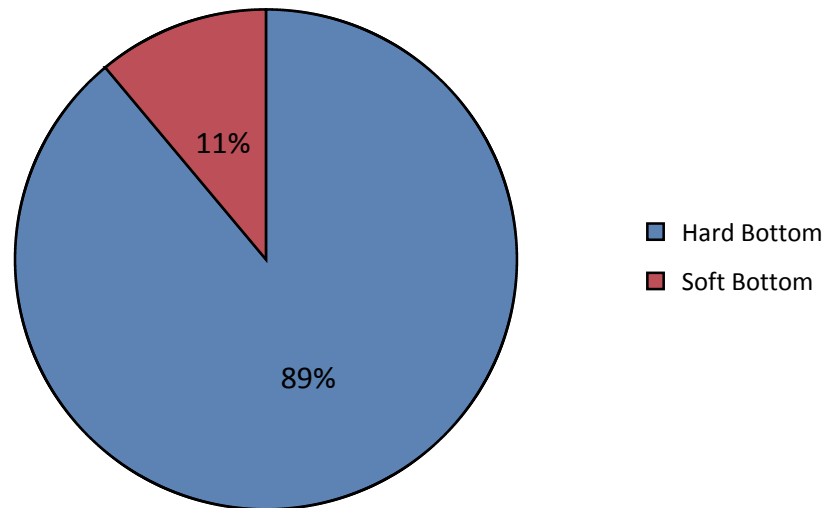


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-12. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

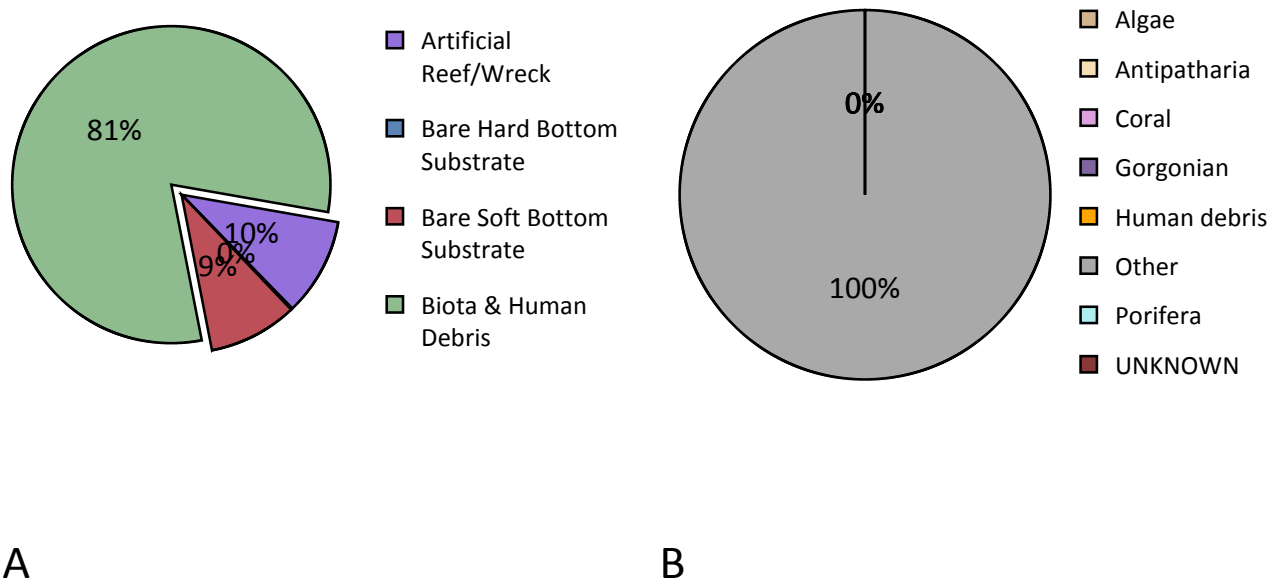


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-12. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Deep Barge; Target B-01; 102 m; ROV 18-12, UNCW 582; 16-V-18-2

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-12.

	ROV 18-12	
	%	Note
Biota	80.84%	X
Algae		X
Ochrophyta		X
<i>Sargassum</i> sp.		X
Other	80.84%	X
Ctenophora		X
Hydrozoa	0.47%	X
Hydroidolina	0.47%	X
Anthozoa - Non Coral		X
Actiniaria		X
Zoanthidae		X
Annelida	0.16%	X
<i>Hermodice carunculata</i> (Pallas, 1766)	0.16%	X
Serpulidae		X
Arthropoda	0.16%	X
Anomura		X
<i>Dardanus</i> sp.		X
Paguroidea	0.16%	
Mollusca	74.77%	X
Bivalvia		X
Gastropoda	0.16%	
Ostreidae	74.61%	X
Echinodermata	0.16%	X
<i>Arbacia punctulata</i> (Lamarck, 1816)		X
Crinoidea	0.16%	X
Chordata - Vertebrate	1.71%	X
Actinopterygii	1.71%	X
Detritus	3.43%	
Bare Substrate	9.19%	
Bare Hard Bottom	0.16%	
Bare Hard Bottom	0.16%	
Bare rock, pavement, boulder, ledge	0.16%	
Bare Soft Bottom	9.03%	

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Deep Barge; Target B-01; 102 m; ROV 18-12, UNCW 582; 16-V-18-2

Artificial Reef/Wreck	9.97%	
Artificial Reef/Wreck	9.97%	
Human debris		X
Human debris		X
Human debris- other		X
Grand Total	100.00%	X

Dive Site: South Carolina, Charleston Deep Art. Reef MPA; Deep Barge; Target B-01; 102 m; ROV 18-12, UNCW 582; 16-V-18-2

Density of Fish:

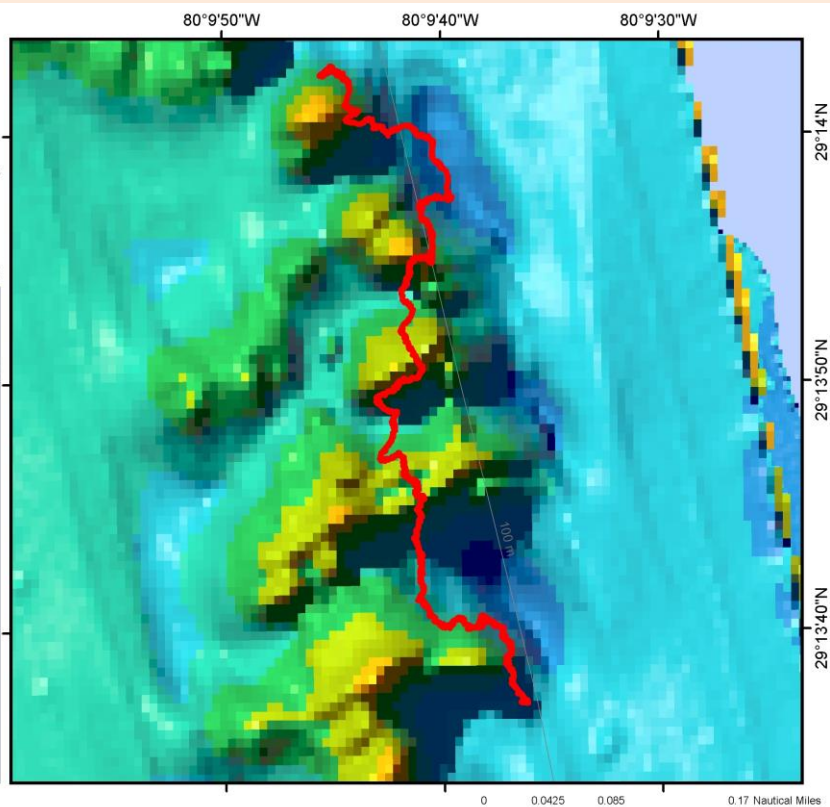
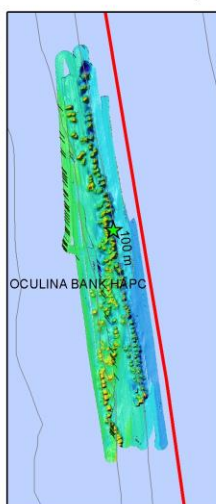
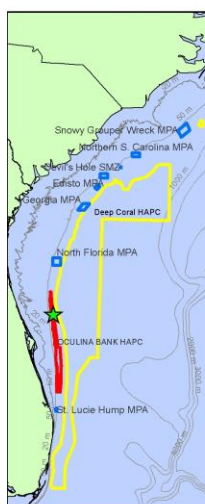
Table 2. No fish densities performed on ROV 18-12.

Dive Site: Florida, Oculina HAPC North, Off Daytona; 85 m; ROV 18-13, UNCW 583; 17-V-18-1

General Location and Dive Track:

Florida, Oculina HAPC North,
Off Daytona; 85 m; ROV 18-13,
UNCW 583; 17-V-18-1

- ★ ROV 18-13
 - ★ Mohawk ROV
 - ★ CTD
 - 201805171 - Transect 01
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Pisces_2011_Oculina_titusville_5m_MB_TIF

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/17/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 251

No. DVD: 2

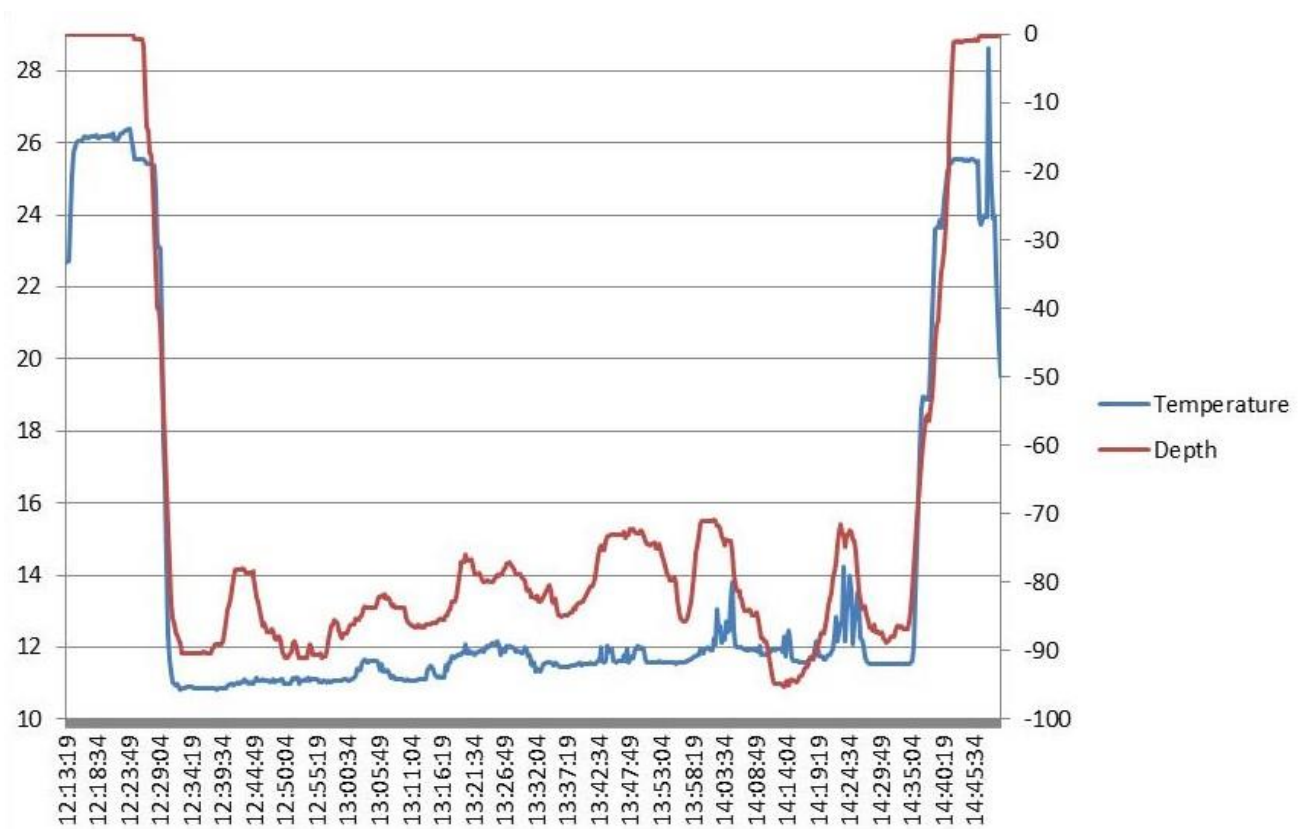
No. Hard Drive: 1

Dive Site: Florida, Oculina HAPC North, Off Daytona; 85 m; ROV 18-13, UNCW 583; 17-V-18-1

Dive Data:

Minimum Bottom Depth (m):	71	Total Transect Length (km): 1.030			
Maximum Bottom Depth (m):	96.1	Surface Current (kn):	0.9		
On Bottom (Time- EDST):	12:32	On Bottom (Lat/Long):	29.327°N; -80.1601°W		
Off Bottom (Time- EDST):	14:34	Off Bottom (Lat/Long):	29.234°N; -80.1627°W		
Physical (bottom); Temp (°C):	10.9	Salinity:	N/A	Visibility (m): 10	Current (kn): 0.1

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-13 are as follows: Depth Maximum: 95.2 m, Temperature: 10.8-14.2 °C.

Dive Site: Florida, Oculina HAPC North, Off Daytona; 85 m; ROV 18-13, UNCW 583; 17-V-18-1

Dive Imagery:



Figure 1: -81.8 m
Peak of *Oculina* coral mound.



Figure 2: -92.1 m
Snowy grouper on *Oculina* coral mound.



Figure 3: -89.4 m
Close up of coral rubble with pencil urchin (*Eucidaris tribuloides*) and soft coral (*Nidalia* sp.)



Figure 4: -85.4 m
Large sea spider (Pycnogonida- *Anoplodactylus lentus*)



Figure 5: -87.9 m
Bush of live, azooxanthellate *Oculina varicosa* coral with *Asteropus annulata* brittlestar on top.



Figure 6: -87.2 m
Hermit crab (*Pagurus* sp.)

Dive Site: Florida, Oculina HAPC North, Off Daytona; 85 m; ROV 18-13, UNCW 583; 17-V-18-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 17-V-18-1; ROV 18-13, UNCW Dive 583; Florida, Oculina HAPC North, off Daytona, 85 m

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (red; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Tracking appears off for E-W but ok for N-S. ROV appears 8-10 m east of MB feature. Collection skid removed. Used digital still camera and screen grabs for photo transects.

Site Description/Habitat/Biota:

Depth range: 76- 93.6 m

MB map shows dense series of mounds, peaks with E-W ridge, peaks ~75-80 m, valleys between peaks ~90-100 m. Multibeam map is shifted 15 m north of actual position.

Weather- Pt/Cloudy, seas 3-5 ft from S, wind 15 kn from 187 dg, air- 26.54 C, surface water- 25.48 C, salinity- 36.09 PSU, current- 0.9 kn to 352 dg.

12:24- Launch

12:33- On bottom- 93.6 m; visibility- 10 m, current- 0.1 from S.

East of mound base, flat coral rubble, sand, shell hash, *Eucidaris tribuloides*.

Head NNE over series of coral mounds, hydroids, Goniaster sp., Cerianthidae, 15 cm live *Oculina* white, zoanths, scorpionfish, red brittlestar *Ophioderma devaneyi*, *Narcissia*,

South slope mound 1- 100 coral rubble, peak 82 m. Peak- brown sponges *Chondrilla*?,

12:44- North slope mound 1, longline, 88 m- ledge near base, *Centrostephanus*, heading along base of Mound 1, 89 m- 1 m ledges, short bigeye, yellow and orange encrusting sponges, *Stichopathes*, snowy grouper, *Corallimorpharia*, snowy, *Prognathodes aya*, *Fasciolaria*, scorpion fish, 2 m relief, 90 m.

12:54- valley, 92 m, 100% rubble, 89 m, exposed limestone rock, 2 m relief, fishing line, *Nidalia*, *Asteropora annulata*, 15 cm live *Oculina*, live *Oculina* 10 cm, live *Oculina* 5 cm, standing dead coral 15-20 cm,

Pycnogonida Anoplodactylus lentus, bank sea bass, stinging hydroid, tatler,

13:10- Head N to Mound 2, in valley, 88.5 m.

13:14- base of Mound 2, 20 cm standing dead coral, covered with ascidians, squat lobster, *Diogenes* hermit crab, 20 cm standing dead coral, south slope 84 m, 100% dead coral.

13:19- Peak of Mound 2, 78.7 m, dense *Eucidaris*, sponges, standing dead, Corallimorph, *Nidalia*, *Arbacia punctulata*; north slope of mound 2, 100% coral rubble, Terebellidae, 15 cm live white *Oculina*, 3 *Nidalia*, 4 *Oculina*, 79 m, near peak of Mound 2.

13:29- North slope Mound 2, 81 m, 1 *Oculina*, in valley between Mound 2 and 3, 86 m.

13:38- South slope of Mound 3, 85 m, 100% rubble, near peak 30 cm standing dead, 77 m- peak, heading NE along peak, lionfish, mounds of dead coral with brown sponge *Chondrilla*, *Eucidaris*, pink clusters of *Cnidaria*?, hydroids.

13:52- Hd N downslope of Mound 3, North slope 80 m, 25 cm white live *Oculina*, *Centrostephanus*, *Titanideum frauenfeldii*, bare rock, in valley between Mound 3 and 4, 87 m,

13:57- South slope Mound 4, 84 m; near peak, 76 m, 15 cm live white *Oculina*, 1 *Oculina*, peak 73 m.

14:05- heading down East slope of Mound 4. *Diodogorgia*, *Chondrilla*.

14:09- Hd along west edge of scour on MB, north of Mound 4, depth 90 m, 1 *Oculina* 96 m, sting hydroid.

14:21- 89 m- 10 cm live white, 10 cm live white, East slope of Mound 5, near peak, *Oculina*, *Oculina* – 78 m, Peak mound 5- 75 m.

14:25- Hd down N slope Mound 5, 100% coral rubble, ledge 86 m, 2 m relief, *Prognathodes aya*, bigeye, *Stichopathes*, *Tanacetipathes*, *Centrostephanus*, snowy, scorpion, small 1-2' cavities in rock, cup corals, *Sargassum* detritus, reticulate eel, 10 cm coral, 88 m, *Diodogorgia*? With dead tips, red porgy.

14:34- end dive, 88 m.

Dominant Benthic Macrobiota:

Scleractinia coral- *Oculina varicosa*- 21 live white, cup corals

Antipatharia coral- *Tanacetipathes* bushy, *Stichopathes luetkeni*

Gorgonia coral- *Diodogorgia*, *Titanideum frauenfeldii*

Alcyonacea- *Nidalia* sp.

Corallimorpharia

Zoanthidea

Actiniaria- Cerianthidae

Hydroida

Porifera- *Chondrilla*?, encrusting orange and yellow

Mollusca- *Fasciolaria*

Pycnogonida- *Anoplodactylus lentus*

Decapoda- *Stenorhynchus seticornis*; *Diogenes*, hermit crabs

Echinodermata- *Arbacia punctulata*, *Eucidaris tribuloides*, *Centrostephanus*

Ophiuroidea- *Ophioderma devaneyi*, *Asteropora annulata*

Human Debris:

Fishing line- longline, fishing lines

Dive Site: Florida, Oculina HAPC North, Off Daytona; 85 m; ROV 18-13, UNCW 583; 17-V-18-1

CPCe Percent Cover Analysis:

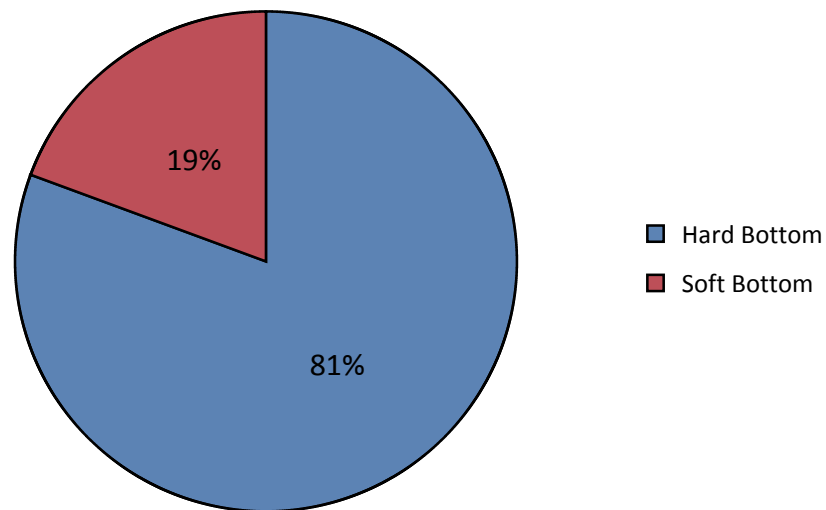


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-13. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

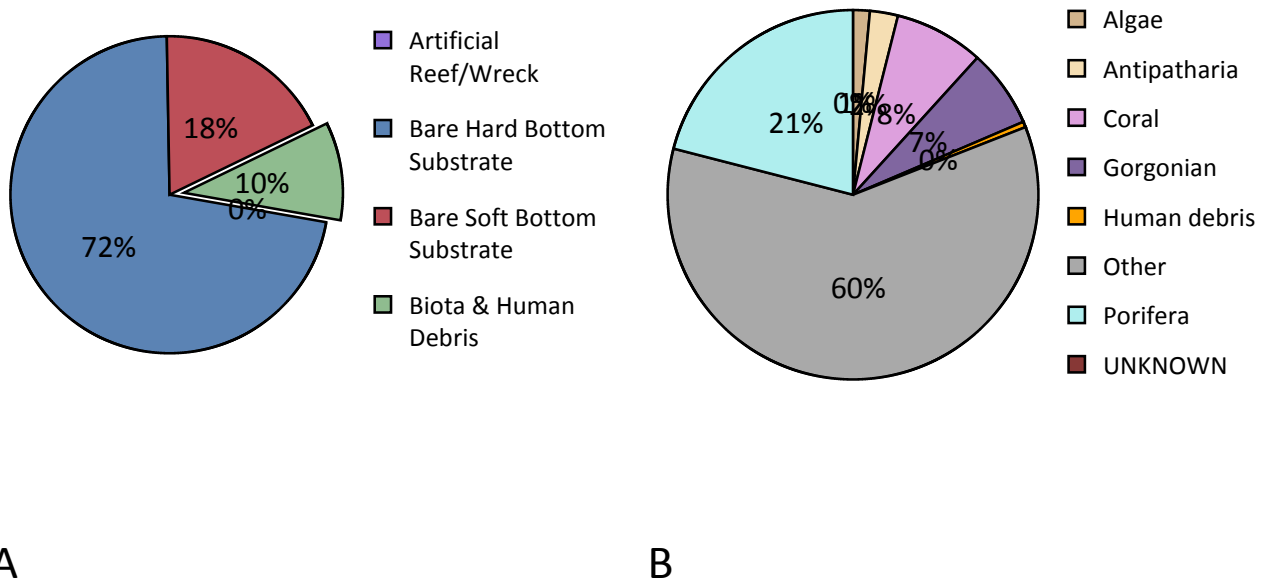


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-13. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: Florida, Oculina HAPC North, Off Daytona; 85 m; ROV 18-13, UNCW 583; 17-V-18-1

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-13.

	ROV 18-13	
	%	Note
Biota	9.95%	X
Algae	0.15%	
Algae- Unid.	0.05%	
Rhodophyta	0.10%	
Corallinales	0.10%	
Porifera	2.10%	X
Demospongiae	2.10%	X
<i>Chondrilla</i> sp.	1.12%	X
Demospongiae- unid. sp.	0.83%	X
<i>Erylus</i> sp.		X
Spirastrellidae	0.15%	
Coral	0.78%	X
Coral- Scleractinia	0.78%	X
<i>Cladocora</i> sp.	0.05%	
<i>Oculina varicosa</i> Le Sueur, 1820	0.39%	X
<i>Phyllangia americana</i> Milne Edwards & Haime, 1849	0.20%	
Scleractinia- standing dead		X
Scleractinia- unid cup	0.15%	X
Gorgonian	0.68%	X
Alcyonacea - gorgonian	0.68%	X
Alcyonacea- gorgonian	0.15%	
<i>Diodogorgia</i> sp.	0.10%	X
<i>Telesto</i> sp.	0.44%	
<i>Thesea</i> sp.		X
<i>Titanideum frauenfeldii</i> (Kölliker, 1865)		X
Antipatharia	0.24%	X
Antipatharia	0.24%	X
Antipatharia unid. sp.	0.05%	
<i>Stichopathes luetkeni</i> Brook, 1889	0.20%	X
<i>Tanacetipathes</i> sp.		X
Other	6.00%	X
Hydrozoa	2.68%	X
Hydroidolina	2.68%	X
Alcyonacea - Alcyoniina	0.10%	X
<i>Nidalia occidentalis</i> Gray, 1835	0.10%	

Dive Site: Florida, Oculina HAPC North, Off Daytona; 85 m; ROV 18-13, UNCW 583; 17-V-18-1

<i>Nidalia</i> sp.		X
Anthozoa - Non Coral	0.49%	X
Actiniaria		X
Cerianthidae	0.10%	X
Corallimorpharia	0.10%	X
Zoanthidae	0.29%	X
Annelida	0.88%	
Annelida Unid.	0.78%	
Serpulidae	0.05%	
Terebellidae	0.05%	
Arthropoda	0.15%	X
Anomura		X
<i>Anoplodactylus lentus</i> Wilson, 1878		X
Cirripedia	0.05%	
<i>Diogenes</i> sp.		X
<i>Eumunida</i> sp.		X
Pycnogonida	0.05%	
<i>Stenorhynchus seticornis</i> (Herbst, 1788)	0.05%	X
Mollusca	0.10%	X
Bivalvia	0.05%	
<i>Fasciolaria</i> sp.		X
Gastropoda	0.05%	
Echinodermata	0.68%	X
<i>Arbacia punctulata</i> (Lamarck, 1816)		X
<i>Asteropora (Asteropora) annulata</i> Örsted & Lütken in: Lütken, 1856		X
<i>Centrostephanus longispinus</i> (Philippi, 1845)		X
Echinoidea		X
<i>Eucidaris tribuloides</i> (Lamarck, 1816)	0.54%	X
<i>Goniaster tessellatus</i> (Lamarck, 1816)		X
<i>Narcissia trigonaria</i> Sladen, 1889		X
<i>Ophioderma devaneyi</i> Hendler & Miller, 1984	0.05%	X
Ophiuroidea	0.10%	
<i>Stylocidaris</i> sp.		X
Chordata - Invertebrate	0.24%	
Ascidacea	0.24%	
Chordata - Vertebrate	0.29%	X
Actinopterygii	0.29%	X
UNKNOWN		X
Detritus	0.39%	
Bare Substrate	90.00%	
Bare Hard Bottom	71.95%	

Dive Site: Florida, Oculina HAPC North, Off Daytona; 85 m; ROV 18-13, UNCW 583; 17-V-18-1

Bare Hard Bottom	71.95%	
Bare coral rubble	48.88%	
Bare rock, pavement, boulder, ledge	19.71%	
Bare rubble/cobble	1.61%	
dead standing Scleractinia (habitat)	1.76%	
Bare Soft Bottom	18.05%	
Human debris	0.05%	X
Human debris	0.05%	X
Human debris- fish line/gear	0.05%	
Human debris- fishing line		X
Grand Total	100.00%	X

Dive Site: Florida, Oculina HAPC North, Off Daytona; 85 m; ROV 18-13, UNCW 583; 17-V-18-1

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-13.

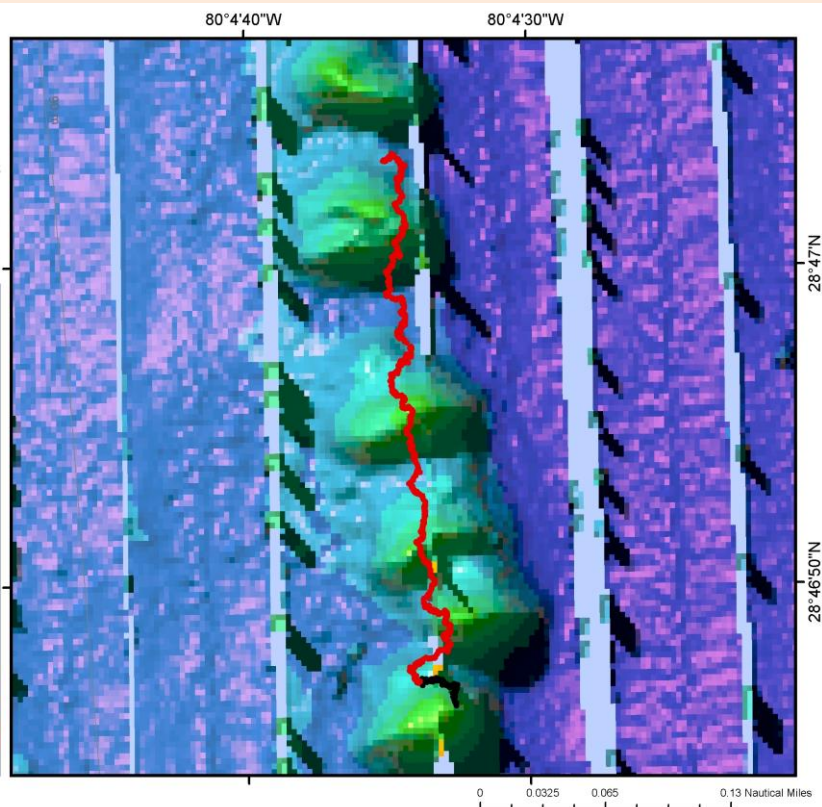
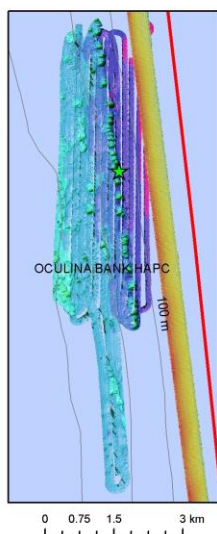
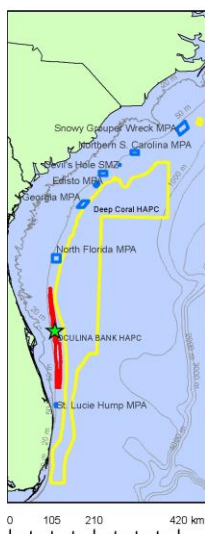
Taxa, Author- Common name	ROV 18-13
Actinopterygii	
Anguilliformes	
<i>Muraena retifera</i> Goode & Bean, 1882- reticulate moray	0.57
Perciformes	
<i>Centropristis ocyurus</i> (Jordan & Evermann, 1887)- bank sea bass	5.94
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	1.13
<i>Hyporthodus niveatus</i> (Valenciennes, 1828)- snowy grouper	0.85
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	0.28
<i>Pagrus pagrus</i> (Linnaeus, 1758)- red porgy	0.28
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye	12.73
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	2.83
<i>Pronotogrammus martinicensis</i> (Guichenot, 1868)- roughtongue bass	0.85
<i>Seriola</i> sp.- amberjack	0.57
<i>Serranus phoebe</i> Poey, 1851- tattler	4.53
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	0.57
Scorpaenidae- scorpionfish	9.34
Tetraodontiformes	
<i>Balistes capriscus</i> Gmelin, 1789- grey triggerfish	0.28
UNKNOWN	1.70

Dive Site: Florida, Oculina HAPC North, Off Titusville; 85 m; ROV 18-14, UNCW 584; 17-V-18-2

General Location and Dive Track:

Florida, Oculina HAPC North,
Off Titusville; 85 m; ROV 18-14,
UNCW 584; 17-V-18-2

- ★ ROV 18-14
 - ★ Mohawk ROV
 - ★ CTD
 - 201805172 - Transect 01
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Pisces_2011_Oculina_Daytona_2_MB_TIF

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/17/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 133

No. DVD: 1

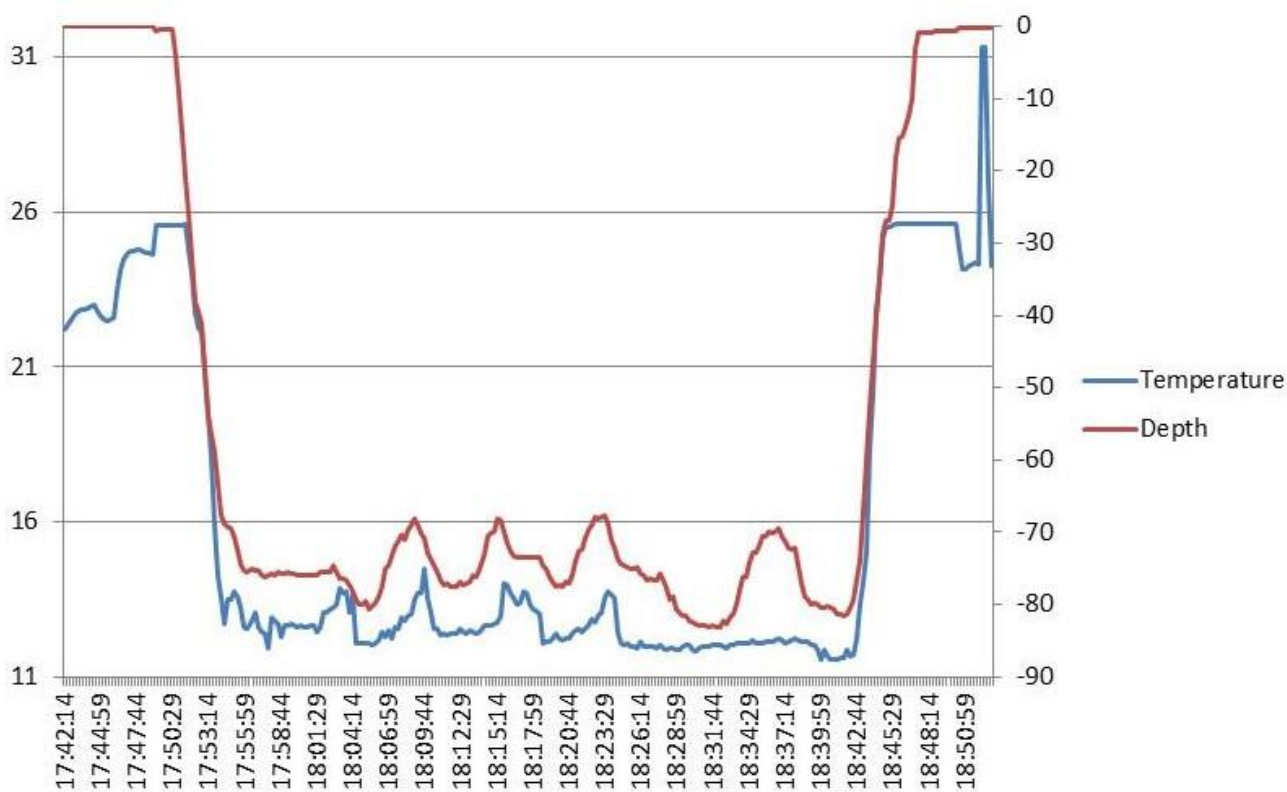
No. Hard Drive: 1

Dive Site: Florida, Oculina HAPC North, Off Titusville; 85 m; ROV 18-14, UNCW 584; 17-V-18-2

Dive Data:

Minimum Bottom Depth (m):	68.4	Total Transect Length (km):	0.548				
Maximum Bottom Depth (m):	84.4	Surface Current (kn):	0.5				
On Bottom (Time- EDST):	17:54	On Bottom (Lat/Long):	28.7795°N; -80.0758°W				
Off Bottom (Time- EDST):	18:42	Off Bottom (Lat/Long):	28.7842°N; -80.0766°W				
Physical (bottom); Temp (°C):	13.5	Salinity:	N/A	Visibility (m):	10	Current (kn):	0.25

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-14 are as follows: Depth Maximum: 83.2 m, Temperature: 11.6-14.5 °C.

Dive Site: Florida, Oculina HAPC North, Off Titusville; 85 m; ROV 18-14, UNCW 584; 17-V-18-2

Dive Imagery:



Figure 1: -78.8 m
Oculina coral mound with bushy black coral (*Tanacetipathes* sp.) and lionfish.



Figure 2: -74.7 m
Luidia sp. sea star on coral rubble.



Figure 3: -78.6 m
27 lionfish were counted on the dive.



Figure 4: -79.4 m
Gray triggerfish hiding.



Figure 5: -72.2 m
Swarm of lionfish. Lionfish have only been recorded on the *Oculina* reefs in past few years.



Figure 6: -75.4 m
Moray eel (*Gymnothorax* sp.) in standing dead *Oculina* coral.

Dive Site: Florida, Oculina HAPC North, Off Titusville; 85 m; ROV 18-14, UNCW 584; 17-V-18-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 17-V-18-2; ROV 18-14, UNCW Dive 584; Florida, Oculina HAPC North, off Titusville, 85 m

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (red; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Tracking appears off for E-W but ok for N-S. ROV appears 8-10 m east of MB feature. Collection skid removed. Used digital still camera and screen grabs for photo transects.

Depth range: 71- 85.5 m

MB map shows dense series of mounds, peaks with E-W ridge, peaks ~70 m, valleys between peaks ~85 m. Multibeam map is shifted 15 m north of actual position

Weather- Cloudy, seas 2-4 ft from S, wind 9 kn from 164 dg, air- 25.17 C, surface water- 25.60 C, salinity- 36.32 PSU, current- 0.5 kn to 306 dg.

17:49- Launch

17:54- On bottom- 72 m; visibility- 10 m, current- 0.1 from S.

Land on peak of Mound 1, 100% coral rubble, hd down N slope, *Stichopathes*, *Asteroporpa annulata*, *Geodia* yellow, *Nidalia*, *Antipathes* bush, *Stenorhynchus*, lionfish, 78 m, north slope, *Prognathodes aya*, *Tanacetipathes*, yellow and orange encrusting sponges, tatler. More dense and diverse biota than am dive.

18:04- Valley between Mound 1 and 2, 82 m, standing dead, southwest slope of Mound 2, Cerianthid, peak Mound 2 ~70 m, west slope of Mound 2, blue angel, white Plexauridae, trigger fish, 79 m- 1' holes in rock bottom with coral rubble, 79 m- west base Mound 2, zoanthids,

18:14- Valley between Mound 2 and 3, 72 m, standing coral with 8 lionfish, Peak of Mound 3 71 m, eel in standing dead coral, north slope of Mound 3.

18:xx- North base of Mound 3, 79 m, rubble, *Stichopathes*.

18:22- South slope Mound 4, fishing line and lure, *Eucidaris tribuloides*, Peak of Mound 4, 71 m; blue spotted

Dive Site: Florida, Oculina HAPC North, Off Titusville; 85 m; ROV 18-14, UNCW 584; 17-V-18-2

cornet fish, north slope, *Tanacetipathes*, *Nidalia*, Clathriidae yellow sponge, dense black coral, *Antipathes* spp. Bushy, 78 m, Some *Tanacetipathes* half dead, standing dead coral, foot of mound rock pavement.

18:29- Valley between Mound 4 and 5, 84 m, 100% coral rubble, *Stichopathes*, bigeye, 85.5 m.

18:33- South slope of Mound 5, *Centrostephanus*, *Eucidaris*, Peak Mound 5- 71 m, *Ircinia*, north slope Mound 5, 10 cm white live *Oculina*, 81 m, 15 cm *Oculina*, 10 cm *Oculina*, 83 m, base of Mound 5, dense black coral.

18:43- End dive.

Dominant Benthic Macrobiota:

Scleractinia coral- *Oculina varicosa*- 3 live white

Antipatharia coral- *Tanacetipathes* bushy, *Antipathes* sp. bushy, *Stichopathes luetkeni*

Gorgonia coral- *Diodogorgia* sp., 10 cm white Plexauridae

Alcyonacea- *Nidalia* sp.

Zoanthidea

Actiniaria- Cerianthidae

Hydroida

Porifera- encrusting orange and yellow, *Chondrilla*?, *Ircinia* sp., yellow Clathriidae?, *Geodia* sp.

Decapoda- *Stenorhynchus seticornis*

Echinodermata- *Eucidaris tribuloides*, *Centrostephanus*

Ophiuroidea- *Asteropora annulata*

Human Debris:

Fishing lines

Dive Site: Florida, Oculina HAPC North, Off Titusville; 85 m; ROV 18-14, UNCW 584; 17-V-18-2

CPCe Percent Cover Analysis:

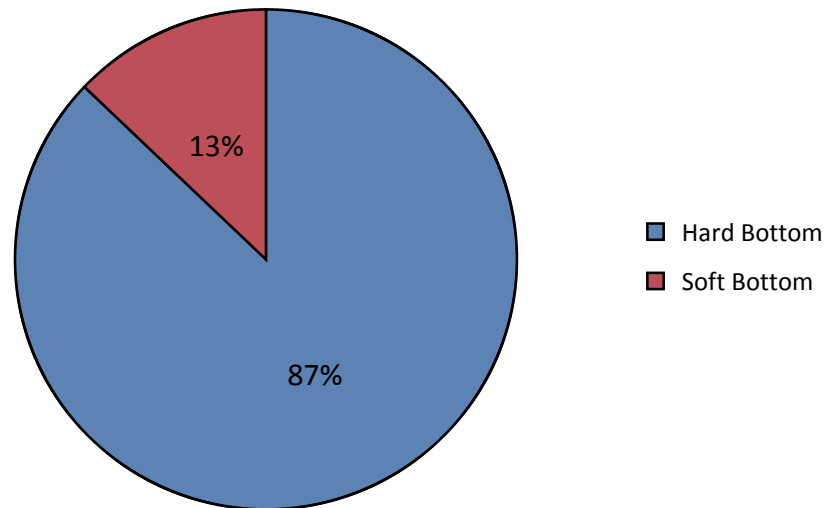


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-14. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

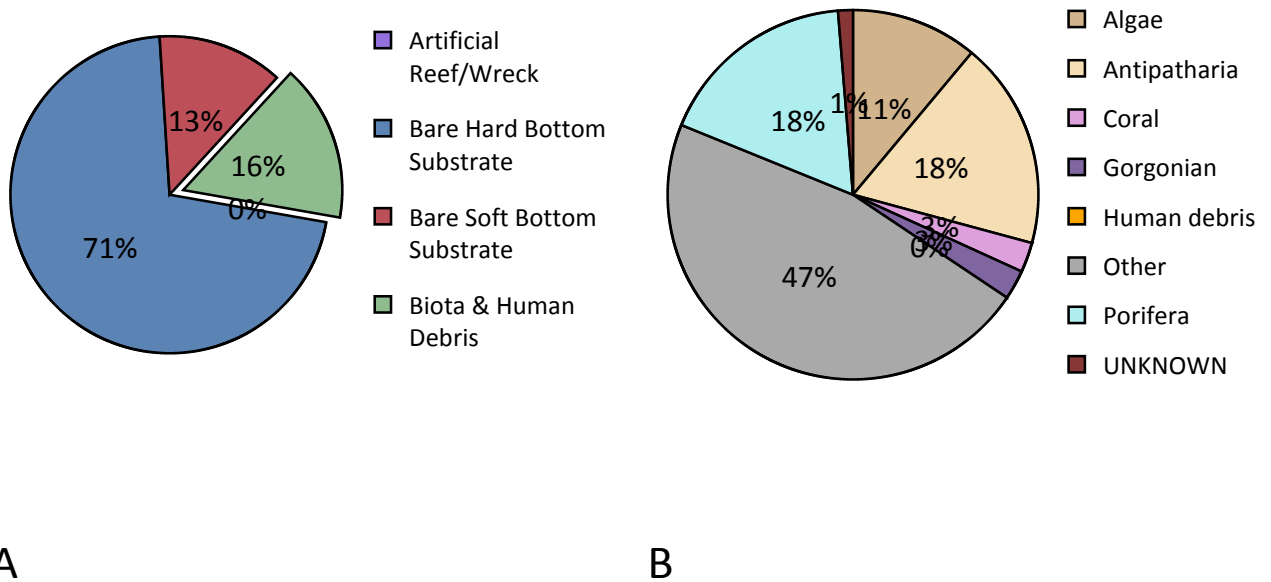


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-14. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: Florida, Oculina HAPC North, Off Titusville; 85 m; ROV 18-14, UNCW 584; 17-V-18-2

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-14.

	ROV 18-14	
	%	Note
Biota	15.99%	X
Algae	1.77%	
Rhodophyta	1.77%	
Corallinales	1.77%	
Porifera	2.80%	X
Demospongiae	2.80%	X
Demospongiae- unid. sp.	1.77%	X
<i>Geodia</i> sp.		X
<i>Ircinia</i> sp.		X
Microcionidae syn. Clathriidae		X
Poecilosclerida	0.42%	
Spirastrellidae	0.62%	
Coral	0.42%	X
Coral- Scleractinia	0.42%	X
Cladocora sp.	0.10%	
<i>Oculina varicosa</i> Le Sueur, 1820	0.21%	X
<i>Phyllangia americana</i> Milne Edwards & Haime, 1849	0.10%	
Scleractinia- standing dead		X
Gorgonian	0.42%	X
Alcyonacea - gorgonian	0.42%	X
Alcyonacea- gorgonian	0.42%	
<i>Diodogorgia</i> sp.		X
Plexauridae		X
Antipatharia	2.91%	X
Antipatharia	2.91%	X
Antipatharia unid. sp.	2.08%	X
<i>Stichopathes luetkeni</i> Brook, 1889	0.21%	X
<i>Tanacetipathes</i> sp.		X
Tanacetipathes sp.- bushy	0.62%	
Other	7.68%	X
Hydrozoa	2.08%	X
Hydroidolina	2.08%	X
Alcyonacea - Alcyoniina	0.73%	X
<i>Nidalia occidentalis</i> Gray, 1835	0.73%	
<i>Nidalia</i> sp.		X

Dive Site: Florida, Oculina HAPC North, Off Titusville; 85 m; ROV 18-14, UNCW 584; 17-V-18-2

Anthozoa - Non Coral	0.62%	X
Cerianthidae	0.42%	X
Zoanthidae	0.21%	
Annelida	3.01%	
Annelida Unid.	2.80%	
Serpulidae	0.21%	
Arthropoda	0.31%	X
Anomura		X
Paguroidea	0.31%	
<i>Stenorhynchus seticornis</i> (Herbst, 1788)		X
Mollusca	0.10%	
Gastropoda	0.10%	
Echinodermata	0.21%	X
<i>Asteropora (Asteropora) annulata</i> Örsted & Lütken in: Lütken, 1856		X
<i>Centrostephanus longispinus</i> (Philippi, 1845)		X
Echinoidea		X
<i>Eucidaris tribuloides</i> (Lamarck, 1816)	0.21%	X
<i>Luidia</i> sp.		X
Chordata - Invertebrate	0.21%	
Ascidiacea	0.10%	
Didemnidae	0.10%	
Chordata - Vertebrate	0.21%	X
Actinopterygii	0.21%	X
UNKNOWN	0.21%	
Bare Substrate	84.01%	
Bare Hard Bottom	71.24%	
Bare Hard Bottom	71.24%	
Bare coral rubble	50.67%	
Bare rock, pavement, boulder, ledge	17.96%	
Bare rubble/cobble	1.77%	
dead standing Scleractinia (habitat)	0.83%	
Bare Soft Bottom	12.77%	
Human debris		X
Human debris		X
Human debris- fishing line		X
Grand Total	100.00%	X

Dive Site: Florida, Oculina HAPC North, Off Titusville; 85 m; ROV 18-14, UNCW 584; 17-V-18-2

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-05.

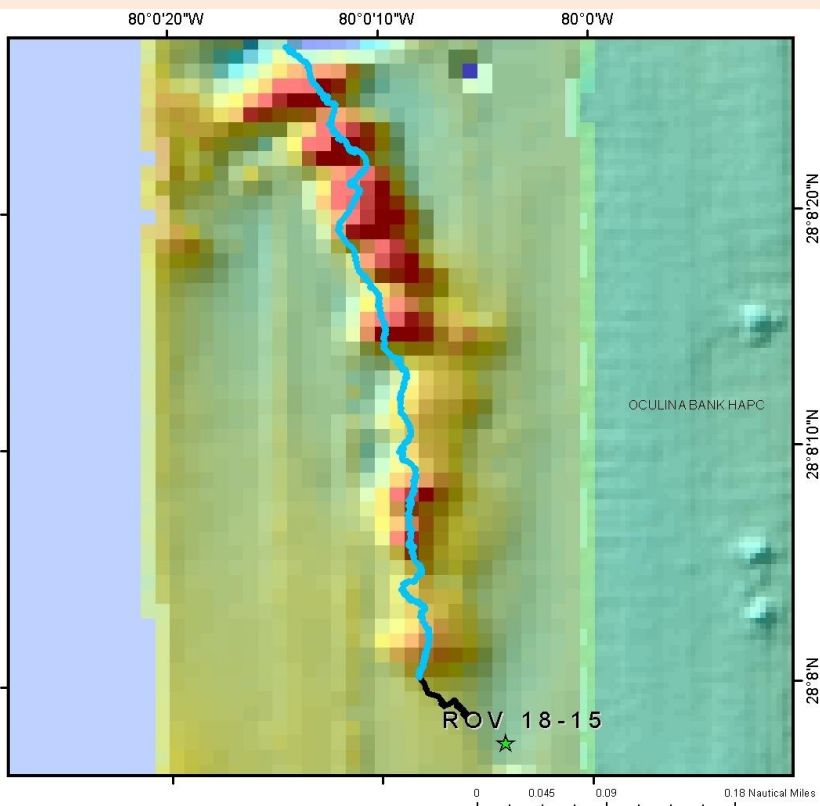
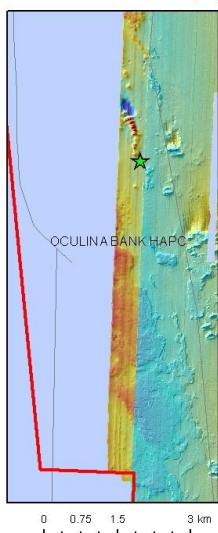
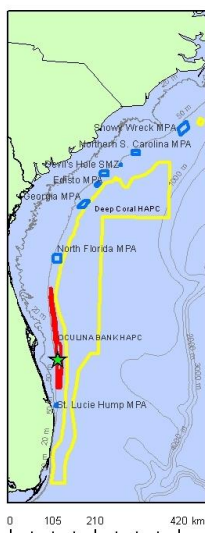
Taxa, Author- Common name	ROV 18-14
Actinopterygii	
Anguilliformes	
<i>Gymnothorax</i> sp.- moray eel	0.38
<i>Muraena retifera</i> Goode & Bean, 1882- reticulate moray	0.38
Muraenidae- moray eel	0.38
Beryciformes	
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	1.88
Perciformes	
<i>Centropristis ocyurus</i> (Jordan & Evermann, 1887)- bank sea bass	0.38
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	1.13
<i>Chromis enchrysur</i> Jordan & Gilbert, 1882- yellowtail reeffish	0.38
<i>Decodon puellaris</i> (Poey, 1860)- red hogfish	0.75
<i>Holacanthus</i> sp.- angelfish	1.50
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	0.38
<i>Priacanthus arenatus</i> Cuvier, 1829- bigeye	0.38
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye	9.01
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	7.51
<i>Serranus phoebe</i> Poey, 1851- tattler	8.26
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	10.14
Scorpaenidae- scorpionfish	3.00
Syngnathiformes	
<i>Fistularia tabacaria</i> Linnaeus, 1758- bluespotted cornetfish	0.38
Tetraodontiformes	
<i>Balistes capriscus</i> Gmelin, 1789- grey triggerfish	0.75
UNKNOWN	0.38

Dive Site: Florida, Oculina HAPC West Extension, Historical Eau Gallie Transect; 75 m; ROV 18-15, UNCW 585; 18-V-18-1

General Location and Dive Track:

Florida, Oculina HAPC West Extension,
Historical Eau Gallie Transect; 75 m;
ROV 18-15, UNCW 585; 18-V-18-1

- ★ ROV 18-15
 - ★ Mohawk ROV
 - ★ CTD
 - 201805181 - Transect 01
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Pisces_2016_ExploratoryOECA

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/18/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 238

No. DVD: 2

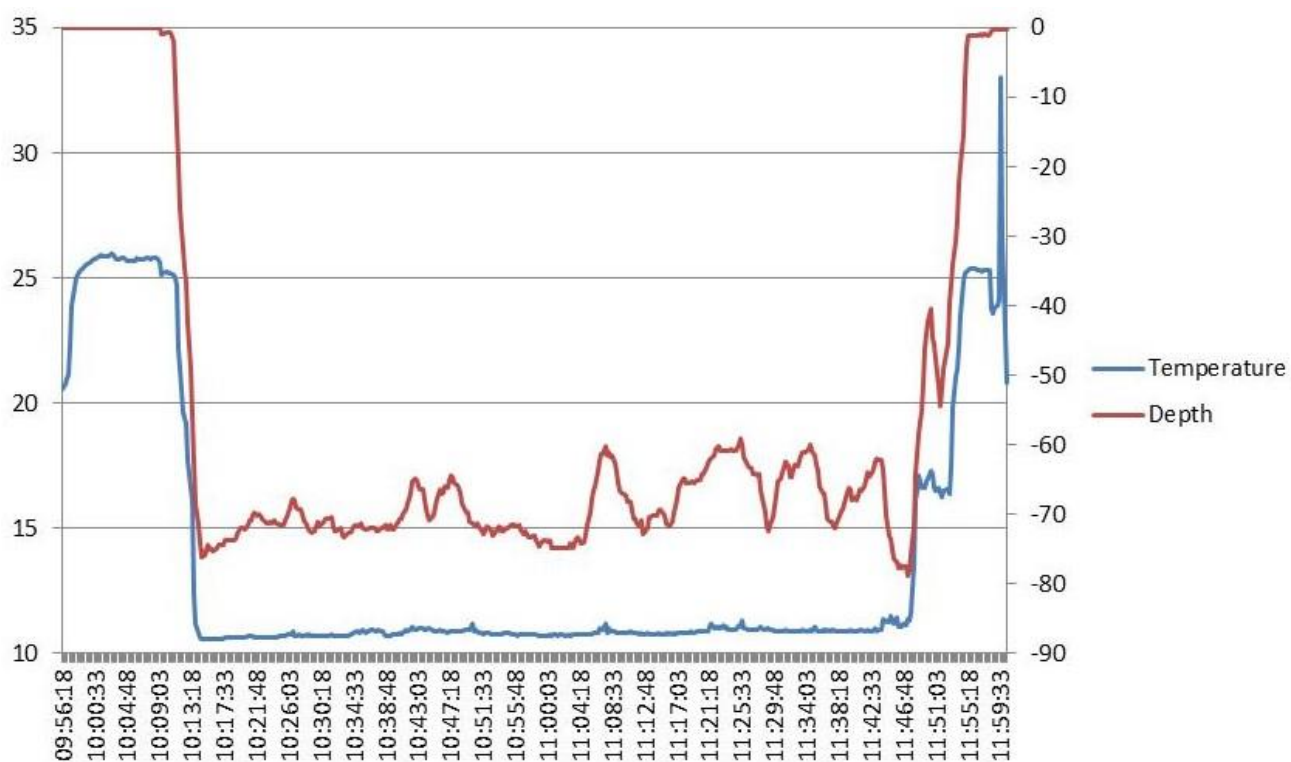
No. Hard Drive: 1

Dive Site: Florida, Oculina HAPC West Extension, Historical Eau Gallie Transect; 75 m; ROV 18-15, UNCW 585; 18-V-18-1

Dive Data:

Minimum Bottom Depth (m): 59.7	Total Transect Length (km): 0.914
Maximum Bottom Depth (m): 79	Surface Current (kn): 0.5
On Bottom (Time- EDST): 10:14	On Bottom (Lat/Long): 28.1328°N; -80.0017°W
Off Bottom (Time- EDST): 11:47	Off Bottom (Lat/Long): 28.1408°N; -80.004°W
Physical (bottom); Temp (°C): 10.6	Salinity: N/A Visibility (m): 10 Current (kn): 1

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-15 are as follows: Depth Maximum: 78.7 m, Temperature: 10.6-11.5 °C.

Dive Site: Florida, Oculina HAPC West Extension, Historical Eau Gallie Transect; 75 m; ROV 18-15, UNCW 585; 18-V-18-1

Dive Imagery:

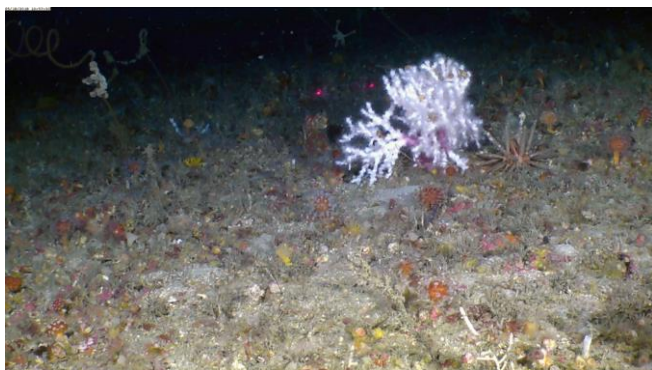


Figure 1: -74 m

Florida *Oculina* HAPC, west expansion. Live, azooxanthellate *Oculina varicosa* coral, with pencil urchin (*Eucidaris tribuloides*), and *Nidalia* sp. soft coral.



Figure 2: -73.2 m

Oculina varicosa coral colony.



Figure 3: -75.7 m

Undercut rock ledge at base of *Oculina* coral mound with cubby.



Figure 4: -73.8 m

Unidentified demosponge.

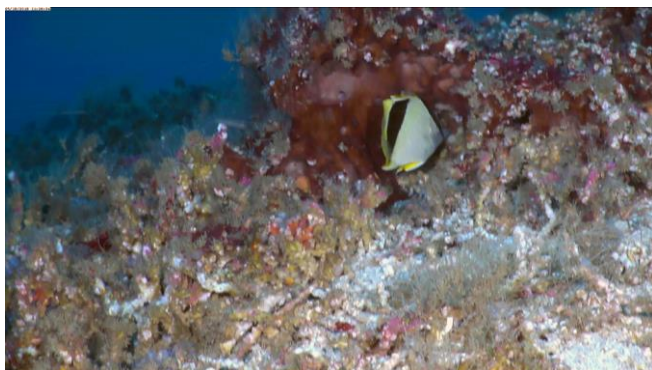


Figure 5: -62.2 m

Peak of *Oculina* coral mound with bank butterflyfish and *Condrilla* demosponge.



Figure 6: -67.9 m

Spiny lobster (*Panulirus argus*) under large dead standing coral.

Dive Site: Florida, Oculina HAPC West Extension, Historical Eau Gallie Transect; 75 m; ROV 18-15, UNCW 585; 18-V-18-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 18-V-18-1; ROV 18-15, UNCW Dive 585; Florida, Oculina HAPC, West Extension, Historical Eau Gallie Transect, 75 m,

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (red; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital camera not working. Video screen grabs only.

Attempted to dive in OECA- 2.3 kn, Moved to OHAPC west (2 miles west, and 0.3 kn current).

Site Description/Habitat/Biota:

Depth range: 62- 79 m

MB map shows series of moderate relief mounds in new West Extension of OHAPC. In region of historical 1976's JSL submersible dives- notes said 1-3 m *Oculina* on low relief, some rock ledges, 69-73 m; also Clelia Dive 608 in 2001.

Weather- Cloudy, seas 1-2 ft from SE, wind 7 kn from 182 dg, air- 26.29 C, surface water- 25.28 C, salinity- 36.16 PSU, current- 0.5 kn to 234 dg.

10:09- Launch

10:15- On bottom- 78.8 m; visibility- 10 m, current- 0.25 from W, increased to ¾ kn from SW.

South of Mound 1, flat coarse sand, *Virgularia presbytes*

10:18- Low relief coral mounds, 1-3 m relief, 76.5 m, base of mound on MB, coral rubble, Eucidaris, top 73 m, coral rubble, Cerianthidae, *Stichopathes luetkeni*, 25 cm standing dead, *Prognathodes aya*, orange encrusting, 20 cm *Geodia*.

Dive Site: Florida, Oculina HAPC West Extension, Historical Eau Gallie Transect; 75 m; ROV 18-15, UNCW 585; 18-V-18-1

10:28- north slope Mound 1, 100% coral rubble, 74 m, *Asteroporpa annulata*, Peak 73 m, 3 5-cm *Oculina* white, *Centrostephanus*, 10 cm *Oculina* 74 m.
10:34- 74 m, valley between Mound 1 and 2, exposed rock, *Stichopathes*, 10 cm *Oculina*, *Nidalia*, hydroids, tatler, 2 *Oculina* 74 m, 1 *Oculina* 10 cm 73.5 m,
10:39- 74 m, south slope of Mound 2, 100% rubble, *Eucidaris* common, 45 dg slope, peak 67 m, dense sponges on rubble, orange sponge, *Centrostephanus*.
10:44- Valley between Mound 2 and 3, 72.5 m
10:45- South slope Mound 3, *Chondrilla*, Peak 66.3 m, dense *Chondrilla*, *Centrostephanus*.
10:49- North slope Mound 3, rubble, *Tanacetipathes* bush several, grey trigger, 15 cm *Oculina* 74.4 m, orange and yellow sponges, blue angel, 15 cm *Oculina*, *Stichopathes*, *Oculina* 5 cm, *Asteroporpa*, 15 cm *Oculina*, bigeye, 10 cm *Oculina*, 4- *Oculina*, 74 m, long valley between Mound 3 and 4. Hard bottom and rubble, *Oculina*, 15 cm branching bryozoan, 45 dg slope, rock ridge, 2-3 m relief, Corallimorph, CCA.
11:00- along rock ledge, 1 m undercut, dead French angel laying on side, breathing, *Stenorhynchus*, blue angel, cubbyu, stripped grunt.
11:04- south base Mound 4, 30 dg slope, *Chondrilla*, *Centrostephanus*, 100% rubble, Peak- 63.4 m, *Aplysina*?
11:12- Valley between Mound 4 and 5, 74 m, 100% rubble.
11:13- Southwest slope Mound 5, 45 dg slope, weird 20 cm lobate yellow sponge with 1-2 cm oscules, very unusual, skirting the west slope.
11:19- 67 m, SW slope of Mound 6, 100% rubble, Lionfish, skirting the west slope of Mound 6, *Chondrilla*, *Eucidaris*, *Centrostephanus*, near peak of Mound 6, 62 m. North slope of Mound 6.
11:28- 71 m, valley between Mound 6 and 7.
11:31- Peak Mound 7, 64.5 m, dense *Chondrilla*, CCA, hydroids, north slope of Mound 7.
11:38- SE slope of Mound 8, 74 m, 100% rubble, peak 64 m, *Panulirus argus*, blue angel, standing dead coral.
11:45- North base of Mound 8, 79 m, heading along west edge of scour, 100% rubble.
11:47- end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- *Oculina varicosa*- 17 live white

Antipatharia coral- *Tanacetipathes* bushy, *Antipathes* sp., *Stichopathes luetkeni*

Gorgonia coral- none

Alcyonacea- *Nidalia* sp.

Zoanthidea

Actiniaria- Cerianthidae

Corallimorpharia

Pennatulacea- *Virgularia presbytes*

Hydroida

Porifera- encrusting orange and yellow, *Chondrilla*?, yellow Clathriidae?, new species, *Geodia* sp., *Aplysina*? Sp.

Annelida- Terebellidae

Decapoda- *Stenorhynchus seticornis*, *Panulirus argus*

Echinodermata- *Eucidaris tribuloides*, *Centrostephanus* sp.

Bryozoa- bushy, branching

Ophiuroidea- *Asteroporpa annulata*

Algae- CCA

Human Debris: Fishing line- 1

Dive Site: Florida, Oculina HAPC West Extension, Historical Eau Gallie Transect; 75 m; ROV 18-15, UNCW 585; 18-V-18-1

CPCe Percent Cover Analysis:

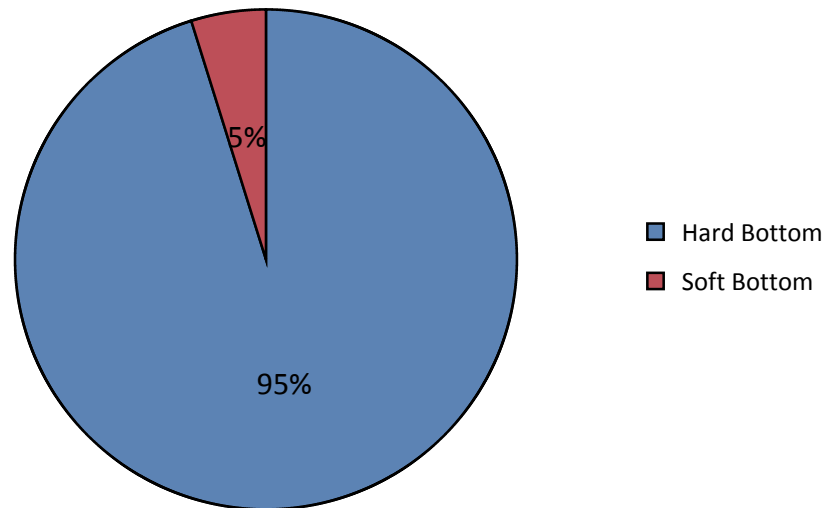


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-15. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

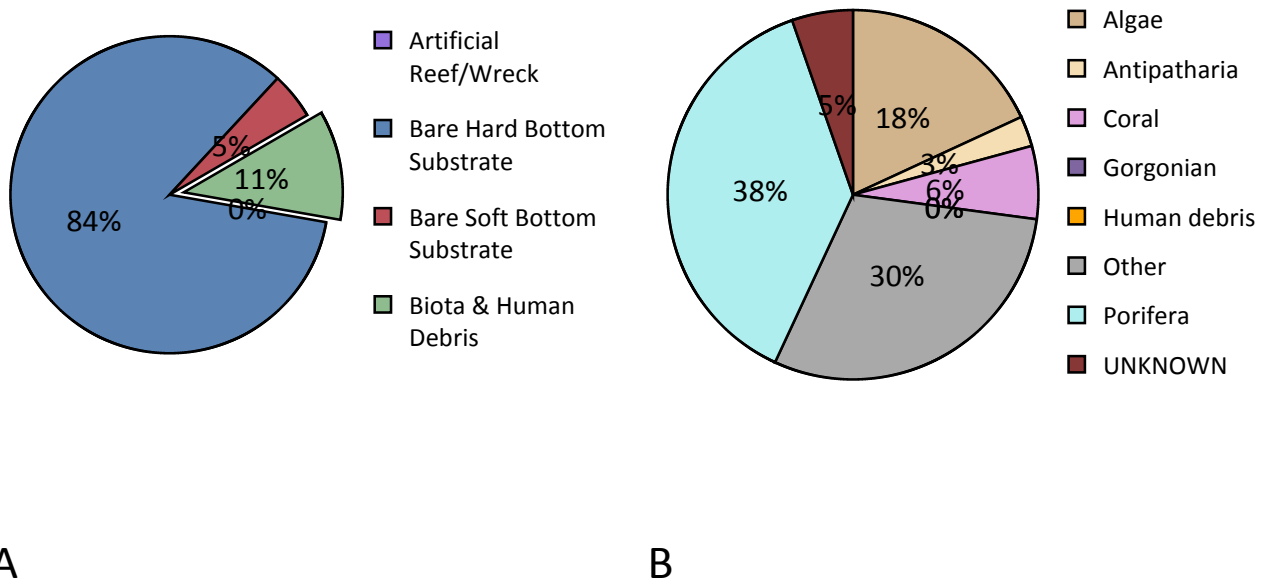


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-15. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: Florida, Oculina HAPC West Ext., Historical Eau Gallie Extension; 75 m; ROV 18-15, UNCW 585;

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-15.

	ROV 18-15	
	%	Note
Biota	11.16%	X
Algae	2.02%	X
Rhodophyta	2.02%	X
Corallinales	2.02%	X
Porifera	4.21%	X
Demospongiae	4.21%	X
<i>Aplysina</i> sp.	0.06%	X
<i>Chondrilla</i> sp.	2.26%	X
<i>Clathria</i> sp.	0.06%	
Demospongiae- unid. sp.	1.54%	X
<i>Geodia</i> sp.		X
Poecilosclerida	0.06%	
<i>Polymastia</i> sp.	0.24%	
Coral	0.71%	X
Coral- Scleractinia	0.71%	X
<i>Oculina varicosa</i> Le Sueur, 1820	0.42%	X
Scleractinia- standing dead		X
Scleractinia- unid cup	0.30%	
Antipatharia	0.30%	X
Antipatharia	0.30%	X
Antipatharia unid. sp.	0.06%	
<i>Antipathes atlantica</i> Gray, 1857	0.12%	
<i>Stichopathes luetkeni</i> Brook, 1889	0.12%	X
<i>Tanacetipathes</i> sp.		X
Other	3.92%	X
Hydrozoa	0.42%	X
Hydroidolina	0.42%	X
Alcyonacea - Alcyoniina	0.30%	X
<i>Nidalia occidentalis</i> Gray, 1835	0.30%	
<i>Nidalia</i> sp.		X
Anthozoa - Non Coral	0.12%	X
Cerianthidae		X
Corallimorpharia		X
<i>Virgularia presbytes</i> Bayer, 1955		X
Zoanthidae	0.12%	X

Dive Site: Florida, Oculina HAPC West Ext., Historical Eau Gallie Extension; 75 m; ROV 18-15, UNCW 585;

Annelida	1.13%	X
Annelida Unid.	1.07%	
Sabellidae		X
Serpulidae	0.06%	
Bryozoa	0.06%	X
Arthropoda	0.12%	X
<i>Panulirus argus</i> (Latreille, 1804)		X
<i>Stenorhynchus seticornis</i> (Herbst, 1788)	0.12%	
Echinodermata	0.95%	X
<i>Asteropora (Asteropora) annulata</i> Örsted & Lütken in: Lütken, 1856	0.06%	X
<i>Centrostephanus longispinus</i> (Philippi, 1845)	0.36%	X
<i>Eucidaris tribuloides</i> (Lamarck, 1816)	0.53%	X
<i>Stylocidaris</i> sp.		X
Chordata - Invertebrate	0.06%	
Didemnidae	0.06%	
Chordata - Vertebrate	0.18%	X
Actinopterygii	0.18%	X
UNKNOWN	0.59%	
Detritus		X
Bare Substrate	88.84%	
Bare Hard Bottom	84.09%	
Bare Hard Bottom	84.09%	
Bare coral rubble	44.27%	
Bare rock, pavement, boulder, ledge	34.54%	
dead standing Scleractinia (habitat)	5.28%	
Bare Soft Bottom	4.75%	
Grand Total	100.00%	X

Dive Site: Florida, Oculina HAPC West Ext., Historical Eau Gallie Extension; 75 m; ROV 18-15, UNCW 585;

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-15.

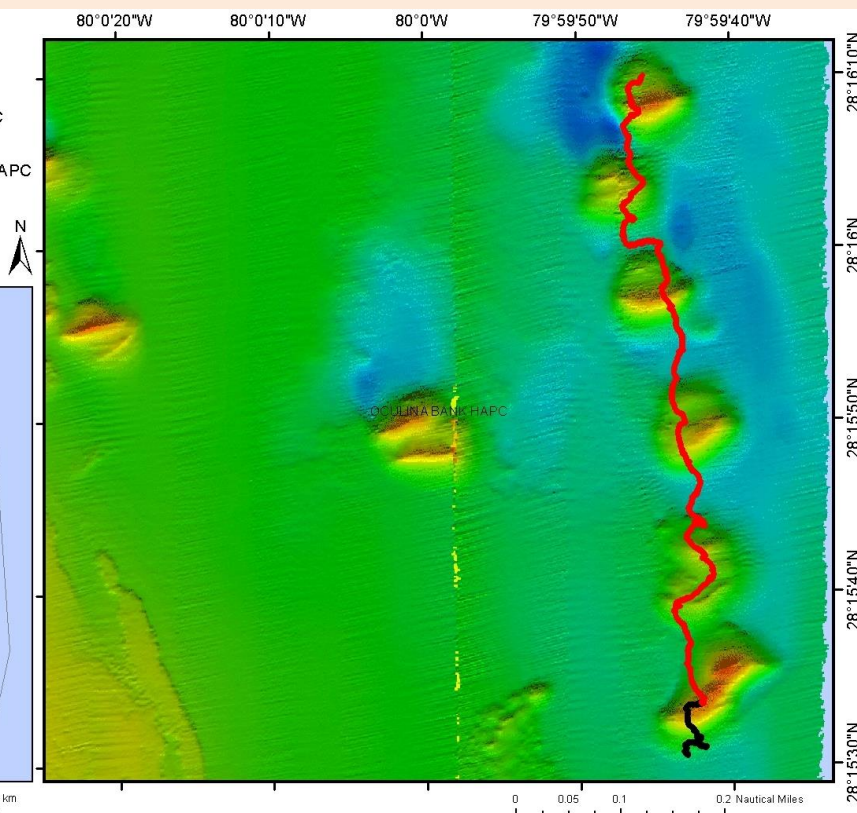
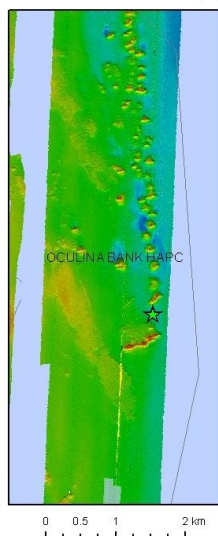
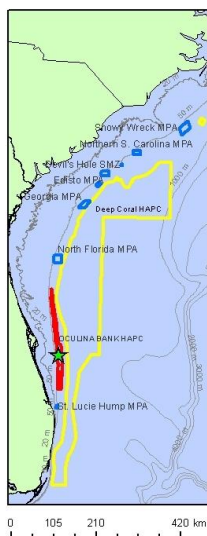
Taxa, Author- Common name	ROV 18-15
Actinopterygii	
Anguilliformes	
<i>Muraena retifera</i> Goode & Bean, 1882- reticulate moray	0.26
Lophiiformes	
<i>Ogcocephalus</i> sp.- batfish	0.26
Perciformes	
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	0.26
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	1.54
<i>Chromis enchrysurus</i> Jordan & Gilbert, 1882- yellowtail reeffish	0.77
<i>Decodon puellaris</i> (Poey, 1860)- red hogfish	0.26
<i>Haemulon striatum</i> (Linnaeus, 1758)- striped grunt	1.54
<i>Holacanthus</i> sp.- angelfish	1.29
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	6.43
<i>Pomacanthus paru</i> (Bloch, 1787)- french angelfish	0.26
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye	3.60
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	1.80
<i>Serranus phoebe</i> Poey, 1851- tattler	4.63
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	0.26
Scorpaenidae- scorpionfish	2.06
Tetraodontiformes	
<i>Balistes capriscus</i> Gmelin, 1789- grey triggerfish	0.51

Dive Site: Florida, Oculina HAPC; Historical Coco Beach Transect; 87 m; ROV 18-16, UNCW 586; 18-V-18-2

General Location and Dive Track:

Florida, Oculina HAPC; Historical
Coco Beach Transect; 87 m;
ROV 18-16, UNCW 586; 18-V-18-2

- ★ ROV 18-16
 - ★ Mohawk ROV
 - ★ CTD
 - 201805182 - Transect 01
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Shepard_2005_Oculina_2mDD

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/18/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 239

No. DVD: 2

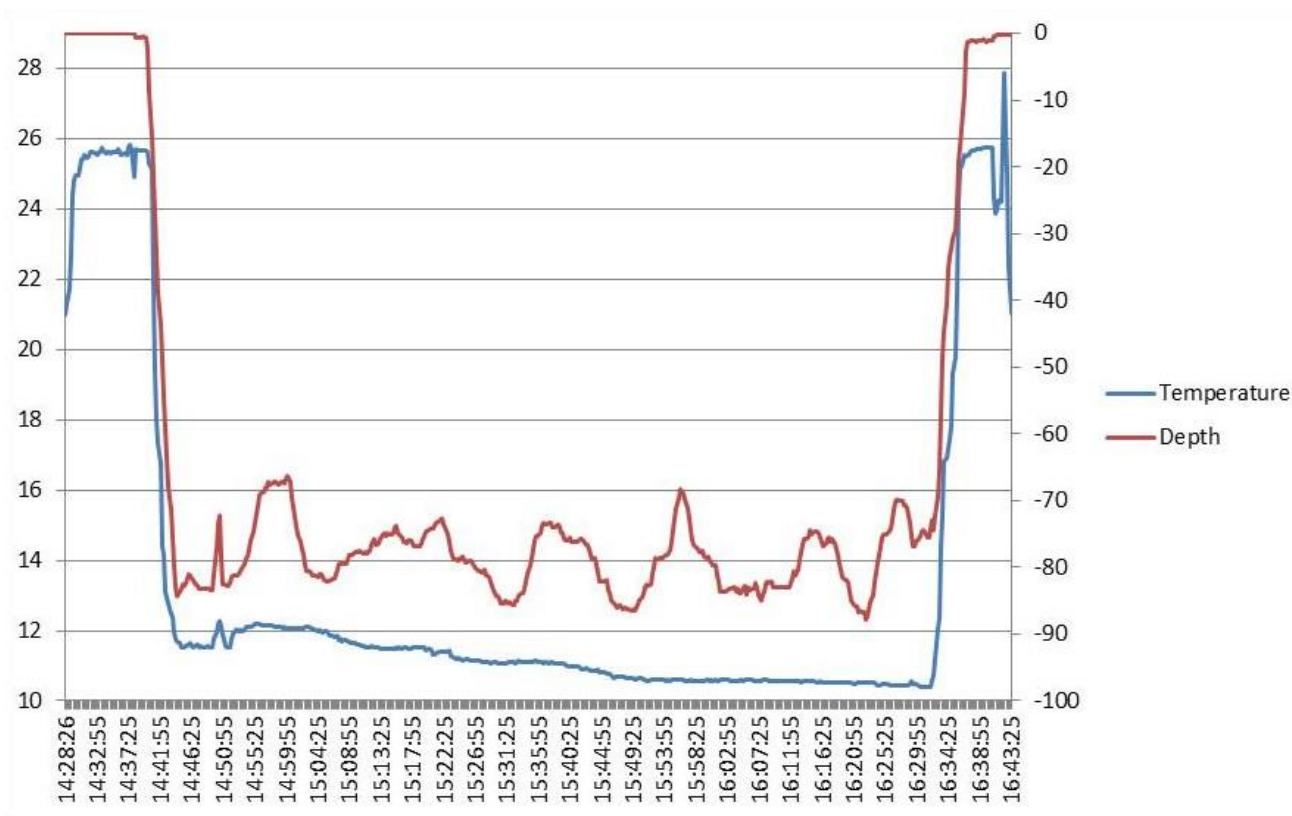
No. Hard Drive: 1

Dive Site: Florida, Oculina HAPC; Historical Coco Beach Transect; 87 m; ROV 18-16, UNCW 586; 18-V-18-2

Dive Data:

Minimum Bottom Depth (m): 67.1	Total Transect Length (km): 1.348
Maximum Bottom Depth (m): 88.4	Surface Current (kn): 0.6
On Bottom (Time- EDST): 14:44	On Bottom (Lat/Long): 28.2585°N; -79.9953°W
Off Bottom (Time- EDST): 16:31	Off Bottom (Lat/Long): 28.2694°N; -79.996°W
Physical (bottom); Temp (°C): 11.7	Salinity: N/A Visibility (m): 10 Current (kn): 0.1

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-16 are as follows: Depth Maximum: 87.7 m, Temperature: 10.4-12.3 °C.

Dive Site: Florida, Oculina HAPC; Historical Coco Beach Transect; 87 m; ROV 18-16, UNCW 586; 18-V-18-2

Dive Imagery:



Figure 1: -83.3 m
Unusually shallow *Cancer* sp. crab with *Chondrilla* sp. sponge and hydroids.



Figure 2: -79.4 m
Batfish on *Oculina* coral mound.



Figure 3: -76.2 m
Lionfish under standing dead coral on peak of *Oculina* coral mound. These reefs were covered with living coral in 1970s prior to devastating bottom shrimp trawling which was not banned here until 2000.



Figure 4: -86 m
Human debris.



Figure 5: -77.6 m
Burrowing sea anemone (Cerianthidae) on coral rubble.



Figure 6: -75.8 m
Flying gurnard.

Dive Site: Florida, Oculina HAPC; Historical Coco Beach Transect; 87 m; ROV 18-16, UNCW 586; 18-V-18-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 18-V-18-2; ROV 18-16, UNCW Dive 586; Florida, Oculina HAPC, Historical Cocoa Beach Transect, 87 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (red; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital camera not working. Video screen grabs only.

Site Description/Habitat/Biota:

Depth range: 69.5- 87.5 m

MB map shows dense line of E-W oriented high-relief mounds. Transect heading north across the mounds. Clelia Dive #617, 2001, and historical JSL dives in late 1970s, 4 nmi wide zone of numerous <1 m live *Oculina*.

Weather- Sunny, seas 1 ft from SE, wind 12 kn from 147 dg, air- 24.83 C, surface water- 25.59 C, salinity- 36.3 PSU, current- 0.6 kn to 010 dg.

14:37- Launch

14:44- On bottom- 86 m; visibility- 10 m, current- 0.1 from SE, increased to 1.25 from SE.

South slope of Mound 1, 100% sand, shell hash, and coral rubble; *Stichopathes*, hydroids, *Eucidaris tribuloides*, *Narcissia trigonaria*; losing video feed off and on, rebooting, Terebellidae,

14:52- near base Mound 1, *Chondrilla*, large crab looks like *Cancer borealis*, Tatler, Sabellidae, *Geodia neptuni*, dense *Chondrilla*, *Geodia* sp.

Peak Mound 1- 69.5 m, hermit crab, Lionfish, dense *Chondrilla*, North slope of Mound 1, 100% rubble.

15:04- Valley N of Mound 1, 100% rubble, 83.2 m. *Eucidaris*, standing dead coral in pit, rock with cavity, CCA, encrusting sponge, *Prognathodes aya*, blue angel.

15:08- SW edge of Mound 2, 80 m, batfish, standing dead coral in depression, ½ m dead coral, 3 lionfish, P.

Dive Site: Florida, Oculina HAPC; Historical Coco Beach Transect; 87 m; ROV 18-16, UNCW 586; 18-V-18-2

aya, encrusting orange sponge, *Tanacetipathes*, *Nidalia*, flying gurnard.

15:20- 75 m, peak of Mound 2, 100% rubble.

15:25- 81 m, North base of Mound 2, pavement, dense *Tanacetipathes*, *Stichopathes*.

15:31- valley between Mound 2 and 3, 87.5 m, coral rubble,

15:35- Near Peak 3, 77 m, Cerianthid, *Chondrilla*, skirted west end of Mound. NW base,

15:45- 85 m, in valley between Mound 3 and 4, 100% rubble, rock pavement, 25 cm flat boulders, canvas on live *Oculina* (first we saw covered in human debris). Didemnidae, *Ophioderma devaneyi*, sea biscuit shell.

15:52- base of Mound 4, scorpionfish; near peak dense *Chondrilla*, Cerianthids, Peak- 70.4 m, North slope- *Ircinia*, yellow Clathriidae, dense *Tanacetipathes*, *Stichopathes*, exposed rock, 81 m.

16:02- 83.2 m, valley between Mound 4 and 5. 1 m relief undercut ledge 85.5 m, CCA, yellow sponge, Cubbyu, rough tongue bass, *Centrostephanus*, red porgy, long ledge 1 m relief, 85 m.

16:08- South base of Mound 5, 84 m, rubble, SE slope of Mound 5, 100% rubble.

16:20- Valley between Mound 5 and 6, going along east edge of scour.

16:30- North slope of Mound 6, 77.3 m.

16:31- end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- *Oculina varicosa*- 2 live white (1 covered with human debris, cloth)

Antipatharia coral- *Tanacetipathes* bushy, *Antipathes* sp., *Stichopathes luetkeni*

Gorgonia coral- none

Alcyonacea- *Nidalia* sp.

Zoanthidea

Actiniaria- Cerianthidae

Hydroida

Annelida- Terebellidae

Porifera- encrusting orange and yellow, *Chondrilla*?, yellow Clathriidae?, new species, *Geodia* sp., *Ircinia* sp.

Decapoda- *Stenorhynchus seticornis*, *Cancer*? Sp.

Echinodermata- *Eucidaris tribuloides*, *Centrostephanus* sp., *Narcissia trigonaria*

Ophiuroidea- *Asteropora annulata*, *Ophioderma devaneyi*

Ascidacea- Didemnidae

Algae- CCA

Human Debris:

Cloth or canvas

Dive Site: Florida, Oculina HAPC; Historical Coco Beach Transect; 87 m; ROV 18-16, UNCW 586; 18-V-18-2

CPCe Percent Cover Analysis:

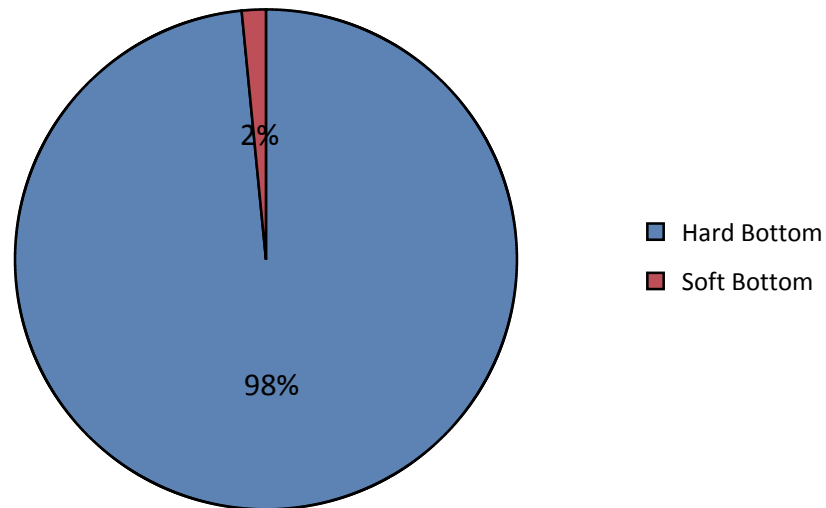


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-16. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

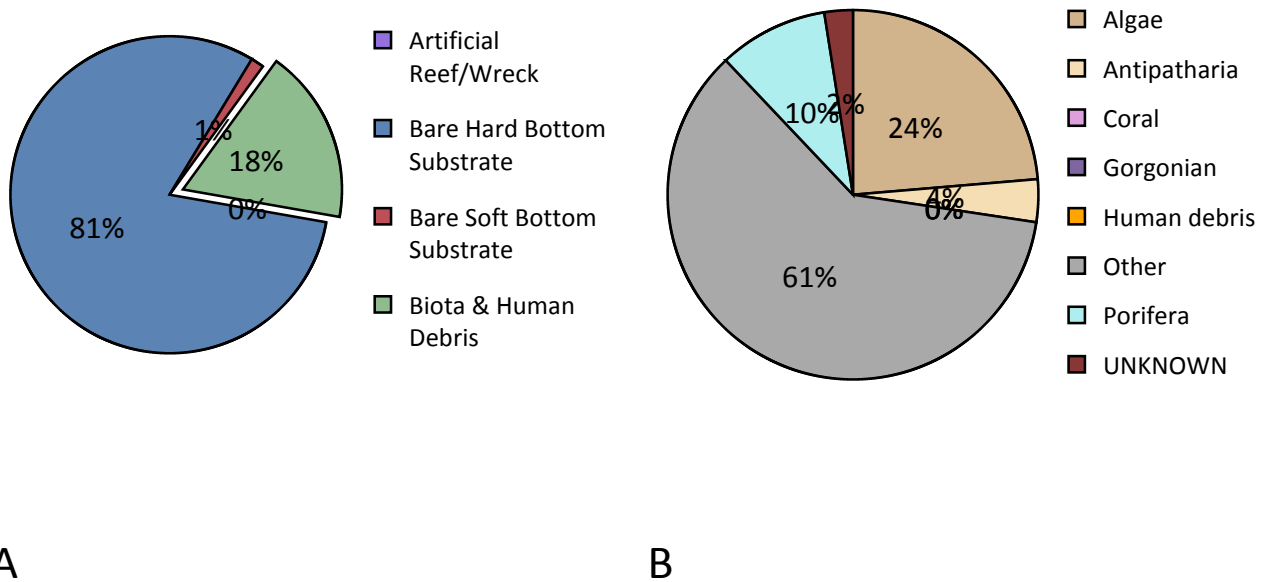


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-16. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: Florida, Oculina HAPC; Historical Coco Beach Transect; 87 m; ROV 18-16, UNCW 586; 18-V-18-2

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-16.

	ROV 18-16	
	%	Note
Biota	17.79%	X
Algae	4.21%	X
Ochrophyta	0.07%	
<i>Dictyota</i> sp.	0.07%	
Rhodophyta	4.13%	X
Corallinales	4.13%	X
Porifera	1.70%	X
Demospongiae	1.70%	X
<i>Chondrilla</i> sp.	0.59%	X
Demospongiae- unid. sp.	1.11%	X
<i>Geodia</i> sp.		X
Coral		X
Coral- Scleractinia		X
<i>Cladocora</i> sp.		X
<i>Oculina varicosa</i> Le Sueur, 1820		X
Scleractinia- standing dead		X
Gorgonian		X
Alcyonacea - gorgonian		X
<i>Ellisella</i> sp.		X
Antipatharia	0.66%	X
Antipatharia	0.66%	X
Antipatharia unid. sp.		X
<i>Stichopathes luetkeni</i> Brook, 1889	0.07%	X
<i>Tanacetipathes</i> sp.		X
<i>Tanacetipathes</i> sp.- bushy	0.59%	
Other	11.22%	X
Hydrozoa	1.25%	X
Hydroidolina	1.25%	X
Alcyonacea - Alcyoniina		X
<i>Nidalia</i> sp.		X
Annelida	8.56%	X
Annelida Unid.	8.56%	
Sabellidae		X
Terebellidae		X
Arthropoda		X

Dive Site: Florida, Oculina HAPC; Historical Coco Beach Transect; 87 m; ROV 18-16, UNCW 586; 18-V-18-2

Anomura		X
<i>Cancer borealis</i> Stimpson, 1859		X
Mollusca		X
<i>Busycon</i> sp.		X
Echinodermata	0.30%	X
Clypeaster sp.		X
<i>Coelopleurus floridanus</i> A. Agassiz, 1872		X
<i>Eucidaris tribuloides</i> (Lamarck, 1816)	0.30%	X
<i>Narcissia trigonaria</i> Sladen, 1889		X
<i>Ophioderma devaneyi</i> Hendler & Miller, 1984		X
Chordata - Invertebrate		X
Didemnidae		X
Chordata - Vertebrate	0.59%	X
Actinopterygii	0.59%	X
UNKNOWN	0.44%	
Detritus	0.07%	
Bare Substrate	82.21%	
Bare Hard Bottom	80.89%	
Bare Hard Bottom	80.89%	
Bare coral rubble	60.30%	
Bare rock, pavement, boulder, ledge	12.77%	
Bare rubble/cobble	3.91%	
dead standing Scleractinia (habitat)	3.91%	
Bare Soft Bottom	1.33%	
Human debris		X
Human debris		X
Human debris- other		X
Human debris- plastic		X
Grand Total	100.00%	X

Dive Site: Florida, Oculina HAPC; Historical Coco Beach Transect; 87 m; ROV 18-16, UNCW 586; 18-V-18-2

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-16.

Taxa, Author- Common name	ROV 18-16
Actinopterygii	
Anguilliformes	
<i>Gymnothorax saxicola</i> Jordan & Davis, 1891- honeycomb moray	0.17
<i>Gymnothorax</i> sp.- moray eel	0.17
Beryciformes	
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	0.17
Lophiiformes	
<i>Ogcocephalus corniger</i> Bradbury, 1980- longnose batfish	0.34
<i>Ogcocephalus parvus</i> Longley & Hildebrand, 1940- roughback batfish	0.17
<i>Ogcocephalus</i> sp.- batfish	0.34
Perciformes	
Anthiadae- anthiid	0.34
<i>Calamus</i> sp.- porgy	0.51
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	0.17
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	0.84
<i>Chromis enchrysurus</i> Jordan & Gilbert, 1882- yellowtail reeffish	0.34
<i>Chromis</i> sp.- damselfish	0.17
<i>Holacanthus</i> sp.- angelfish	0.68
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	0.34
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	0.17
<i>Plectranthias garrupellus</i> Robins & Starck, 1961- apricot bass	0.34
<i>Priacanthus arenatus</i> Cuvier, 1829- bigeye	0.34
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye	0.68
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	3.38
<i>Pronotogrammus martinicensis</i> (Guichenot, 1868)- roughtongue bass	1.69
Serranidae- sea bass	0.17
<i>Serranus phoebe</i> Poey, 1851- tattler	3.71
Scorpaeniformes	
<i>Dactylopterus volitans</i> (Linnaeus, 1758)- flying gurnard	0.17
<i>Pontinus rathbuni</i> Goode & Bean, 1896- highfin scorpionfish	0.17
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	2.53
Scorpaenidae- scorpionfish	3.38
Tetraodontiformes	
<i>Chilomycterus schoepfii</i> (Walbaum, 1792)- striped burrfish	0.17
UNKNOWN	0.17

Dive Site: Florida, Oculina HAPC, West Extension, Shipwreck 88 m. ROV 18-XX, UNCW 58X; 18-V-18-3

Dive Notes:

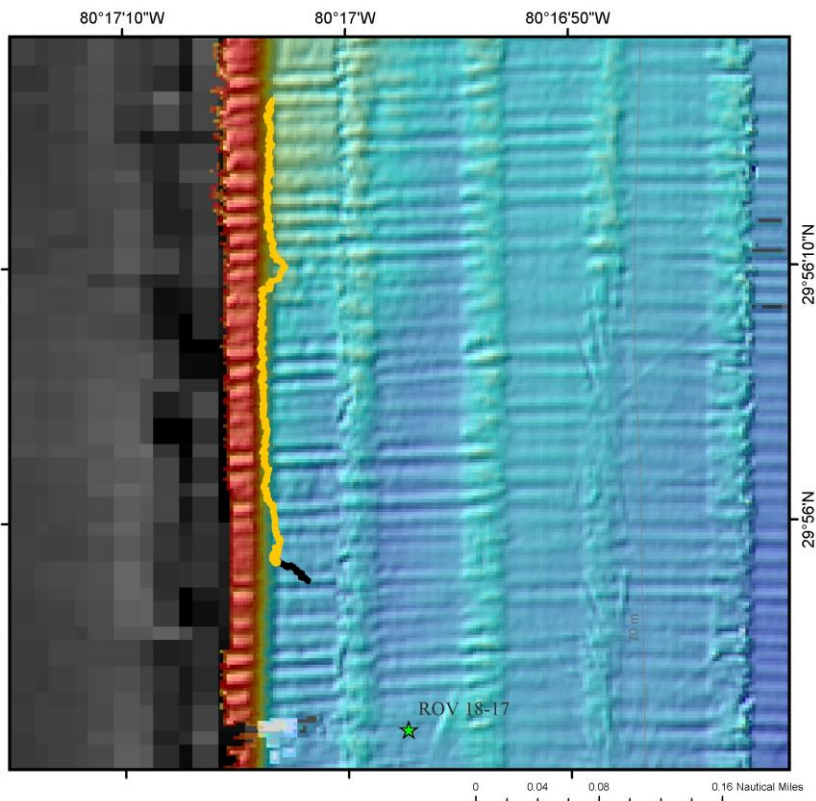
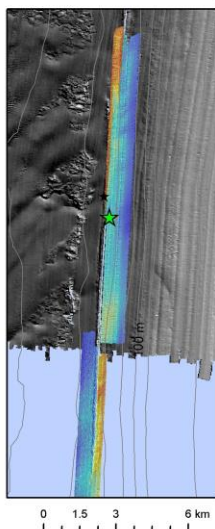
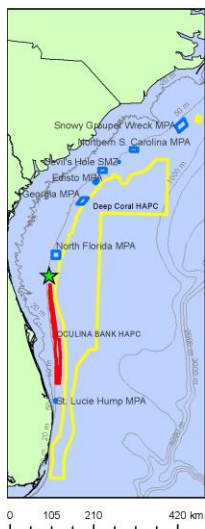
Canceled- Tried to dive here earlier today, but two boats fishing on the wreck, one had a bouy in the water, and was not moving, had to be anchored. Fishing with large bait, second boat drifting over it, caught several amberjack. This is no anchor zone.

Dive Site: Florida, Outside North Florida MPA; Target FL-6; 60 m; ROV 18-17, UNCW 587; 19-V-18-1

General Location and Dive Track:

Florida, Outside North Florida MPA;
Target FL-6; 60 m; ROV 18-17,
UNCW 587; 19-V-18-1

- ★ ROV 18-17
 - ★ Mohawk ROV
 - ★ CTD
 - 201805191 - Transect 01
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Pisces_2018_SNFL_MPA_4m_Grid

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/19/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 184

No. DVD: 2

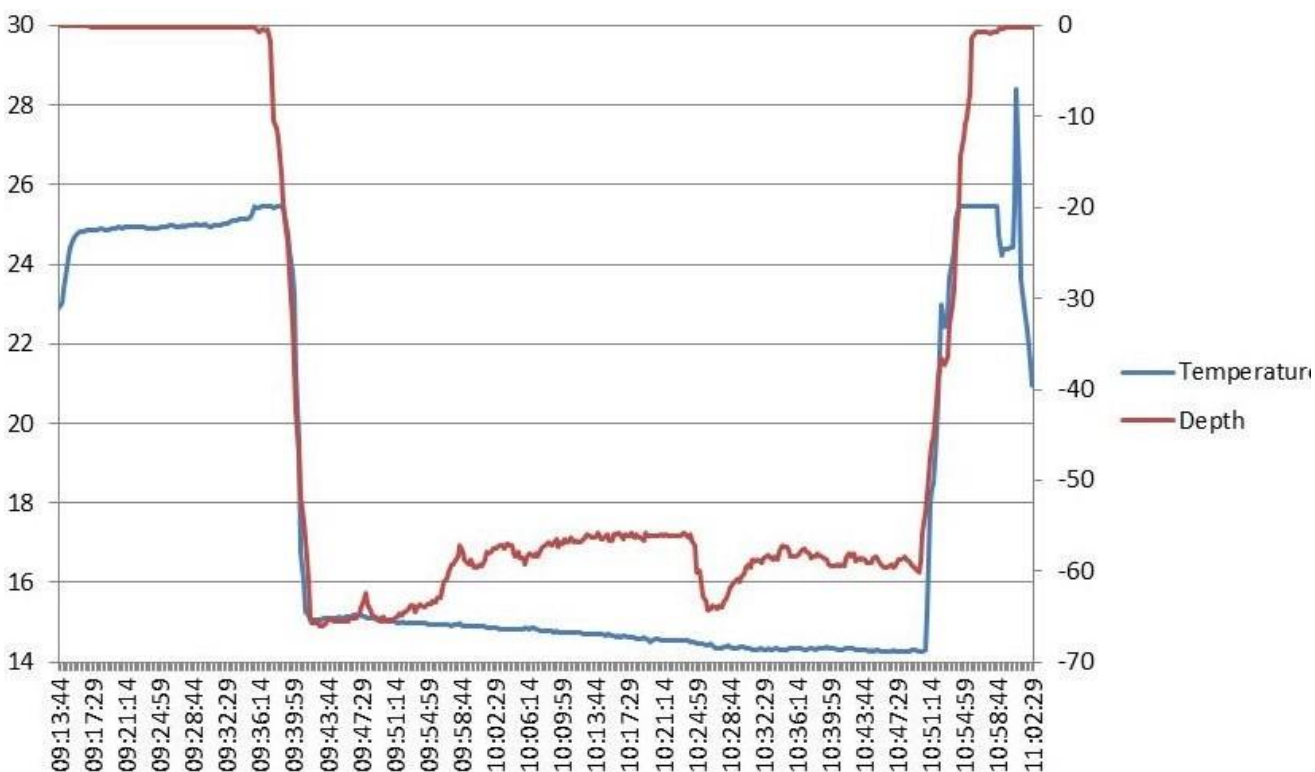
No. Hard Drive: 1

Dive Site: Florida, Outside North Florida MPA; Target FL-6; 60 m; ROV 18-17, UNCW 587; 19-V-18-1

Dive Data:

Minimum Bottom Depth (m):	56.5	Total Transect Length (km):	0.616				
Maximum Bottom Depth (m):	68	Surface Current (kn):	0.7				
On Bottom (Time- EDST):	9:41	On Bottom (Lat/Long):	29.9328°N; -80.2839°W				
Off Bottom (Time- EDST):	10:50	Off Bottom (Lat/Long):	29.938°N; -80.2844°W				
Physical (bottom); Temp (°C):	15.1	Salinity:	N/A	Visibility (m):	3	Current (kn):	0.25

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-17 are as follows: Depth Maximum: 66 m, Temperature: 14.3-15.2 °C.

Dive Site: Florida, Outside North Florida MPA; Target FL-6; 60 m; ROV 18-17, UNCW 587; 19-V-18-1

Dive Imagery:



Figure 1: -63.2 m
Jumble of rock boulders on east slope of ridge. Lasers are 10 cm.



Figure 2: -58.6 m
Bushy black coral (*Tanacetipathes* sp.)

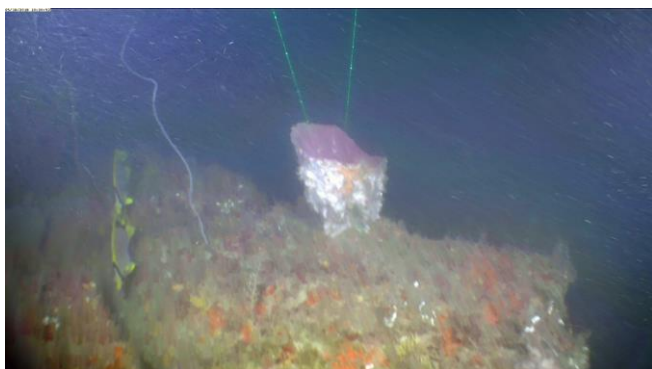


Figure 3: -57.9 m
Vase sponge (*Ircinia campana*).



Figure 4: -58 m
Wire coral (*Stichopathes luetkeni*) and hydroid fan (*Solanderia gracilis*).



Figure 5: -62.8 m
White azooxanthellate coral (*Madracis myriaster*).



Figure 6: -61.5 m
Rugged eastern slope of ridge.

Dive Site: Florida, Outside North Florida MPA; Target FL-6; 60 m; ROV 18-17, UNCW 587; 19-V-18-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 19-V-18-1; ROV 18-17, UNCW Dive 587; Florida, Outside North Florida MPA, FL6, 60 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

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Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (green; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital camera failed at 13 m. Video screen grabs only.

ROV problems- cables, fiber optics, and mother boards.

Upwelling event- 2 m visibility, previous day was 10o C on Oculina reefs; no grouper- may have moved off for cold water.

Site Description/Habitat/Biota:

Depth range: 57-69.3 m

MB map shows N-S linear ridge, transect heading N along ridge.

Weather- Rainy, seas 3-4 ft from SW, wind 15 kn from 175 dg, air- 25.92 C, surface water- 25.53 C, salinity- 36.26 PSU, current- 0.8 kn to 303.

9:35- Launch

Still camera failed at 13 m.

9:42- On bottom- 68.3 m; visibility- 3 m (nepheloid layer about 5 m off bottom), current- ½ kn from SE.

150 m south of WP 1, on ridge, flat rock, low relief ledges, dense *Stichopathes*, Didemnidae, Hydroida, sponges, 25 cm relief, ½ m ledges.

9:47- Heading N, ½-1m flat rock slabs on flat rock pavement, *Muricea*, *Tanacetipathes*, *Ircinia campana*.

9:53- East slope, *Filograna*, 1-2 m boulders, rugged, eroded, hi rugosity, low slope; Lionfish, Vermilion

Dive Site: Florida, Outside North Florida MPA; Target FL-6; 60 m; ROV 18-17, UNCW 587; 19-V-18-1

snapper, Tatler, 20 cm *Madracis myriaster*? white on vertical rock, *Panulirus argus*, Spirastrellidae, *Tanacetipathes* bushy common, Vermilions common, 58 m top of rocks, very rugged, big boulders, spotfin butterfly.

10:10- East slope, 57 m top edge, big boulders, *Ircinia*, 30 cm *Muricea*, Lionfish, blue angel, several lionfish, *Erylus*, stinging hydroids.

10:25- base of east slope, 66 m, sediment, 9 m relief, base of boulders, *Stichopathes*, *Cinachyrella* yellow, no grouper so far, lionfish common, Vermilion, 20 cm *Oculina*? White, *Tanacetipathes*.

10:33- top edge, 59 m, CCA on rock, Green algae- stalk and flat disc 1 cm, vermilion common hunkered down under rock. No grouper- likely cold upwelling event. Previous day was 10oC on *Oculina* reefs.

10:50- End dive, 59 m.

Dominant Benthic Macrobiota:

Scleractinia coral- *Oculina varicosa*- 2 live white; *Madracis myriaster*-2

Antipatharia coral- *Tanacetipathes* bushy (20-50 cm), *Stichopathes luetkeni*

Gorgonia coral- 30-40 cm *Muricea* common

Hydroida- *Solanderia gracilis*

Porifera- encrusting orange and yellow, *Cinachyrella*? sp., *Ircinia* sp., *Ircinia campana*, *Erylus* sp.

Annelida- *Filograna* sp.

Decapoda- *Panulirus argus*

Echinodermata- *Centrostephanus* sp.

Asciacea- Didemnidae

Algae- CCA

Human Debris:

none

Dive Site: Florida, Outside North Florida MPA; Target FL-6; 60 m; ROV 18-17, UNCW 587; 19-V-18-1

CPCe Percent Cover Analysis:

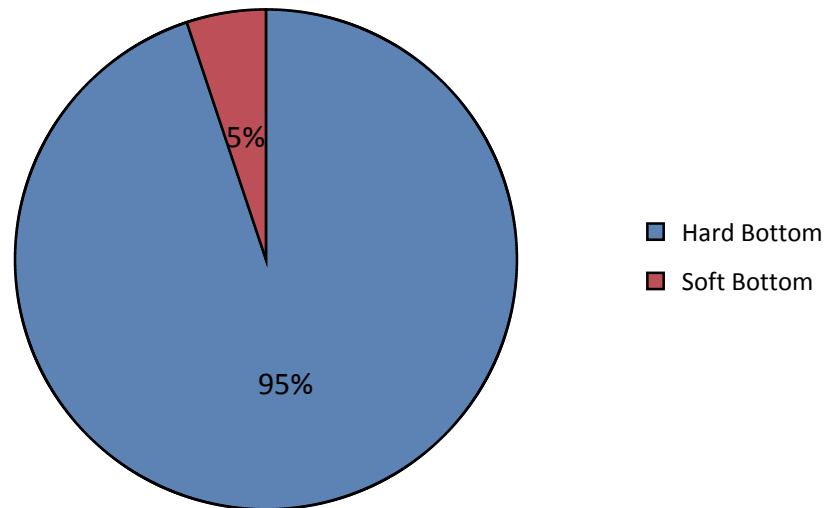


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-17. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

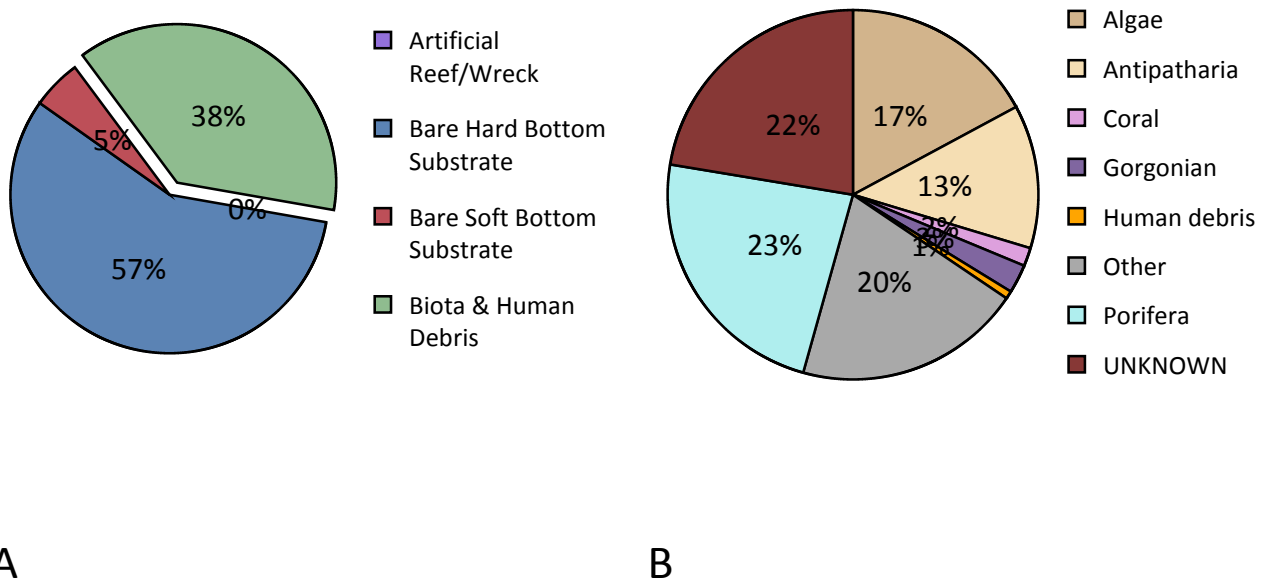


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-17. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: Florida, Outside North Florida MPA; Target FL-6; 60 m; ROV 18-17, UNCW 587; 19-V-18-1

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-17.

	ROV 18-17 %	Note
Biota	37.66%	X
Algae	6.49%	X
Algae- Unid.	2.08%	
Chlorophyta		X
Rhodophyta	4.42%	X
Corallinales	3.98%	
Corallinophycidae		X
Rhodophyta	0.43%	
Porifera	8.83%	X
Demospongiae	8.83%	X
<i>Agelas clathrodes</i> (Schmidt, 1870)		X
Axinellidae		X
<i>Chondrosia</i> sp.- lobate gray (MPA)	0.26%	
<i>Cinachyrella</i> sp.		X
Demospongiae- unid. sp.	6.15%	X
<i>Erylus</i> sp.		X
<i>Ircinia campana</i> (Lamarck, 1814)	0.09%	X
<i>Ircinia</i> sp.	1.21%	X
<i>Ircinia strobilina</i> (Lamarck, 1816)		X
Spirastrellidae	1.13%	X
Coral	0.61%	X
Coral- Scleractinia	0.61%	X
<i>Madracis myriaster</i> (Milne Edwards & Haime, 1850)		X
<i>Oculina varicosa</i> Le Sueur, 1820	0.61%	X
Gorgonian	0.95%	X
Alcyonacea - gorgonian	0.95%	X
Alcyonacea- gorgonian	0.17%	
<i>Diodogorgia</i> sp.	0.17%	X
<i>Ellisella</i> sp.		X
<i>Muricea</i> sp.	0.61%	X
Antipatharia	4.76%	X
Antipatharia	4.76%	X
Antipatharia unid. sp.	0.26%	
<i>Stichopathes luetkeni</i> Brook, 1889	2.42%	X
<i>Tanacetipathes</i> sp.		X

Dive Site: Florida, Outside North Florida MPA; Target FL-6; 60 m; ROV 18-17, UNCW 587; 19-V-18-1

<i>Tanacetipathes</i> sp.- bushy	1.73%	
<i>Tanacetipathes tanacetum</i> (Pourtales, 1880)	0.35%	
Other	16.02%	X
Hydrozoa	4.94%	X
Hydroidolina	4.94%	X
<i>Solanderia</i> sp.		X
Alcyonacea - Alcyoniina	0.09%	
Octocorallia	0.09%	
Anthozoa - Non Coral	0.17%	
Zoanthidae	0.17%	
Annelida	0.43%	X
<i>Filograna</i> sp.	0.43%	X
Bryozoa	0.17%	
Bryozoa	0.09%	
<i>Schizoporella</i> sp.	0.09%	
Arthropoda		X
<i>Panulirus argus</i> (Latreille, 1804)		X
Chordata - Invertebrate	1.21%	X
Didemnidae	1.21%	X
<i>Pyrosoma</i> sp.		X
Chordata - Vertebrate	0.43%	X
Actinopterygii	0.43%	X
UNKNOWN	8.48%	
Detritus	0.09%	
Bare Substrate	62.08%	
Bare Hard Bottom	57.06%	
Bare Hard Bottom	57.06%	
Bare rock, pavement, boulder, ledge	57.06%	
Bare Soft Bottom	5.02%	
Human debris	0.26%	X
Human debris	0.26%	X
Human debris- fishing line		X
Human debris- other	0.26%	X
Grand Total	100.00%	X

Dive Site: Florida, Outside North Florida MPA; Target FL-6; 60 m; ROV 18-17, UNCW 587; 19-V-18-1

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-17.

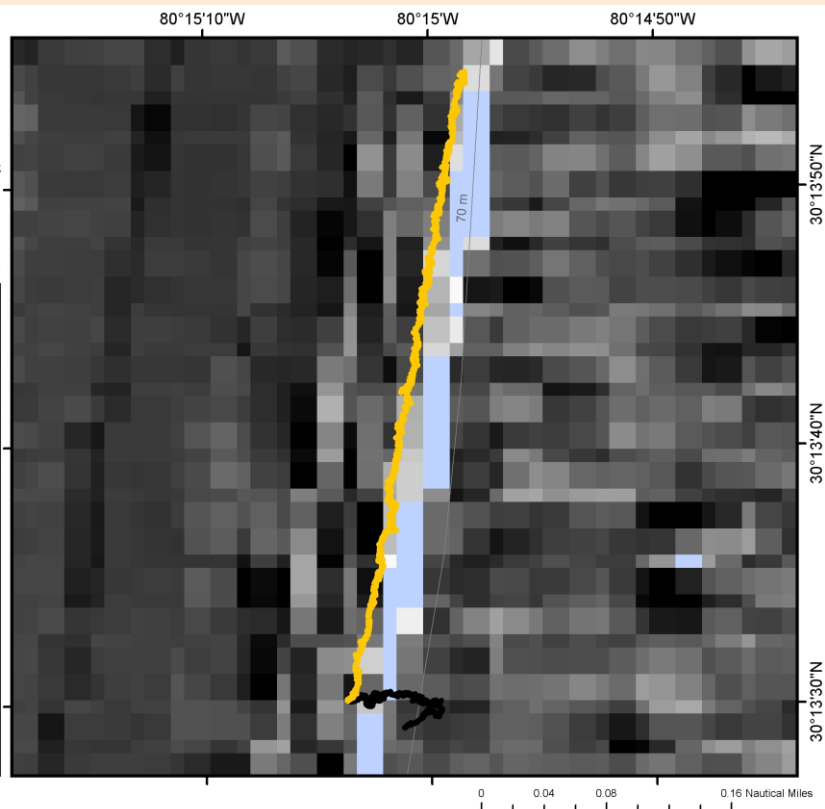
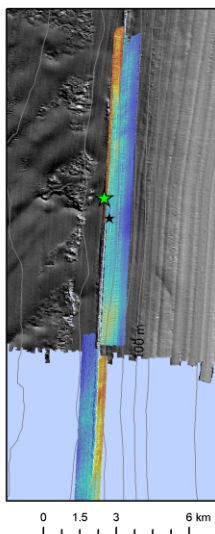
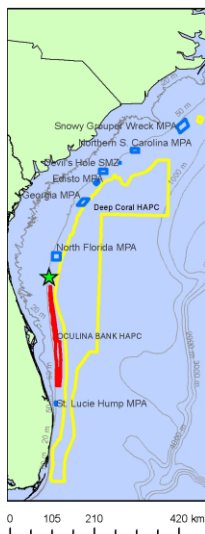
Taxa, Author- Common name	ROV 18-17
Actinopterygii	
Anguilliformes	
<i>Gymnothorax moringa</i> (Cuvier, 1829)- spotted moray	0.71
Beryciformes	
Holocentridae- squirrelfish	0.71
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	2.13
Perciformes	
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	4.26
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	2.84
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	61.75
<i>Holacanthus</i> sp.- angelfish	2.13
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	0.71
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	0.71
<i>Rhomboplites aurorubens</i> (Cuvier, 1829)- vermilion snapper	124.91
<i>Seriola</i> sp.- amberjack	0.71
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	12.07
<i>Scorpaena plumieri</i> Bloch, 1789- spotted scorpionfish	0.71
Scorpaenidae- scorpionfish	0.71
Tetraodontiformes	
<i>Canthigaster</i> sp.- puffer	3.55

Dive Site: Florida, Outside North Florida MPA; Target FL-4; 50 m; ROV 18-18, UNCW 588; 19-V-18-2

General Location and Dive Track:

Florida, Outside North Florida MPA;
Target FL-4; 50 m; ROV 18-18,
UNCW 588; 19-V-18-2

- ★ ROV 18-18
 - ★ Mohawk ROV
 - ★ CTD
 - 201805192 - Transect 01
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Navy_2011_CONFIDENTIAL_US WTR_Tif

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/19/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 326

No. DVD: 2

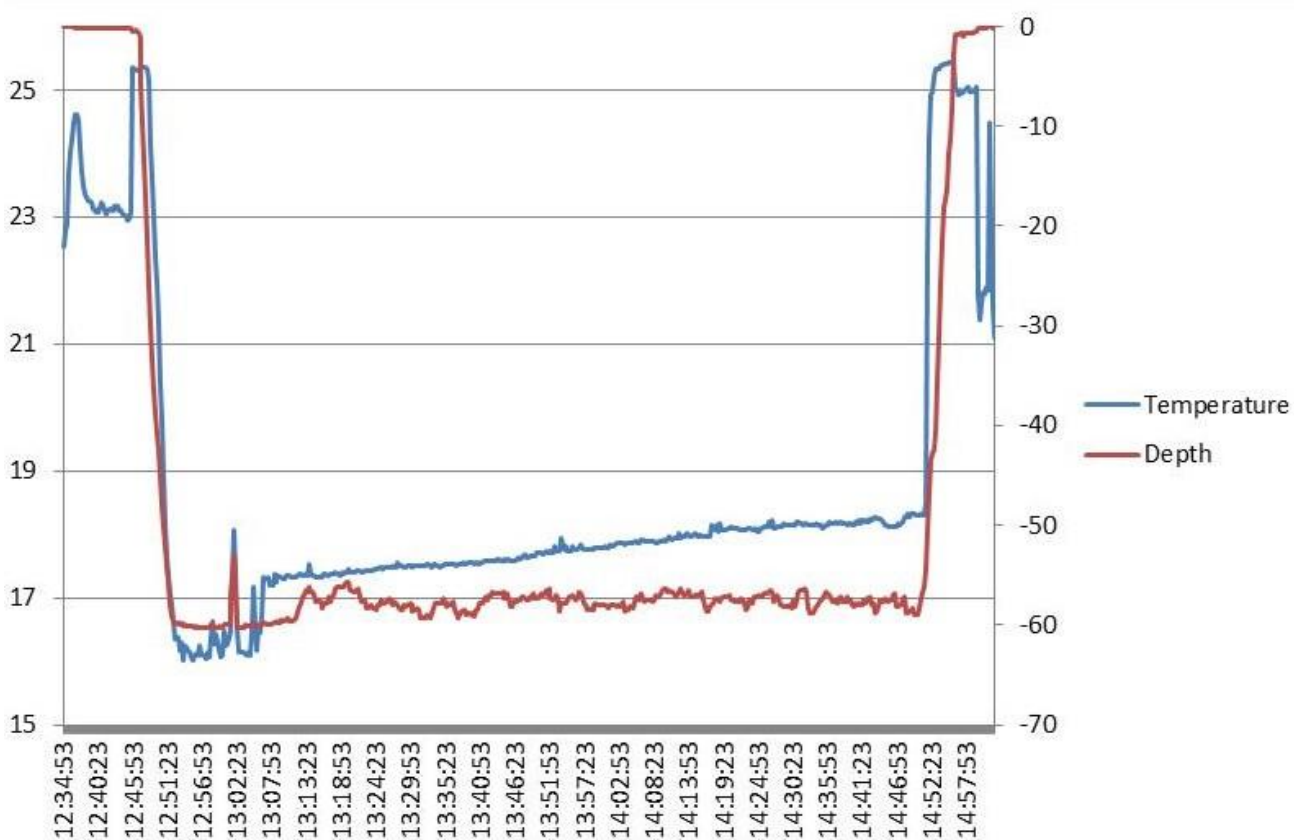
No. Hard Drive: 1

Dive Site: Florida, Outside North Florida MPA; Target FL-4; 50 m; ROV 18-18, UNCW 588; 19-V-18-2

Dive Data:

Minimum Bottom Depth (m):	53.9	Total Transect Length (km):	0.951				
Maximum Bottom Depth (m):	62	Surface Current (kn):	1.1				
On Bottom (Time- EDST):	12:51	On Bottom (Lat/Long):	30.2248°N; -80.2503°W				
Off Bottom (Time- EDST):	14:50	Off Bottom (Lat/Long):	30.2318°N; -80.2496°W				
Physical (bottom); Temp (°C):	16.6	Salinity:	N/A	Visibility (m):	5	Current (kn):	0.1

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-18 are as follows: Depth Maximum: 60.3 m, Temperature: 16-18.3 °C.

Dive Site: Florida, Outside North Florida MPA; Target FL-4; 50 m; ROV 18-18, UNCW 588; 19-V-18-2

Dive Imagery:



Figure 1: -62.3 m
Vase sponge (*Ircinia campana*) overgrown with hydroids, and white Didemnidae tunicates.



Figure 2: -59.4 m
Rugged east slope of ridge, with 1-2 m undercut ledges.

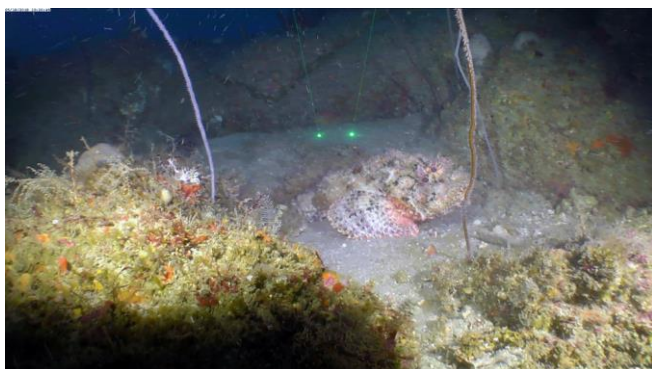


Figure 3: -59.6 m
Large scorpionfish. Lasers 10 cm.



Figure 4: -59.1 m
Undercut flat rock boulders with wire coral (*Stichopathes luetkeni*).



Figure 5: -59.1 m
Spiny lobster (*Panulirus argus*).



Figure 6: -59.3 m
Large sea fan (*Hypnogorgia pendula*).

Dive Site: Florida, Outside North Florida MPA; Target FL-4; 50 m; ROV 18-18, UNCW 588; 19-V-18-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 19-V-18-2; ROV 18-18, UNCW Dive 588; Florida, Outside North Florida MPA, FL4, 50 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (green; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital still working.

ROV problems- cables, fiber optics, and mother boards.

Digital still failed again at 17 m; used video frame grabs for photos.

Site Description/Habitat/Biota:

Depth range: 58-63 m

MB map shows N-S linear ridge, transect heading N along ridge.

Weather- Rain, seas 3-4 ft from SW, wind 15 kn from 221 dg, air- 23.82 C, surface water- 25.41 C, salinity- 35.64 PSU, current- 1.1 kn to 9 dg.

12:45- Launch

12:53- On bottom- 63 m; visibility- 5 m, current- 0.1 from N, W (variable).

East of ridge, flat hard bottom, sediment, sand/shell hash, *Tanacetipathes*, *Stichopathes*, hydroids, *Muricea*, *Ircinia*, Axinellida, heading west to ridge, Didemnidae, *Titanideum frauenfeldii*, *Filograna*, stinging hydroid.

13:01- Lost video feed. Got it back. Rhodophyta- thin flat branching, lionfish, blue angel,

13:11- 60.5 m, east base of ridge, flat boulders ½- 1 m relief, Spirastrellidae, low slope, high rugosity, dense cover biota, hydroids, *Ircinia*, red orange and yellow encrusting sponges, stout moray, lionfish, *Stichopathes*, *Ircinia campana*, *Tanacetipathes* bushy 25 cm, *Agelas* ball orange, scorpionfish, *Sargassum* detritus, DMST

sponge.

13:20- 58 m, top of ledge, flat pavement; back on slope, <1 m relief flat top boulders, ½ -1 m ledge N-S, 10 dg slope, fishing line, eel, *Panulirus argus*, tomtate, lionfish common, lobster, scamp, single stalk *Tanacetipathes*, Cubbyu, squirrelfish, spanish hogfish, spotfin butterfly, *Antipathes furcata*, soapfish, jackknife, fishing line, Clathriidae yellow, purple reef fish, wrasse bass.

13:36- 61 m, east slope, chewed on tomtate, lobster, blackbar soldier, amberjack, anchor line, reticulate eel, ¾ m diam *Tanacetipathes*, 1-2 m relief, for short section, then back to <1 m ledge, *Prognathodes aya*, *Schizoporella*, reef butterfly, scamp, solitary cup coral under ledges,

13:55- east slope, same, *Diodogorgia*.

14:00- green algae (stalked with thin flat disc on top), lobster, 50 cm white *Hypnogorgia pendula*, red snapper, *Aplysina* tubes, *Oculina* white 20 cm, fishing line.

14:22- *Placospongia*, 60 m, east slope, 1-2 m relief, ½ m *Geodia neptuni*, purple *Aplydium*, lobster, *Scaphella junonia*.

14:36- east slope, 60 m, 1 m relief ledges, flat boulders, dense tomtates, reef fish, lobster, fishing line.

14:47- 60 m, east slope, ledge <1/2 m, flat boulders <1/2 m low slope, low rugosity.

14:50- 61 m, end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- *Oculina varicosa*- 1 white live

Antipatharia coral- *Tanacetipathes* bushy (20-50 cm), *Stichopathes luetkeni*, *Antipathes furcata*, single stalk *Tanacetipathes*

Gorgonia coral- *Muricea* sp., *Hypnogorgia pendula* (1), *Titanideum frauenfeldii*, *Diodogorgia* sp.

Hydroida

Porifera- encrusting orange and yellow, yellow sphere, *Ircinia* sp., *Ircinia campana*, DMST, Axinellida, *Aplysina* tubes, *Geodia neptuni*, *Placospongia* sp.

Annelida- *Filograna* sp.

Bryozoa- *Schizoporella* sp.

Mollusca- *Scaphella junonia*

Decapoda- *Panulirus argus*- 8

Echinodermata- *Centrostephanus* sp.

Ascidiacea- Didemnidae, purple *Aplydium* sp.

Algae- Rhodophyta thin flat blade

Human Debris:

Fishing line- several, anchor line.

Dive Site: Florida, Outside North Florida MPA; Target FL-4; 50 m; ROV 18-18, UNCW 588; 19-V-18-2

CPCe Percent Cover Analysis:

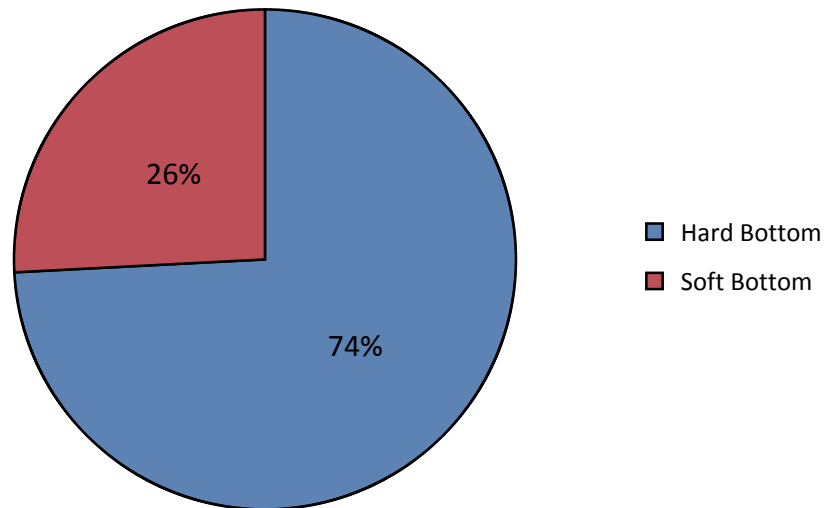


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-18. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

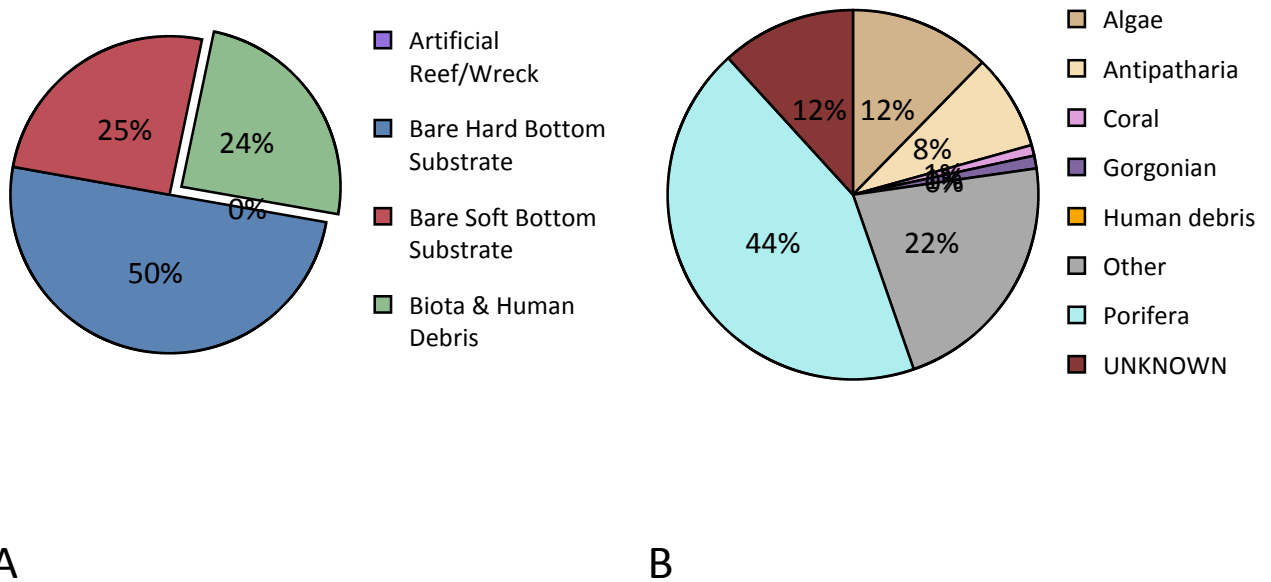


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-18. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: Florida, Outside North Florida MPA; Target FL-4; 50 m; ROV 18-18, UNCW 588; 19-V-18-2

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-18.

	ROV 18-18	Note
	%	
Biota	24.50%	X
Algae	3.01%	X
Algae- Unid.	0.96%	
Chlorophyta		X
Cyanobacteria	0.09%	
Ochrophyta	0.32%	X
Ochrophyta	0.32%	
<i>Sargassum</i> sp.		X
Rhodophyta	1.64%	X
Corallinales	0.87%	
Rhodophyta	0.78%	X
Porifera	10.68%	X
Demospongiae	10.68%	X
Aplysina sp.	0.05%	X
Axinellidae		X
Cinachyrella sp.		X
Demospongiae- DMST	0.50%	X
Demospongiae- unid. sp.	6.71%	X
Demospongiae- Ye sphere (MPA)	0.18%	
<i>Geodia neptuni</i> (Sollas, 1886)		X
<i>Geodia</i> sp.	0.05%	
<i>Ircinia campana</i> (Lamarck, 1814)		X
<i>Ircinia</i> sp.	0.91%	X
<i>Placospongia</i> sp.		X
Poecilosclerida	0.05%	
Spirastrellidae	2.24%	X
Coral	0.23%	X
Coral- Scleractinia	0.23%	X
<i>Madracis myriaster</i> (Milne Edwards & Haime, 1850)	0.18%	
<i>Oculina varicosa</i> Le Sueur, 1820		X
Scleractinia- unid cup	0.05%	X
Gorgonian	0.27%	X
Alcyonacea - gorgonian	0.27%	X
Alcyonacea- gorgonian	0.14%	
<i>Bebryce</i> sp.		X

Dive Site: Florida, Outside North Florida MPA; Target FL-4; 50 m; ROV 18-18, UNCW 588; 19-V-18-2

<i>Diodogorgia</i> sp.	0.14%	X
<i>Hypnogorgia</i> sp.		X
<i>Muricea</i> sp.		X
<i>Titanideum frauenfeldii</i> (Kölliker, 1865)		X
Antipatharia	2.05%	X
Antipatharia	2.05%	X
Antipatharia unid. sp.	0.09%	X
<i>Antipathes atlantica</i> Gray, 1857		X
<i>Antipathes furcata</i> Gray, 1857	0.27%	X
<i>Stichopathes luetkeni</i> Brook, 1889	1.09%	X
<i>Tanacetipathes</i> sp.		X
<i>Tanacetipathes</i> sp.- bushy	0.46%	
<i>Tanacetipathes tanacetum</i> (Pourtales, 1880)	0.14%	
Other	8.26%	X
Hydrozoa	3.65%	X
Hydroidolina	3.65%	X
Anthozoa - Non Coral	0.14%	X
Corallimorpharia	0.14%	X
Annelida	0.32%	X
<i>Filograna</i> sp.	0.09%	X
Serpulidae	0.18%	
Terebellidae	0.05%	
Bryozoa	0.14%	X
Bryozoa	0.14%	X
<i>Schizoporella</i> sp.		X
Arthropoda	0.18%	X
<i>Panulirus argus</i> (Latreille, 1804)	0.14%	X
Penaeidae	0.05%	
Mollusca		X
<i>Scaphella junonia</i> (Lamarck, 1804)		X
<i>Spondylus</i> sp.		X
Chordata - Invertebrate	0.23%	X
Didemnidae	0.23%	X
<i>Eudistoma</i> sp.		X
Chordata - Vertebrate	0.59%	X
Actinopterygii	0.59%	X
UNKNOWN	2.87%	
Detritus	0.14%	
Bare Substrate	75.50%	
Bare Hard Bottom	50.05%	
Bare Hard Bottom	50.05%	
Bare rock, pavement, boulder, ledge	48.68%	

Dive Site: Florida, Outside North Florida MPA; Target FL-4; 50 m; ROV 18-18, UNCW 588; 19-V-18-2

Bare rubble/cobble	1.37%	
Bare Soft Bottom	25.46%	
Human debris		X
Human debris		X
Human debris- fishing line		X
Grand Total	100.00%	X

Dive Site: Florida, Outside North Florida MPA; Target FL-4; 50 m; ROV 18-18, UNCW 588; 19-V-18-2

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-18.

Taxa, Author- Common name	ROV 18-18
Actinopterygii	
Anguilliformes	
<i>Gymnothorax moringa</i> (Cuvier, 1829)- spotted moray	1.40
<i>Muraena retifera</i> Goode & Bean, 1882- reticulate moray	0.35
<i>Muraena robusta</i> Osório, 1911- stout moray	1.05
Beryciformes	
Holocentridae- squirrelfish	14.01
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	26.61
<i>Myripristis jacobus</i> Cuvier, 1829- blackbar soldierfish	29.76
<i>Plectrypops retrospinis</i> (Guichenot, 1853)- cardinal soldierfish	0.35
Perciformes	
<i>Apogon pseudomaculatus</i> Longley, 1932- twospot cardinalfish	0.35
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	12.61
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	3.50
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	3.85
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	33.61
<i>Chromis enchrysurus</i> Jordan & Gilbert, 1882- yellowtail reef fish	4.55
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	3.85
<i>Chromis scotti</i> Emery, 1968- purple reef fish	3.15
<i>Equetus lanceolatus</i> (Linnaeus, 1758)- jackknife fish	8.40
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	357.14
<i>Haemulon plumierii</i> (Lacepède, 1801)- white grunt	0.35
<i>Haemulon</i> sp.- grunt	70.03
<i>Haemulon striatum</i> (Linnaeus, 1758)- striped grunt	28.01
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	2.80
<i>Halichoeres cyanocephalus</i> (Bloch, 1791)- yellowcheek wrasse	0.35
<i>Halichoeres garnoti</i> (Valenciennes, 1839)- yellowhead wrasse	4.55
<i>Halichoeres</i> sp.- wrasse	6.30
<i>Holacanthus</i> sp.- angelfish	17.86
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	4.55
<i>Lutjanus</i> sp.- snapper	0.35
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	4.20
<i>Mycteroperca</i> sp.- grouper	0.35
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	17.51
<i>Prognathodes aculeatus</i> (Poey, 1860)- longsnout butterflyfish	0.35
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	3.85
<i>Rhomboplites aurorubens</i> (Cuvier, 1829)- vermilion snapper	5.95
<i>Rypticus saponaceus</i> (Bloch & Schneider, 1801)- greater soapfish	1.05
<i>Seriola rivoliana</i> Valenciennes, 1833- almaco jack	0.35

Dive Site: Florida, Outside North Florida MPA; Target FL-4; 50 m; ROV 18-18, UNCW 588; 19-V-18-2

<i>Seriola</i> sp.- amberjack	0.35
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	4.20
<i>Serranus phoebe</i> Poey, 1851- tattler	0.70
<i>Serranus</i> sp.- sea bass	0.35
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	33.26
<i>Scorpaena plumieri</i> Bloch, 1789- spotted scorpionfish	0.35
Scorpaenidae- scorpionfish	0.35
Tetraodontiformes	
<i>Balistes capriscus</i> Gmelin, 1789- grey triggerfish	0.35
<i>Canthigaster</i> sp.- puffer	44.82
UNKNOWN	1.75

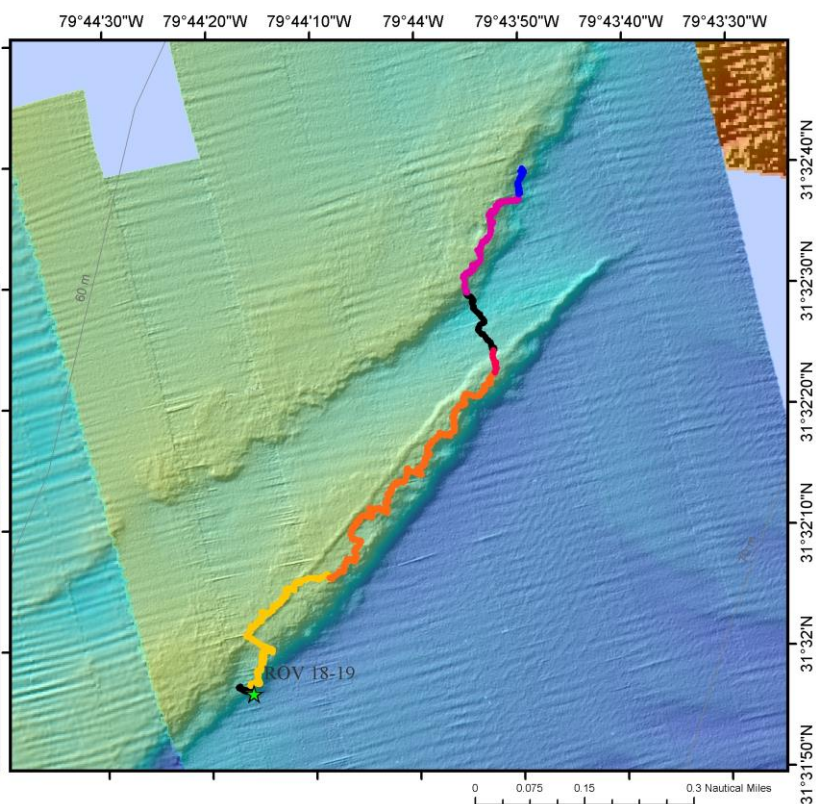
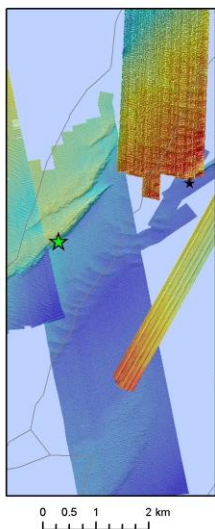
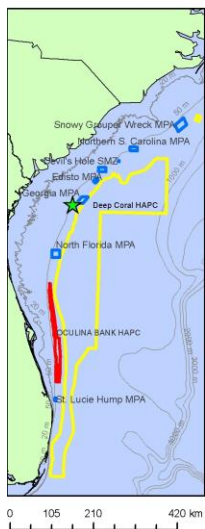
Dive Site: Georgia, Outside Georgia MPA; Target GA-2; 61 m; ROV 18-19, UNCW 589; 20-V-18-1

General Location and Dive Track:

Georgia, Outside Georgia MPA;
Target GA-2; 61 m; ROV 18-19,
UNCW 589; 20-V-18-1

- ★ ROV 18-19
- ★ Mohawk ROV
- ★ CTD
- 201805201 - Transect 01
- 201805201 - Transect 02
- 201805201 - Transect 03
- 201805201 - Transect 04
- 201805201 - Transect 05
- ROV Track

- Oculina HAPC
- MPA
- Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: NancyFoster_10_15_GeorgiaEast_bag.bag

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/20/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 481

No. DVD: 4

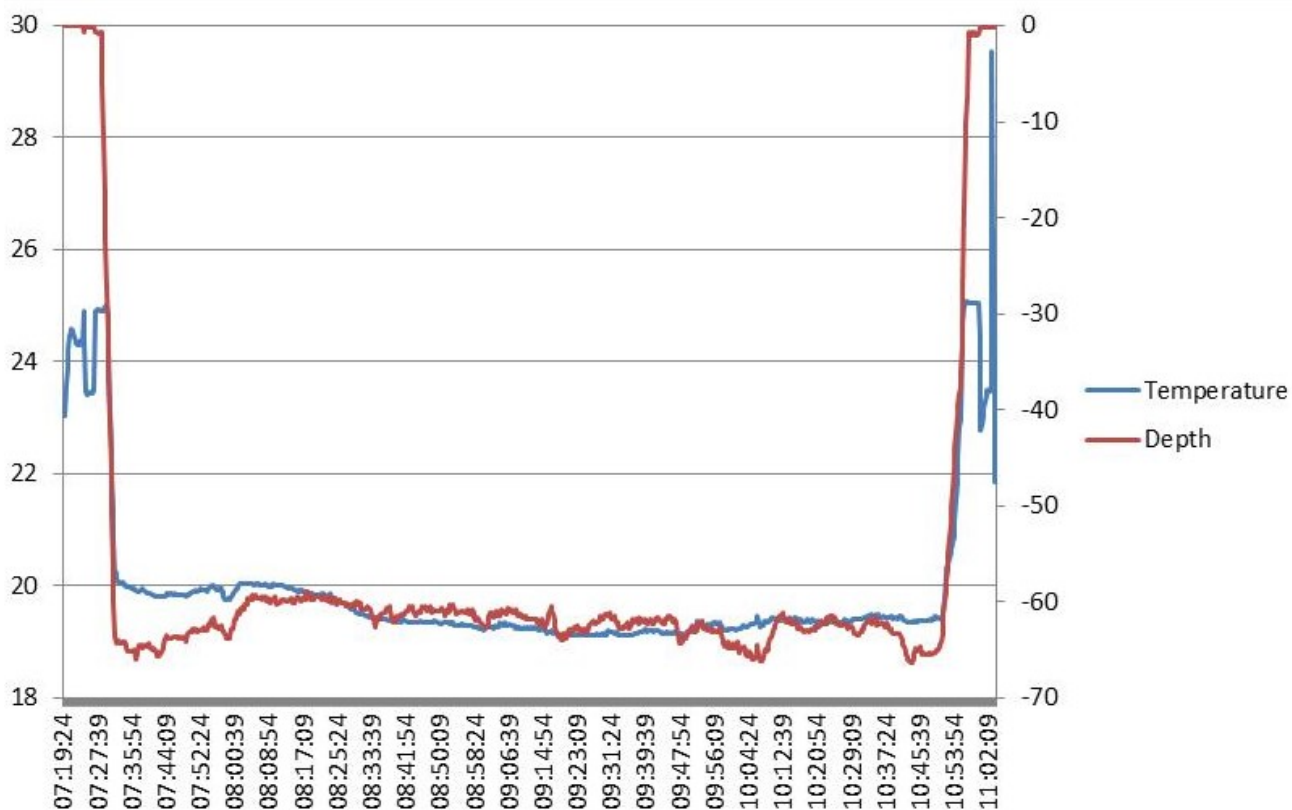
No. Hard Drive: 1

Dive Site: Georgia, Outside Georgia MPA; Target GA-2; 61 m; ROV 18-19, UNCW 589; 20-V-18-1

Dive Data:

Minimum Bottom Depth (m): 59.5	Total Transect Length (km): 2.003
Maximum Bottom Depth (m): 67.1	Surface Current (kn): 0.2
On Bottom (Time- EDST): 7:31	On Bottom (Lat/Long): 31.5325°N; -79.7382°W
Off Bottom (Time- EDST): 10:51	Off Bottom (Lat/Long): 31.5443°N; -79.7305°W
Physical (bottom); Temp (°C): 20.2	Salinity: N/A Visibility (m): 3 Current (kn): 0.25

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-19 are as follows: Depth Maximum: 66.3 m, Temperature: 19.1-20.2 °C.

Dive Site: Georgia, Outside Georgia MPA; Target GA-2; 61 m; ROV 18-19, UNCW 589; 20-V-18-1

Dive Imagery:



Figure 1: -67.2 m
Whitespotted soapfish on low relief rock habitat.



Figure 2: -65.6 m
Aplysina sp. demosponge with hydroids.



Figure 3: -61.5 m
Slipper lobster (*Scyllarides nodifer*)



Figure 4: -63.2 m
Sea cucumber (*Isostichopus badionotus*)



Figure 5: -65 m
Spotted moray eel.



Figure 6: -67 m
School of red snapper. 83 were counted on the dive.

Dive Site: Georgia, Outside Georgia MPA; Target GA-2; 61 m; ROV 18-19, UNCW 589; 20-V-18-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 20-V-18-1; ROV 18-19, UNCW Dive 589; Georgia, Outside Georgia MPA, GA2, 70 m

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (green; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital still camera working for transects.

Site Description/Habitat/Biota:

Depth range: 61.5-67 m

MB map shows NE-SW linear ridge, top- 66 m, east base 67 m; transect heading north along ridge.

Weather- Cloudy, seas 3-4 ft swell from S, wind 2 kn from 315 dg, air- 25.91 C, surface water- 24.91 C, salinity- 35.6 PSU, current- 0.2 to 250 dg.

7:27- Launch

7:32- On bottom- 66 m; visibility- 3-5 m, current- 0.25 kn from NE.

Wp 32 m to NE. Top of plateau, flat sand/shell hash, hydroids, flat hard bottom, encrusting sponges, *Filograna*, lionfish, *Ircinia*, porgy, heading NE to east slope, *Tanacetipathes*, *Muricea* 30 cm, *Narcissia trigonaria*, *Stichopathes*.

7:42 m- East slope, 66 m, not well defined, low slope, low relief, low rugosity, ledges and outcrops <1/2 m, weird *Aplysina*, lobate, apical oscules white, blue angel, porgy, Axinellida orange sphere, yellow sphere Demosponges, *Agelas* sp., 30 cm *Geodia neptuni*, spotfin butterfly, *Stenorhynchus*, rock hind, reef butterfly, *Goniaster tessellatus*.

8:00- Head west to small N-S ledge on MB, 60- 60.5 m. Top of plateau, flat hard bottom, 62 m,

8:03- 62 m, on ledge in MB. Flat rock boulders <1m diam, <1/2 m relief, patchy hard bottom, hydroids,

Dive Site: Georgia, Outside Georgia MPA; Target GA-2; 61 m; ROV 18-19, UNCW 589; 20-V-18-1

Tanacetipathes, *Goniaster*, *Stichopathes*, Didemnidae, short bigeye, lionfish.

61.7 m- top of second ridge.

8:18- on second ledge, 61.5 m, *Scyllarides nodifer*, soapfish, Spirastrellidae, squirrelfish, 30 cm *Ircinia campana*.

8:27- Heading E back to main ridge. Top of plateau pavement, sediment, Terebellidae.

8:31- top edge of east slope, 62 m; 64 m lower slope. Visually see no slope, low relief hard bottom, <1/2 m relief, low rugosity, same biota, cubbyu, *Prognathodes aya*.

8:52- near west ledge, 1 m eroded rock, lionfish, butterfly fish, same biota, ledge ends, heading east back to east slope, amberjack.

8:56- east to east slope, slipper lobster, *Isostichopus badionotus*?

9:15- still on plateau, heading 45 dg to east slope, low relief hard bottom.

9:19- near east edge on MB, 65.5 m, low relief hard bottom, low slope, low rugosity, cardinal soldier fish, *Eucidaris tribuloides*, *Antipatharia* fan, *Sargassum* detritus.

9:33- East slope, 64.4 m, hermit crab, east slope, 1 m relief, ledges rock boulders, scamp, 30 cm *Muricea*, *Tanacetipathes*, *Stichopathes*, red snapper- school at least several dozen, gag, *Oceanapia*, *Diodogorgia*.

9:50- East slope and top, same, low relief, scamp, pile of fishing line, 64 m.

9:54- Head NW to west ridge, flat sand, no xs photos; half way across sand flat, 67.5 m.

10:08- east base of West Ridge, 67 m, low slope, low relief, low rugosity, same biota, heading NE along West ridge, 64 m near top of ridge, no obvious slope or ledges, red snapper, 30 cm yellow sphere demo, *Antipathes atlantica*, *Filograna*, yellow Clathriidae, DMST sponge, *Antipatharia* fan, Didemnidae, *Stichopathes*, 50 cm bamboo sticks laying on bottom common, red snapper, lionfish, tatler, yellow spikey sponge Clathriidae?, *Ircinia campana*. Pavement low relief hard bottom.

10:25- East slope of West ridge, various from low relief ledges, to flat rock hardbottom, same biota, occasional red snapper, still low vis 3 m, fishing line, lionfish, anchor line, *Aiolochoiria crassa*, low relief, low slope, low rugosity, hard bottom. 64 m, bushy tan bryozoa, *Antipathes furcata*, spotted moray.

10:41- Head east to go to base of slope, 67 m base of slope, flat hard bottom, same biota, 50+ red snapper, low relief, low slope, low rugosity, hard bottom, no tomtate, no anthiids (what are they eating here? Spawning aggregations? In 2017 counted 142 red snapper along this same transect).

10:51- end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- None

Antipatharia coral- *Tanacetipathes* bushy, *Stichopathes luetkeni*, *Antipathes furcata*, *Antipathes* sp., *Antipathes atlantica*,

Gorgonia coral- *Muricea* sp., *Diodogorgia* sp.

Hydroida

Porifera- encrusting orange and yellow, yellow sphere, yellow Clathriidae?, *Ircinia* sp., *Ircinia campana*, DMST, Axinellida, *Geodia neptuni*, *Oceanapia*, *Aiolochoiria crassa*

Annelida- *Filograna* sp., Terebellidae

Bryozoa- bushy tan

Decapoda- hermit crabs, *Stenorhynchus seticornis*, *Scyllarides nodifer*

Echinodermata- *Eucidaris tribuloides*, *Narcissia trigonaria*, *Goniaster tessellatus*, *Isostichopus badionotus*

Asciacea- Didemnidae

Algae- CCA

Human Debris: Fishing line- several, anchor line.

Dive Site: Georgia, Outside Georgia MPA; Target GA-2; 61 m; ROV 18-19, UNCW 589; 20-V-18-1

CPCe Percent Cover Analysis:

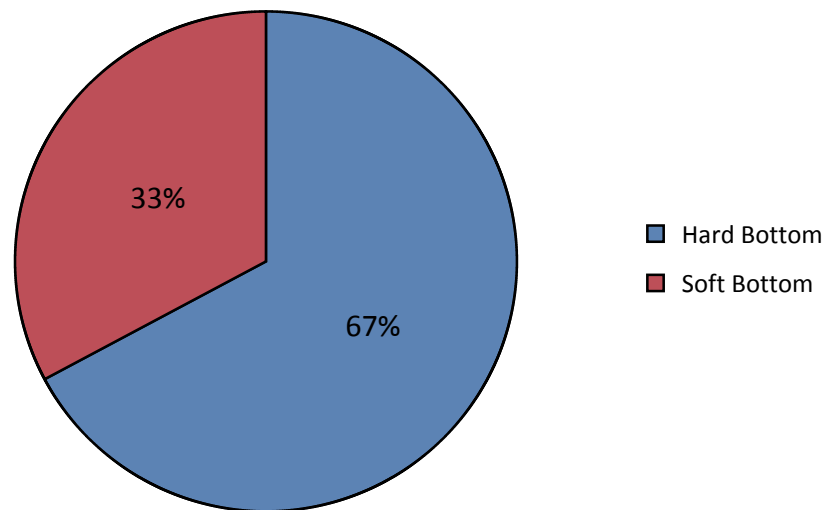


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-19. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

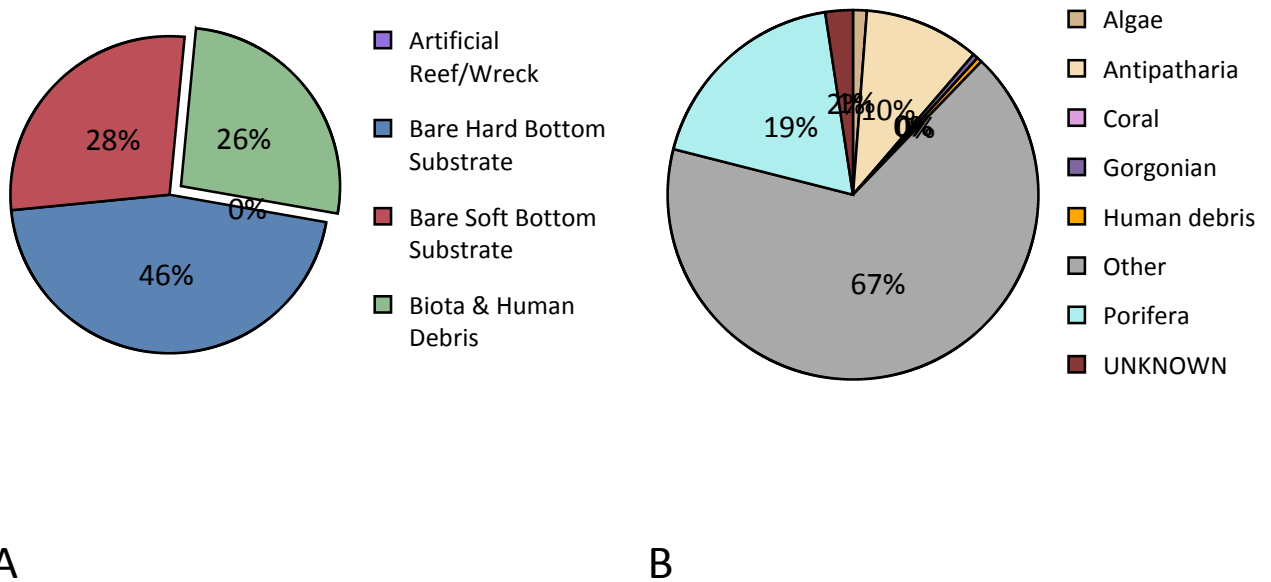


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-19. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: Georgia, Outside Georgia MPA; Target GA-2; 61 m; ROV 18-19, UNCW 589; 20-V-18-1

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-19.

	ROV 18-19 %	Note
Biota	26.14%	X
Algae	0.32%	
Rhodophyta	0.32%	
Corallinales	0.32%	
Porifera	4.89%	X
Demospongiae	4.89%	X
<i>Agelas</i> sp.		X
<i>Aiolochoira crassa</i> (Hyatt, 1875)		X
<i>Aplysina</i> sp.		X
Axinellidae		X
<i>Callyspongia (Cladochalina) vaginalis</i> (Lamarck, 1814)		X
<i>Clathria</i> sp.	0.20%	
Demospongiae- DMST		X
Demospongiae- unid. sp.	2.92%	X
<i>Geodia neptuni</i> (Sollas, 1886)		X
<i>Ircinia campana</i> (Lamarck, 1814)	0.67%	X
<i>Ircinia</i> sp.	0.16%	
Microcionidae syn. Clathriidae		X
<i>Oceanapia</i> sp.		X
Spirastrellidae	0.79%	X
Tetractinellida	0.04%	
Xestospongia sp.	0.12%	
Gorgonian	0.12%	X
Alcyonacea - gorgonian	0.12%	X
<i>Diodogorgia</i> sp.	0.08%	X
<i>Muricea</i> sp.		X
<i>Nicella</i> sp.	0.04%	
Antipatharia	2.64%	X
Antipatharia	2.64%	X
Antipatharia unid. sp.	1.22%	X
<i>Antipathes atlantica</i> Gray, 1857		X
<i>Stichopathes luetkeni</i> Brook, 1889	1.42%	X
Other	18.18%	X
Hydrozoa	13.53%	X
Hydroidolina	13.53%	X
Annelida	3.35%	X
Annelida Unid.	2.88%	

Dive Site: Georgia, Outside Georgia MPA; Target GA-2; 61 m; ROV 18-19, UNCW 589; 20-V-18-1

Filograna sp.	0.39%	X
Terebellidae	0.08%	X
Bryozoa	0.16%	X
Bryozoa	0.12%	X
<i>Schizoporella</i> sp.	0.04%	
Arthropoda	0.04%	X
Anomura		X
Scyllaridae	0.04%	
<i>Scyllarides</i> sp.		X
<i>Stenorhynchus seticornis</i> (Herbst, 1788)		X
Mollusca		X
<i>Busycon</i> sp.		X
<i>Fasciolaria</i> sp.		X
Echinodermata	0.12%	X
Asteroidea	0.04%	
<i>Eucidaris tribuloides</i> (Lamarck, 1816)		X
<i>Goniaster tessellatus</i> (Lamarck, 1816)		X
<i>Isostichopus badionotus</i> (Selenka, 1867)		X
<i>Narcissia trigonaria</i> Sladen, 1889	0.08%	X
Chordata - Invertebrate	0.16%	X
Ascidiacea	0.04%	
Didemnidae	0.12%	X
<i>Pyrosoma</i> sp.		X
Chordata - Vertebrate	0.08%	X
Actinopterygii	0.08%	X
UNKNOWN	0.63%	
Detritus	0.12%	
Bare Substrate	73.74%	
Bare Hard Bottom	45.66%	
Bare Hard Bottom	45.66%	
Bare coral rubble	0.04%	
Bare rock, pavement, boulder, ledge	44.28%	
Bare rubble/cobble	1.34%	
Bare Soft Bottom	28.08%	
Human debris	0.12%	X
Human debris	0.12%	X
Human debris- anchor line		X
Human debris- cans/bottles	0.04%	X
Human debris- fishing line		X
Human debris- other	0.08%	X
Grand Total	100.00%	X

Dive Site: Georgia, Outside Georgia MPA; Target GA-2; 61 m; ROV 18-19, UNCW 589; 20-V-18-1

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-19.

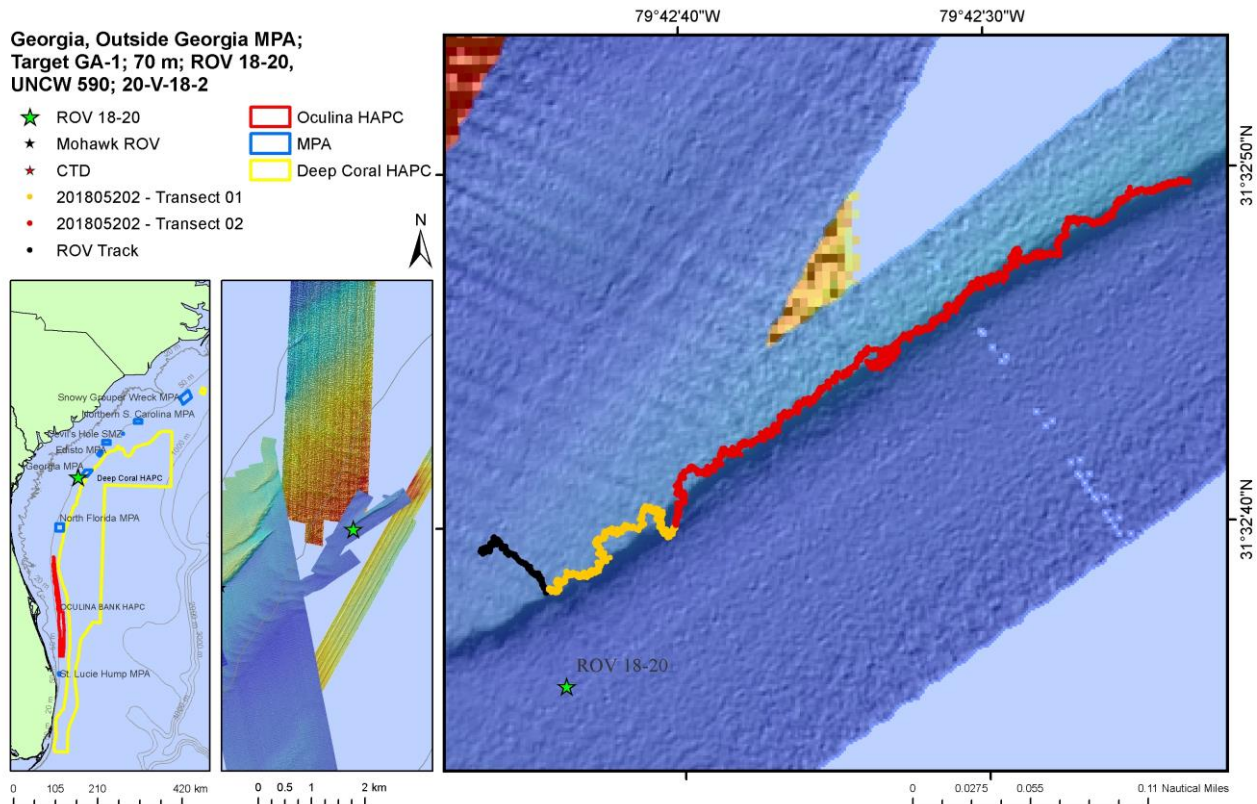
Taxa, Author- Common name	ROV 18-19
Actinopterygii	
Anguilliformes	
<i>Gymnothorax moringa</i> (Cuvier, 1829)- spotted moray	0.35
<i>Muraena robusta</i> Osório, 1911- stout moray	0.18
Muraenidae- moray eel	0.18
Aulopiformes	
<i>Synodus</i> sp.- lizardfish	0.71
Beryciformes	
Holocentridae- squirrelfish	1.77
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	0.53
<i>Plectrypops retrospinis</i> (Guichenot, 1853)- cardinal soldierfish	0.35
Gadiformes	
Phycidae- hake	0.35
Perciformes	
<i>Apogon pseudomaculatus</i> Longley, 1932- twospot cardinalfish	0.71
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	0.53
<i>Calamus</i> sp.- porgy	2.47
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	0.18
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	10.61
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	11.84
<i>Chromis enchrysurus</i> Jordan & Gilbert, 1882- yellowtail reeffish	1.94
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	0.35
<i>Chromis scotti</i> Emery, 1968- purple reeffish	0.35
<i>Epinephelus adscensionis</i> (Osbeck, 1765)- rock hind	0.18
<i>Equetus lanceolatus</i> (Linnaeus, 1758)- jackknife fish	0.18
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	0.71
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	1.94
<i>Halichoeres</i> sp.- wrasse	6.36
<i>Holacanthus</i> sp.- angelfish	5.48
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	1.77
<i>Lutjanus analis</i> (Cuvier, 1828)- mutton snapper	0.18
<i>Lutjanus campechanus</i> (Poey, 1860)- red snapper	13.96
<i>Mycteroperca microlepis</i> (Goode & Bean, 1879)- gag grouper	0.18
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	0.53
<i>Mycteroperca</i> sp.- grouper	0.18
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	4.60
<i>Priacanthus arenatus</i> Cuvier, 1829- bigeye	2.12
<i>Pristiglenys alta</i> (Gill, 1862)- short bigeye	6.01
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	4.95

Dive Site: Georgia, Outside Georgia MPA; Target GA-2; 61 m; ROV 18-19, UNCW 589; 20-V-18-1

<i>Ptereleotris</i> sp.- dartfish	0.35
<i>Rypticus maculatus</i> Holbrook, 1855- whitespotted soapfish	1.77
<i>Seriola rivoliana</i> Valenciennes, 1833- almaco jack	1.77
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	8.13
<i>Serranus baldwini</i> (Evermann & Marsh, 1899)- lantern bass	4.24
<i>Serranus phoebe</i> Poey, 1851- tattler	10.43
<i>Serranus</i> sp.- sea bass	0.35
Scorpaeniformes	
<i>Pontinus rathbuni</i> Goode & Bean, 1896- highfin scorpionfish	0.18
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	22.98
Scorpaenidae- scorpionfish	0.53
Tetraodontiformes	
<i>Balistes capriscus</i> Gmelin, 1789- grey triggerfish	0.35
<i>Canthigaster</i> sp.- puffer	14.50
<i>Sphoeroides</i> sp.- puffer	0.18
<i>Sphoeroides spengleri</i> (Bloch, 1785)- bandtail puffer	0.18
UNKNOWN	1.41

Dive Site: Georgia, Outside Georgia MPA; Target GA-1; 70 m; ROV 18-20, UNCW 590; 20-V-18-2

General Location and Dive Track:



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: NancyFoster_10_15_GeorgiaEast_bag.bag

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/20/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 357

No. DVD: 2

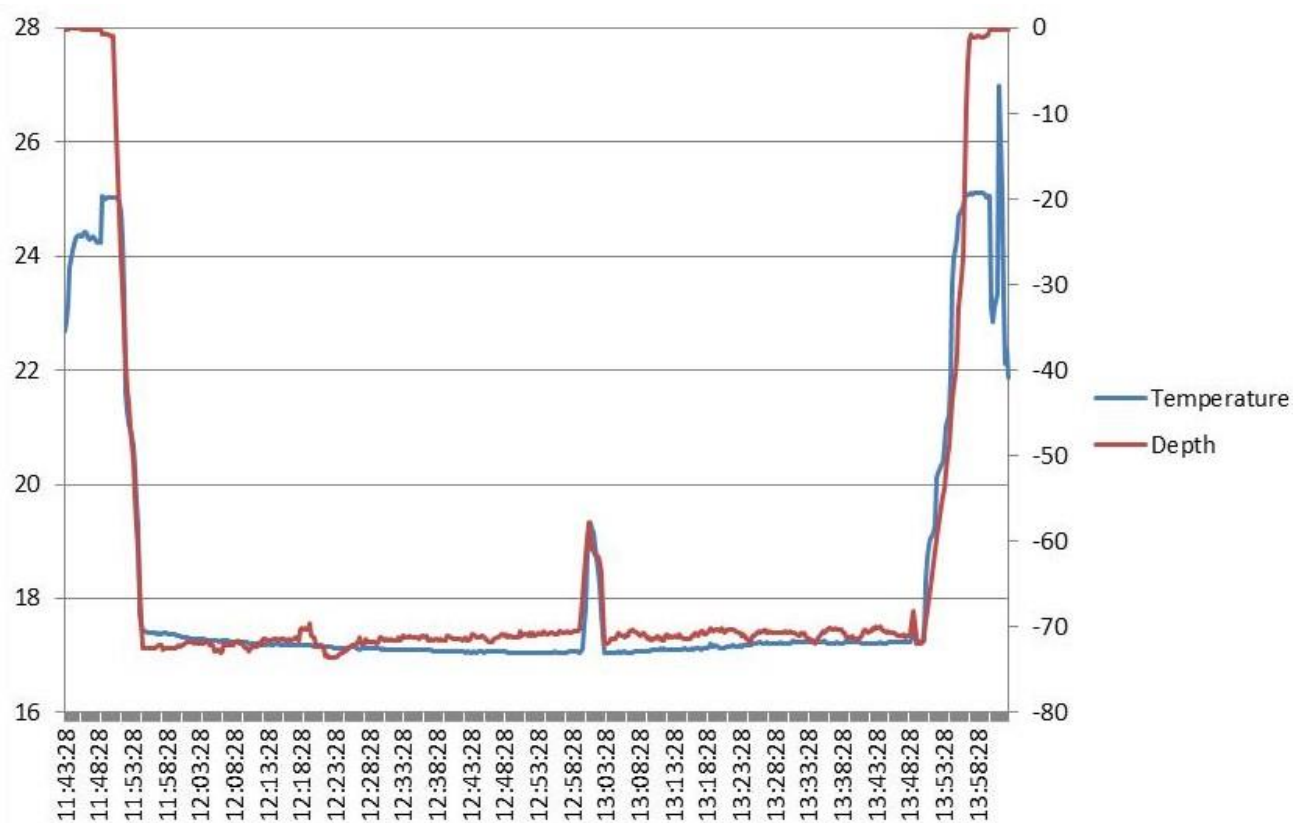
No. Hard Drive: 1

Dive Site: Georgia, Outside Georgia MPA; Target GA-1; 70 m; ROV 18-20, UNCW 590; 20-V-18-2

Dive Data:

Minimum Bottom Depth (m):	57.6	Total Transect Length (km):	0.825				
Maximum Bottom Depth (m):	74.3	Surface Current (kn):	0.2				
On Bottom (Time- EDST):	11:54	On Bottom (Lat/Long):	31.5442°N; -79.713°W				
Off Bottom (Time- EDST):	13:49	Off Bottom (Lat/Long):	31.5471°N; -79.7064°W				
Physical (bottom); Temp (°C):	17.4	Salinity:	N/A	Visibility (m):	5	Current (kn):	0.75

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-20 are as follows: Depth Maximum: 73.6 m, Temperature: 17-19.3 °C.

Dive Site: Georgia, Outside Georgia MPA; Target GA-1; 70 m; ROV 18-20, UNCW 590; 20-V-18-2

Dive Imagery:



Figure 1: -74.7 m
Hermit crab.



Figure 2: -73.1 m
Stout moray eel with papilloma-like warts on head and inside mouth. Could be granulomatous dermatitis (*Mycobacterium* sp.) that is known in captive populations of moray eels.



Figure 3: -72.8 m
School of red snapper on rock ledge habitat. 39 were counted on the dive.



Figure 4: -72.9 m
Human debris.

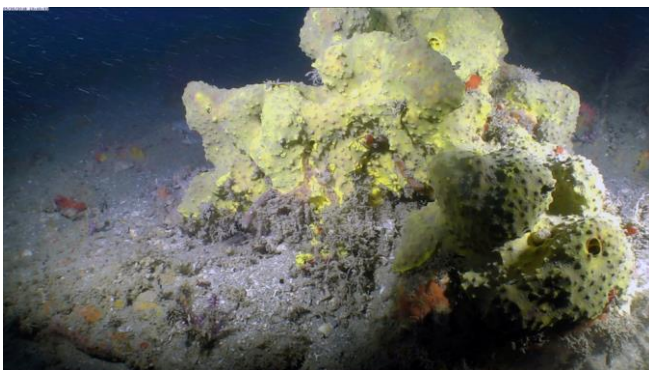


Figure 5: -72.7 m
Yellow wart sponge (*Aiolochoxia crassa*)

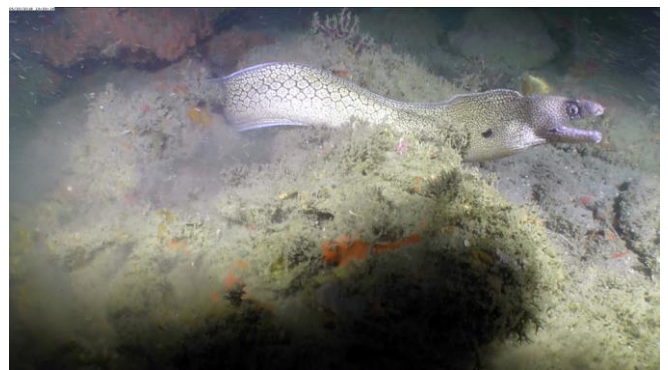


Figure 6: -72.2 m
Reticulate moray eel.

Dive Site: Georgia, Outside Georgia MPA; Target GA-1; 70 m; ROV 18-20, UNCW 590; 20-V-18-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 20-V-18-2; ROV 18-20, UNCW Dive 590; Georgia, Outside Georgia MPA, GA1, 70 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (green; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital still camera working for transects. Had to stop down photos because of turbidity, went to screen grabs.

Site Description/Habitat/Biota:

Depth range: 73.3- 75 m

MB map shows NE-SW oriented ridge, 69 m top, 71 m east base (MB shows 4 m shallower than the ROV groundtruth); transect head NE along ridge. Nearest port 70 nmi away.

Weather- Cloudy, seas 3 ft swell from S, wind 12 kn from 159 dg, air- 24.3 C, surface water- 25.40 C, salinity- 35.92 PSU, current- 0.2 to 356 dg.

11:48- Launch

11:55- On bottom- 74.8 m; visibility variable- 1-3-5 m, current- ½ kn from S.

58 m west of ridge, flat coarse sand and rubble, low relief rock, 2 ft bamboo sticks (*Spartina?*), hermit crab, plastic bag debris; heading SE to east slope of ridge. Bigeye, tatlers, *Sargassum* detritus, lionfish, *Antipathes* fan.

12:04- Top edge of ridge on MB, 74.8 m, head NE along ridge, *Narcissia trigonaria*, rock hard bottom, no ledge yet, low relief, low slope, low rugosity, rock ledges, flat rock, 25 cm relief, 74 m, *Spirastrellidae*, hermit crab, yellow encrusting sponge, *Aiolochoia crassa*, 20 cm *Antipatharia* fan common, red snapper, lionfish, red snapper, hydroids, *Aiolochoia crassa*, 10+ red snapper. *Holothuria lentiginosa enodis*. Off ridge on

Dive Site: Georgia, Outside Georgia MPA; Target GA-1; 70 m; ROV 18-20, UNCW 590; 20-V-18-2

plateau, red snappers.

12:20- back on edge, 74 m, top of ridge; base of ridge- 75 m. Visibility variable 1-3 m. Scamp, school of Red snapper- dozens, low diversity and density of biota, low relief <25 cm, mostly flat hardbottom, scamp.

12:35- On ledge, 25 cm, slipper lobster, stout eel papilloma warts on head, solitary corals, dozen+ red snapper, human debris, lionfish, *P. aya*, spotfin butterfly, scamp, *Erylus*, Cubbyu, fishing line.

12:59- lost video, power back, 13 m off bottom.

13:03- On ridge edge, 73.3 m, numerous red snapper, Corallimorpharia, gag, scamp, lionfish, thin rock slabs, undercut 25 cm relief, 10 cm thick, long line, pipe with eel, fishing line.

13:24- 73.4 m, top edge, thin rock slabs, fishing line, 5 m vis, spotted eel, *Aiolochoia crassa*, *Filograna*.

13:37- top edge, school red snapper, *Erylus* large colony, cable, *Diodogorgia*.

13:48- lost video feed, video back.

13:49- 73.5 m, east slope of ridge, end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- Solitary corals

Antipatharia coral- *Stichopathes luetkeni*, *Antipathes furcata*, *Antipathes* sp.

Gorgonia coral- *Diodogorgia* sp.

Corallimorpharia

Hydroida

Porifera- encrusting orange and yellow, Spirastrellidae, yellow sphere, yellow Clathriidae?, *Ircinia* sp., *Ircinia campana*, DMST, Axinellida, *Aiolochoia crassa*, *Erylus* sp.

Annelida- *Filograna* sp.

Decapoda- hermit crabs, *Stenorhynchus seticornis*, *Scyllarides nodifer*

Echinodermata- *Narcissia trigonaria*, *Holothuria lentiginosa enodis*

Ascidiacea- Didemnidae

Algae- none

Diseased eel- papilloma warts

Herbst, L. H., Costa, S. F., Weiss, L. M., Johnson, L. K., Bartell, J., Davis, R., Walsh, M., Levi, M. (2001). Granulomatous skin lesions in moray eels caused by a novel Mycobacterium species related to Mycobacterium triplex. Infect Immun, 69(7), 4639-4646. doi:10.1128/IAI.69.7.4639-4646.2001

Human Debris:

Fishing line- common; human debris- common, plastic, cable

Dive Site: Georgia, Outside Georgia MPA; Target GA-1; 70 m; ROV 18-20, UNCW 590; 20-V-18-2

CPCe Percent Cover Analysis:

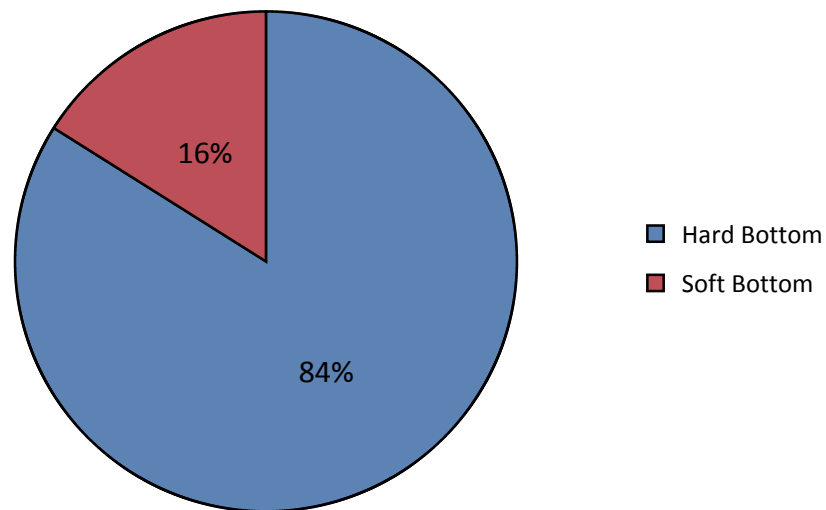


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-20. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

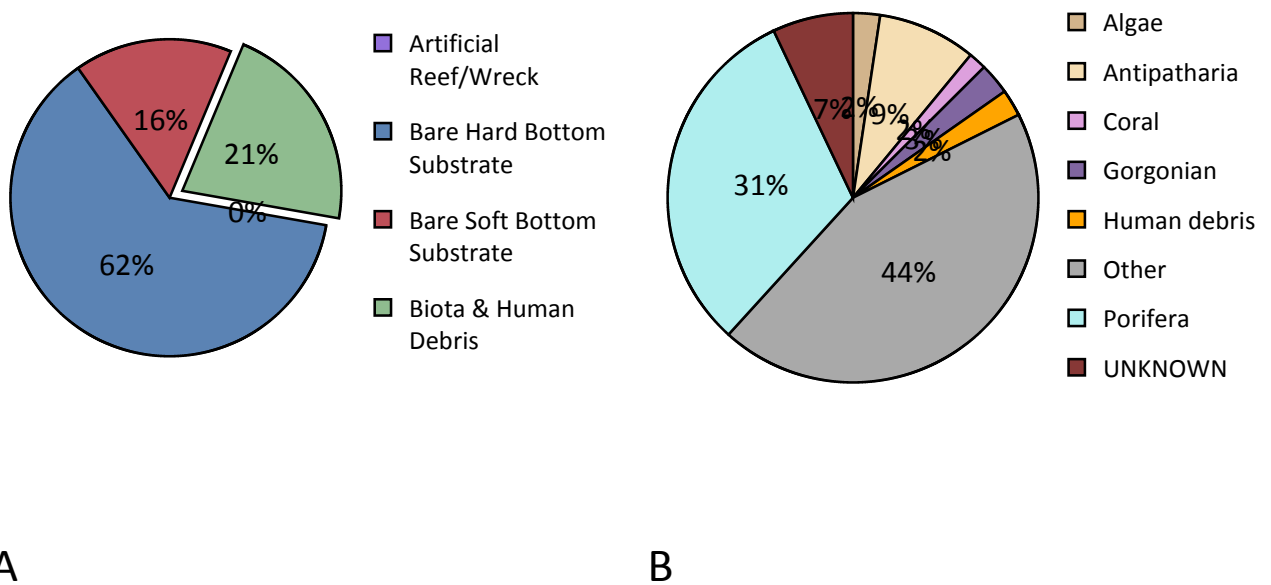


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-20. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: Georgia, Outside Georgia MPA; Target GA-1; 70 m; ROV 18-20, UNCW 590; 20-V-18-2

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-20.

	ROV 18-20	Note
	%	
Biota	20.99%	X
Algae	0.50%	X
Algae- Unid.	0.08%	
Ochrophyta		X
<i>Sargassum</i> sp.		X
Rhodophyta	0.42%	
Porifera	6.72%	X
Demospongiae	6.72%	X
<i>Aiolochoira crassa</i> (Hyatt, 1875)	0.34%	X
<i>Aplysina</i> sp.	0.08%	
Axinellidae		X
<i>Clathria</i> sp.	0.08%	
<i>Corallistes</i> sp.		X
Demospongiae- unid. sp.	4.11%	X
<i>Erylus</i> sp.		X
<i>Ircinia campana</i> (Lamarck, 1814)		X
Microcionidae syn. Clathriidae		X
Spirastrellidae	1.93%	X
Tetractinellida	0.17%	
Coral	0.34%	X
Coral- Scleractinia	0.34%	X
<i>Phyllangia americana</i> Milne Edwards & Haime, 1849	0.08%	
Scleractinia- unid cup	0.25%	X
Gorgonian	0.59%	X
Alcyonacea - gorgonian	0.59%	X
Alcyonacea- gorgonian	0.08%	
<i>Diodogorgia</i> sp.	0.50%	X
Antipatharia	1.85%	X
Antipatharia	1.85%	X
Antipatharia unid. sp.	1.85%	X
<i>Antipathes atlantica</i> Gray, 1857		X
<i>Stichopathes luetkeni</i> Brook, 1889		X
Other	11.00%	X
Hydrozoa	4.53%	X
Hydroidolina	4.53%	X

Dive Site: Georgia, Outside Georgia MPA; Target GA-1; 70 m; ROV 18-20, UNCW 590; 20-V-18-2

Anthozoa - Non Coral		X
Corallimorpharia		X
Annelida	1.18%	X
Annelida Unid.	1.09%	
<i>Filograna</i> sp.		X
Sabellidae	0.08%	
<i>Spirobranchus giganteus</i> (Pallas, 1766)		X
Terebellidae		X
Arthropoda		X
Anomura		X
Decapoda		X
Echinodermata	0.17%	X
<i>Holothuria (Vaneyothuria) lentiginosa enodis</i> Miller & Pawson, 1979	0.17%	X
<i>Narcissia trigonaria</i> Sladen, 1889		X
Chordata - Vertebrate	2.60%	X
Actinopterygii	2.60%	X
UNKNOWN	1.51%	X
Detritus	1.01%	
Bare Substrate	78.51%	
Bare Hard Bottom	62.47%	
Bare Hard Bottom	62.47%	
Bare rock, pavement, boulder, ledge	61.04%	
Bare rubble/cobble	1.43%	
Bare Soft Bottom	16.04%	
Human debris	0.50%	X
Human debris	0.50%	X
Human debris- cans/bottles		X
Human debris- fishing line		X
Human debris- net	0.17%	
Human debris- other	0.34%	X
Human debris- plastic		X
Grand Total	100.00%	X

Dive Site: Georgia, Outside Georgia MPA; Target GA-1; 70 m; ROV 18-20, UNCW 590; 20-V-18-2

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-20.

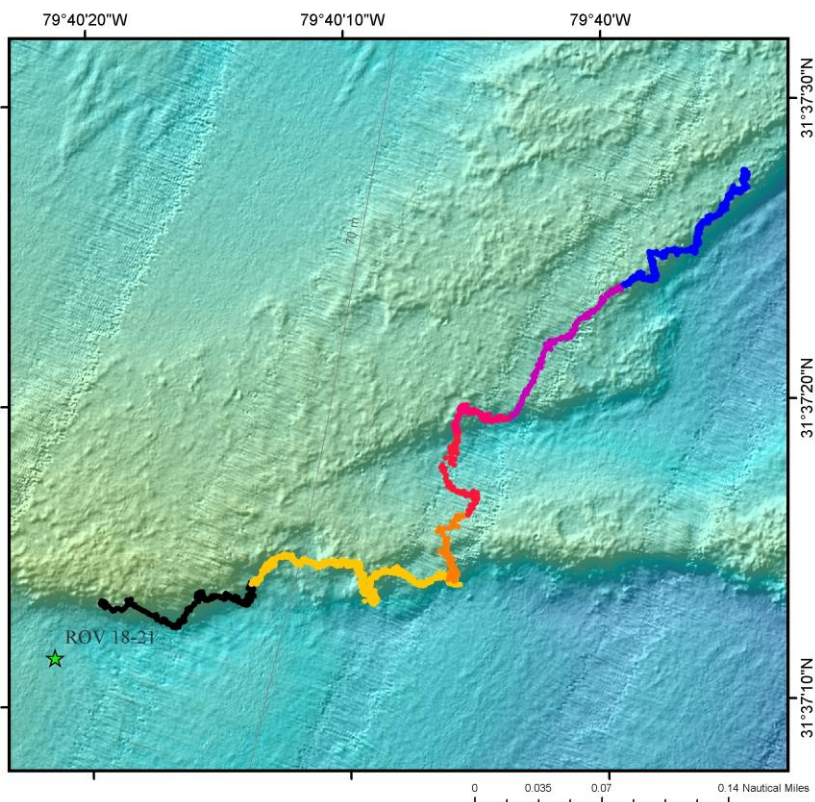
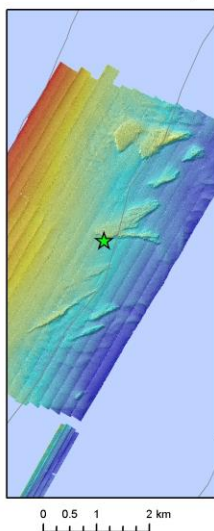
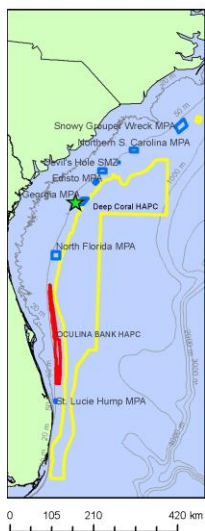
Taxa, Author- Common name	ROV 18-20
Actinopterygii	
Anguilliformes	
<i>Gymnothorax</i> sp.- moray eel	1.31
<i>Muraena retifera</i> Goode & Bean, 1882- reticulate moray	0.44
<i>Muraena robusta</i> Osório, 1911- stout moray	1.74
Muraenidae- moray eel	2.18
Aulopiformes	
<i>Synodus</i> sp.- lizardfish	0.44
Perciformes	
<i>Apogon pseudomaculatus</i> Longley, 1932- twospot cardinalfish	0.44
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	0.44
<i>Calamus</i> sp.- porgy	1.31
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	12.20
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	8.71
<i>Chromis enchrysur</i> Jordan & Gilbert, 1882- yellowtail reeffish	2.61
<i>Chromis scotti</i> Emery, 1968- purple reeffish	0.87
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	3.49
<i>Halichoeres</i> sp.- wrasse	0.87
<i>Holacanthus</i> sp.- angelfish	8.28
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	4.36
<i>Lutjanus campechanus</i> (Poey, 1860)- red snapper	14.38
<i>Mycteroperca microlepis</i> (Goode & Bean, 1879)- gag grouper	0.87
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	5.23
<i>Pagrus pagrus</i> (Linnaeus, 1758)- red porgy	1.31
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	137.69
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye	14.38
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	16.12
<i>Seriola</i> sp.- amberjack	0.87
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	3.05
<i>Serranus phoebe</i> Poey, 1851- tattler	6.97
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	58.39
Scorpaenidae- scorpionfish	0.44
Tetraodontiformes	
<i>Balistes capriscus</i> Gmelin, 1789- grey triggerfish	2.61
<i>Canthigaster</i> sp.- puffer	25.27
<i>Sphoeroides spengleri</i> (Bloch, 1785)- bandtail puffer	3.05
UNKNOWN	0.44

Dive Site: Georgia, Outside Georgia MPA; Target GA-3; 70 m; ROV 18-21, UNCW 591; 20-V-18-3

General Location and Dive Track:

Georgia, Outside Georgia MPA;
Target GA-3; 70 m; ROV 18-21,
UNCW 591; 20-V-18-3

- ★ ROV 18-21
- ★ Mohawk ROV
- ★ CTD
- Oculina HAPC
- MPA
- Deep Coral HAPC
- 201805203 - Transect 01
- 201805203 - Transect 02
- 201805203 - Transect 03
- 201805203 - Transect 04
- 201805203 - Transect 05
- 201805203 - Transect 06
- ROV Track



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: NancyFoster_14_08_MPA_GA

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/20/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 116

No. DVD: 2

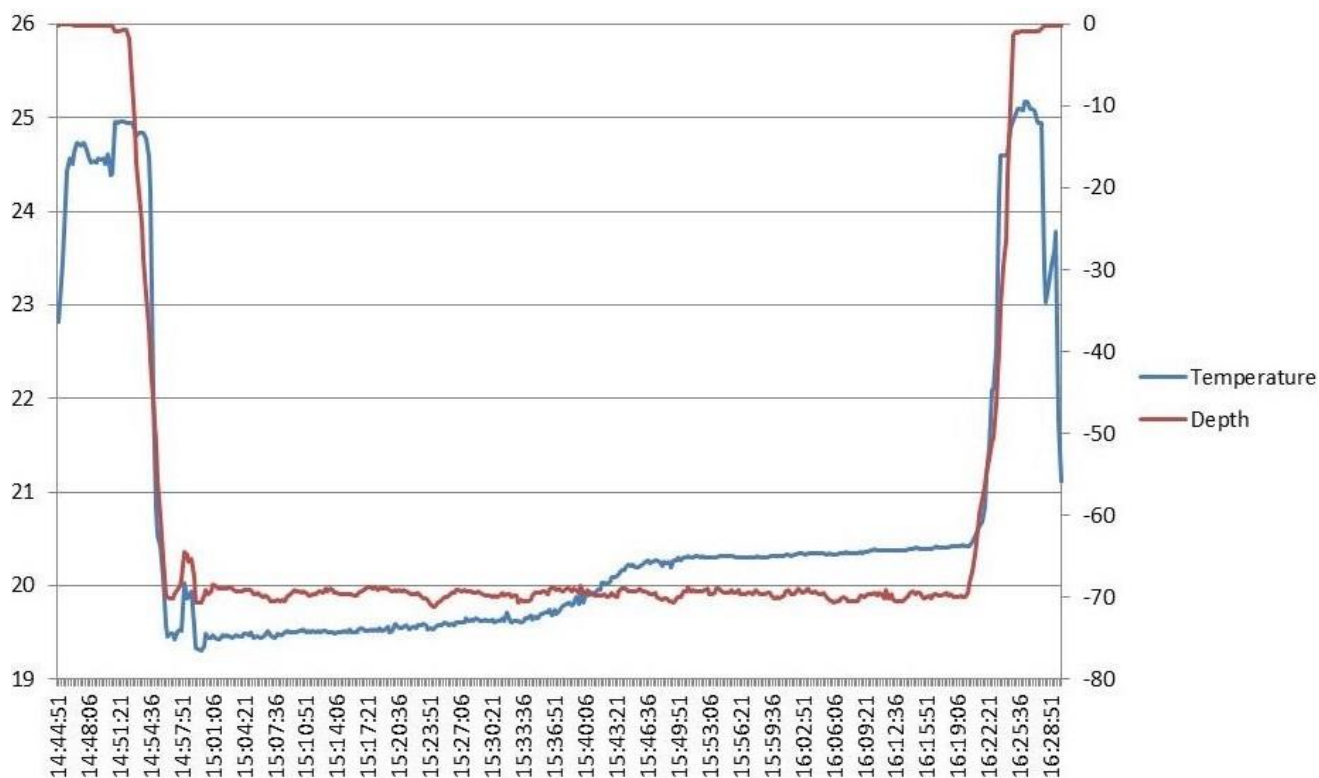
No. Hard Drive: 1

Dive Site: Georgia, Outside Georgia MPA; Target GA-3; 70 m; ROV 18-21, UNCW 591; 20-V-18-3

Dive Data:

Minimum Bottom Depth (m):	65.3	Total Transect Length (km): 0.952		
Maximum Bottom Depth (m):	72.1	Surface Current (kn): 0.2		
On Bottom (Time- EDST):	14:56	On Bottom (Lat/Long): 31.6204°N; -79.6722°W		
Off Bottom (Time- EDST):	16:19	Off Bottom (Lat/Long): 31.6242°N; -79.6652°W		
Physical (bottom); Temp (°C):	19.5	Salinity: N/A	Visibility (m): 5	Current (kn): 0.1

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-21 are as follows: Depth Maximum: 71.1 m, Temperature: 19.3-20.4 °C.

Dive Site: Georgia, Outside Georgia MPA; Target GA-3; 70 m; ROV 18-21, UNCW 591; 20-V-18-3

Dive Imagery:



Figure 1: -71.1 m
Human debris.



Figure 2: -70.9 m
Bubble wrap sponge (Heteroscleromorpha?)



Figure 3: -72.2 m
Starfish (*Goniaster tessalata*), fire worm (*Hermodice carunculata*), and unid. gorgonian.

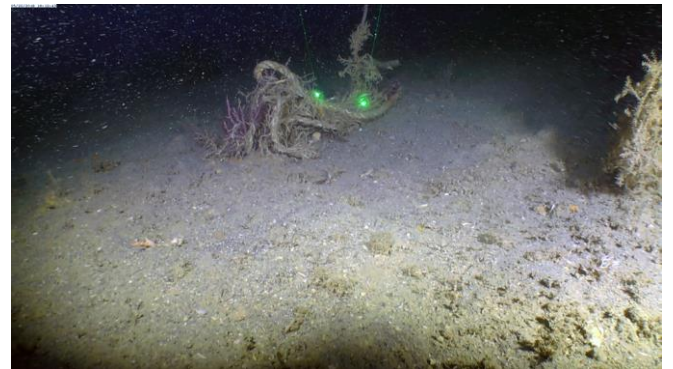


Figure 4: -71.8 m
Rope or anchor line wrapped on gorgonian.



Figure 5: -71.7 m
Human debris was common at this site- fishing line, abundant plastic bags, cups.



Figure 6: -71.2 m
Whelk shell that appears to have been eaten.

Dive Site: Georgia, Outside Georgia MPA; Target GA-3; 70 m; ROV 18-21, UNCW 591; 20-V-18-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 20-V-18-3; ROV 18-21, UNCW Dive 591; Georgia, Outside Georgia MPA, GA3, 70 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (green; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital still camera working for transects. Used digital still camera and screen grabs for photo transects.

Site Description/Habitat/Biota:

Depth range: 71- 73 m

MB map shows flat topped plateau, bottom of escarpment- 71 m, top- 68.8 m; transect to east along E-W escarpment on south side.

Weather- Cloudy, seas 3 ft swell from S, wind 9 kn from 202 dg, air- 25.2 C, surface water- 25.11 C, salinity- 35.83 PSU, current- 0.2 to 84 dg.

14:50- Launch

14:56- On bottom- 72 m; visibility 5 m, current- 0.5 kn from W.

73 m- south base of escarpment, coarse sand, slope- low slope, low relief, low rugosity, hard bottom <25 cm relief, human debris- coffee can, heading E along ridge, 71 m, hydroids, lionfish, sediment, patchy hard bottom, silty, low diversity, low density biota, orange sponges, red snapper, amberjack, short bigeye, plastic cup.

15:17- 71 m, on slope, flat sand, hard bottom, small ½ m ledge, dead *Oculina varicosa*, thick branches; back on hard bottom, flat, low relief, low rugosity, low diversity biota. Lionfish, mostly hydroids, encrusting small orange and yellow sponges, few small 15 cm pits in rock, *Sargassum* detritus; base of slope, 73 m, mostly sediment; head N back upslope. *Diodogorgia*, short 25 cm ledge, mostly sediment, patchy flat hardbottom,

Dive Site: Georgia, Outside Georgia MPA; Target GA-3; 70 m; ROV 18-21, UNCW 591; 20-V-18-3

whelk with hermit crab, *Stichopathes*, plastic debris, lionfish, plastic bag.

15:34- Change heading to N to second E-W ridge, 160 m away.

15:38- 20 cm bubble wrap sponge (warty surface- Aka?), in sand valley between ridges, 72 m.

15:42- 71.5 m, base of second ridge, change heading to ENE along ridge 2. Flat hard bottom, sediment, hydroids dominate, top of ridge on MB, 71 m, sediment and hardbottom, plastic trash bag, *Filograna*. What appears to be escarpment in MB, is flat sand and sparse flat hardbottom.

15:49- Head to ridge 3, NE-SW ridge that appears more relief in MB, 70 m- top, 72 m- east base.

15:56- 71.3 m, top of Ridge 3, flat sand rubble, hard bottom, low relief rock, 25 cm, butterfly fish, *Stichopathes*, on slope- 71.5 m, low relief hardbottom, *Diodogorgia*, *Filograna*, *Stichopathes*, plastic trash, 71 m, P. aya, 25 cm rock, lionfish, hydroids, *Narcissia trigonaria*. 72.2 m- on lower slope. Same habitat, rope, plastic bag, *Goniaster tessellatus*, *Hermodice carunculata*, porgy, scamp.

16:20- 71.6 m, end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- Solitary corals

Antipatharia coral- *Stichopathes luetkeni*

Gorgonia coral- *Diodogorgia* sp.

Hydroida

Porifera- encrusting orange and yellow, bubble wrap demosponge (Aka?)

Annelida- *Filograna* sp.

Echinodermata- *Narcissia trigonaria*, *Goniaster tessellatus*

Algae- none

Human Debris:

Fishing line; human debris- abundant- plastic bags, cups

Dive Site: Georgia, Outside Georgia MPA; Target GA-3; 70 m; ROV 18-21, UNCW 591; 20-V-18-3

CPCe Percent Cover Analysis:

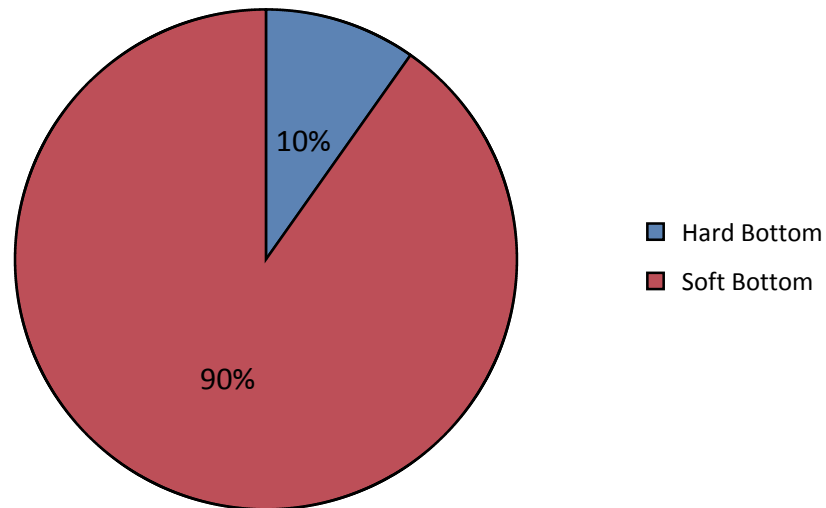


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-21. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

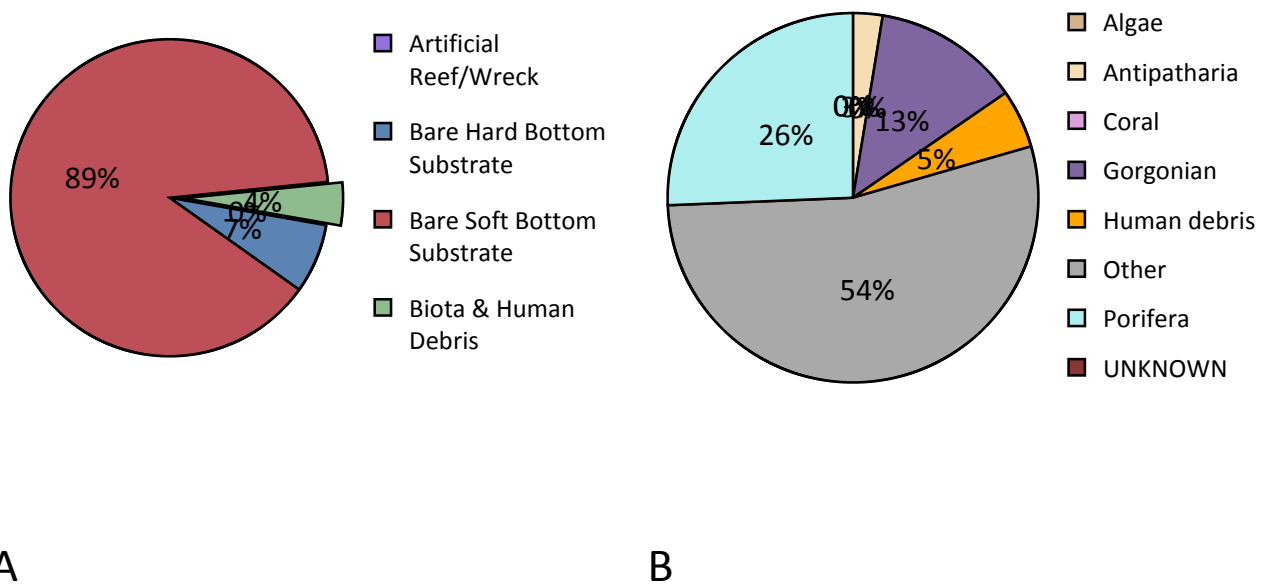


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-21. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: Georgia, Outside Georgia MPA; Target GA-3; 70 m; ROV 18-21, UNCW 591; 20-V-18-3

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-21.

	ROV 18-21	
	%	Note
Biota	4.16%	X
Algae		X
Ochrophyta		X
<i>Sargassum</i> sp.		X
Porifera	1.12%	X
Demospongiae	1.12%	X
Demospongiae- unid. sp.	0.22%	X
Heteroscleromorpha- bubble wrap sponge	0.67%	X
<i>Ircinia campana</i> (Lamarck, 1814)		X
<i>Ircinia</i> sp.	0.11%	
<i>Niphates</i> sp.	0.11%	
Coral		X
Coral- Scleractinia		X
Scleractinia- standing dead		X
Gorgonian	0.56%	X
Alcyonacea - gorgonian	0.56%	X
<i>Diodogorgia</i> sp.	0.56%	X
<i>Titanideum frauenfeldii</i> (Kölliker, 1865)		X
Antipatharia	0.11%	X
Antipatharia	0.11%	X
<i>Stichopathes luetkeni</i> Brook, 1889	0.11%	X
Other	2.36%	X
Hydrozoa	0.56%	X
Hydroidolina	0.56%	X
Anthozoa - Non Coral		X
Corallimorpharia		X
Annelida	0.11%	X
Annelida Unid.	0.11%	
<i>Filograna</i> sp.		X
<i>Hermodice carunculata</i> (Pallas, 1766)		X
Bryozoa		X
Arthropoda	0.22%	X
Anomura		X
Paguroidea	0.22%	
Mollusca		X

Dive Site: Georgia, Outside Georgia MPA; Target GA-3; 70 m; ROV 18-21, UNCW 591; 20-V-18-3

<i>Busycon</i> sp.		X
Echinodermata	0.11%	X
<i>Goniaster tessellatus</i> (Lamarck, 1816)	0.11%	X
<i>Narcissia trigonaria</i> Sladen, 1889		X
Chordata - Vertebrate		X
Actinopterygii		X
Detritus	1.35%	
Bare Substrate	95.62%	
Bare Hard Bottom	7.08%	
Bare Hard Bottom	7.08%	
Bare rock, pavement, boulder, ledge	6.63%	
Bare rubble/cobble	0.45%	
Bare Soft Bottom	88.54%	
Human debris	0.22%	X
Human debris	0.22%	X
Human debris- anchor line		X
Human debris- fishing line		X
Human debris- other	0.22%	X
Human debris- plastic		X
Grand Total	100.00%	X

Dive Site: Georgia, Outside Georgia MPA; Target GA-3; 70 m; ROV 18-21, UNCW 591; 20-V-18-3

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-21.

Taxa, Author- Common name	ROV 18-21
Actinopterygii	
Anguilliformes	
Muraenidae- moray eel	0.47
Aulopiformes	
<i>Synodus</i> sp.- lizardfish	0.47
Batrachoidiformes	
<i>Opsanus</i> sp.- toadfish	0.47
Perciformes	
<i>Apogon pseudomaculatus</i> Longley, 1932- twospot cardinalfish	0.94
<i>Calamus</i> sp.- porgy	0.47
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	2.81
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	2.34
<i>Equetus lanceolatus</i> (Linnaeus, 1758)- jackknife fish	0.47
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	2.34
<i>Halichoeres</i> sp.- wrasse	0.47
<i>Lutjanus campechanus</i> (Poey, 1860)- red snapper	2.81
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	1.40
<i>Pagrus pagrus</i> (Linnaeus, 1758)- red porgy	0.47
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	1.87
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye	13.56
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	2.34
<i>Seriola</i> sp.- amberjack	0.47
<i>Serranus notospilus</i> Longley, 1935- saddle bass	0.94
<i>Serranus phoebe</i> Poey, 1851- tattler	10.29
Sparidae- porgy	0.47
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	24.32
Tetraodontiformes	
<i>Canthigaster</i> sp.- puffer	13.10
<i>Sphoeroides spengleri</i> (Bloch, 1785)- bandtail puffer	2.81
UNKNOWN	0.47

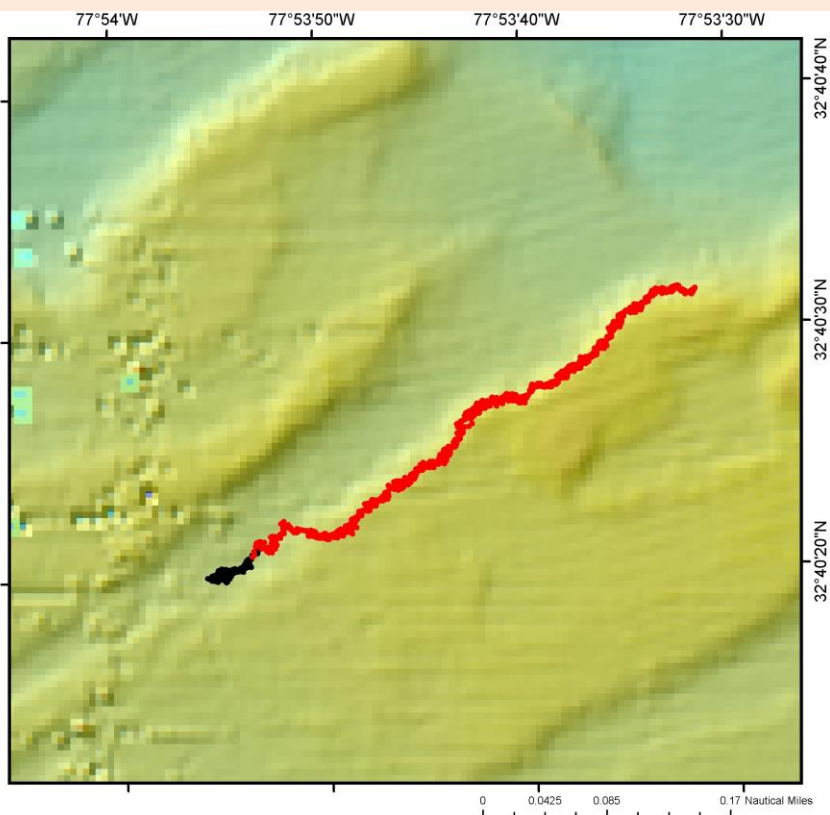
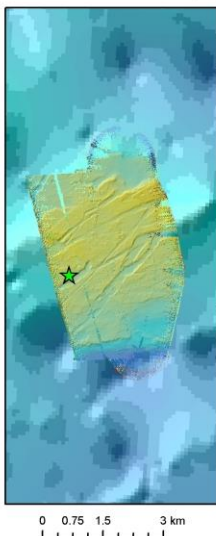
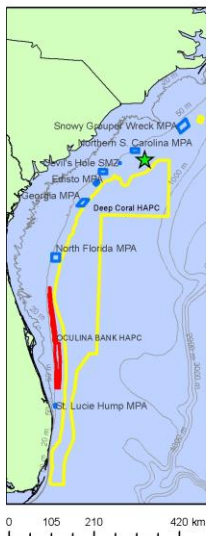
Dive Site: South Carolina, Outside Northern South Carolina MPA; Deep Iceberg Scour; 250 m; ROV 18-22, UNCW 592; 21-V-18-1

General Location and Dive Track:

South Carolina, Outside
Northern South Carolina MPA;
Deep Iceberg Scour; 250 m;
ROV 18-22, UNCW 592; 21-V-18-1

- ★ ROV 18-22
- ★ Mohawk ROV
- ★ CTD
- 201805211 - Transect 01
- ROV Track

- Oculina HAPC
- MPA
- Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Pisces_2018_NEW_SC_Mound_8m_Grid

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/21/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 291

No. DVD: 2

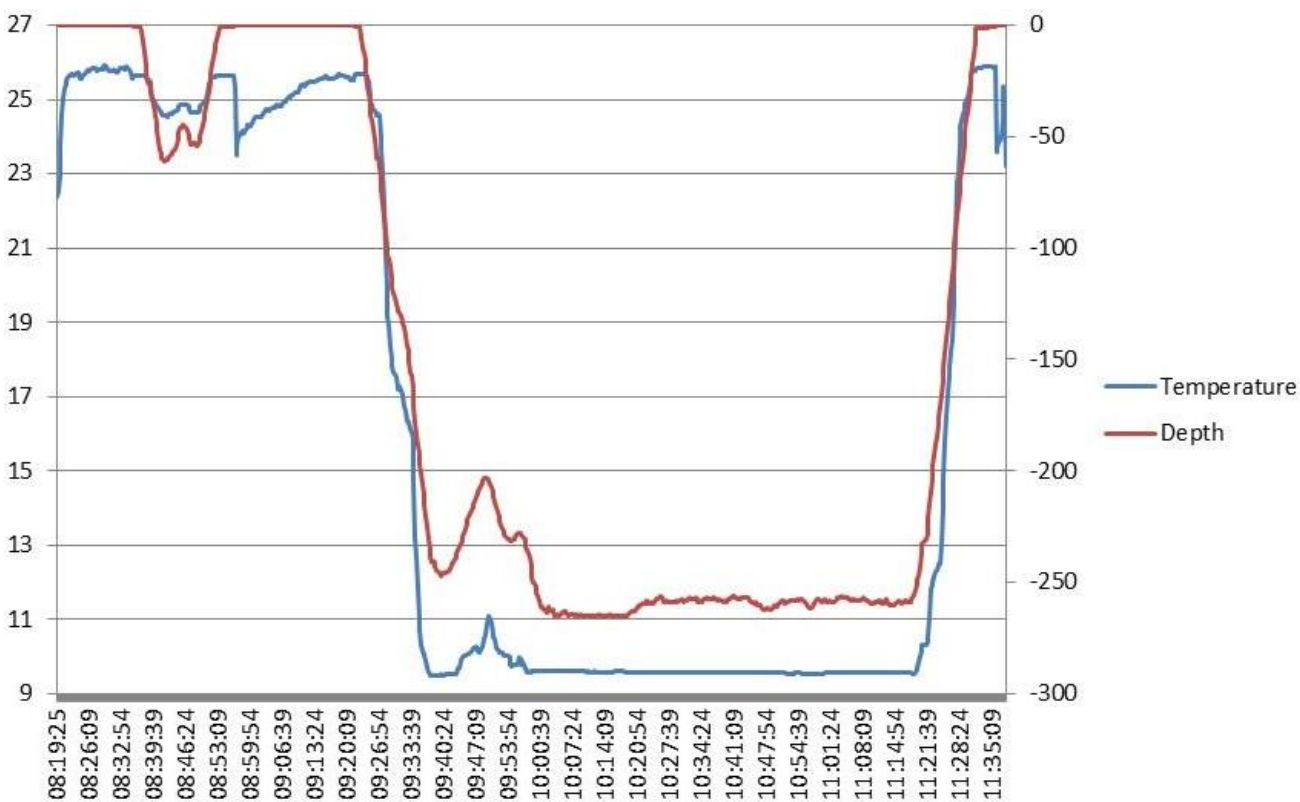
No. Hard Drive: 1

Dive Site: South Carolina, Outside Northern South Carolina MPA; Deep Iceberg Scour; 250 m; ROV 18-22, UNCW 592; 21-V-18-1

Dive Data:

Minimum Bottom Depth (m):	256.9	Total Transect Length (km):	0.633
Maximum Bottom Depth (m):	266	Surface Current (kn):	1.6
On Bottom (Time- EDST):	10:02	On Bottom (Lat/Long):	32.6722°N; -77.8989°W
Off Bottom (Time- EDST):	11:17	Off Bottom (Lat/Long):	32.6754°N; -77.8922°W
Physical (bottom); Temp (°C):	9.6	Salinity: N/A	Visibility (m): 30 Current (kn): 1

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-22 are as follows: Depth Maximum: 265.2 m, Temperature: 9.5-9.6 °C.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Deep Iceberg Scour; 250 m; ROV 18-22, UNCW 592; 21-V-18-1

Dive Imagery:

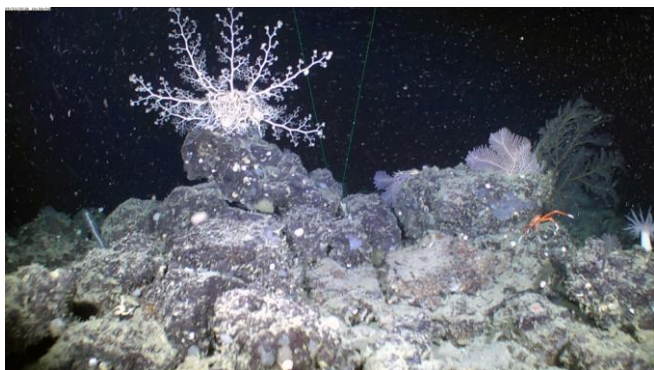


Figure 1: -259.6 m
Basketstar on rock cobble at edge of deep ice berg scour.



Figure 2: -260.5 m
Unidentified gorgonian and sea anemone.



Figure 3: -259.9 m
Deepwater glass sponge (*Aphrocallistes beatrix*) which has potent anti-cancer compounds.



Figure 4: -262.6 m
Stylaster coral.



Figure 5: -258.1 m
Asteroidea apparently eating a gorgonian.



Figure 6: -258.8 m
Large black coral (*Leiopathes* sp.).

Dive Site: South Carolina, Outside Northern South Carolina MPA; Deep Iceberg Scour; 250 m; ROV 18-22, UNCW 592; 21-V-18-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 21-V-18-1; ROV 18-22, UNCW Dive 592; South Carolina, outside Northern South Carolina MPA, Deep Ice Berg Scour Site, 250 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (green; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital still camera stopped working at depth. Used video frame grabs for transect photos.

Site Description/Habitat/Biota:

Depth range: 256- 267 m

New Pisces MB map shows several straight scars (ice berg scars?); largest 2700 m long, 130 m wide, 15 m deep; NE part of map with deep hole 250 top, 278 m base. Transect NE along scour by deep hole, south edge 255 m, 265 m in bottom, 88 m wide.

Weather- Sunny, seas 2-4 ft swell from SE, wind 10 kn from 197 dg, air- 25.62 C, surface water- 25.70 C, salinity- 35.89 PSU, current- 1.9 kn to 37 dg.

8:35- Launch, unable to get to bottom, recovered.

9:21- Launch

9:35- On bottom- 255 m; visibility 5 m, current variable ¼ to ¾ kn from SW.

Wp 1125 m to NE. Ascent took 14 min, drifted 710 m (50 ft/min descent rate). Still camera failed. Drifting 10-20 m off bottom to Wp.

10:01- in scour, 267 m flat sediment with rubble/cobble, 5 cm round phosphoritic limestone, *Stylocidaris*, sea pen, *Cancer* crab, black belly rose fish, green eye, anemone, 15 cm white fan gorgonian, 80% cover

Dive Site: South Carolina, Outside Northern South Carolina MPA; Deep Iceberg Scour; 250 m; ROV 18-22, UNCW 592; 21-V-18-1

rubble/cobble, Primnoid.

10:21- 262 m, slope, Primnoid, Eumunida. 260 m- 1-2 m ledge and outcrops, slimehead, Plumarella, Desmacella blue encrusting sponge, top edge- 259 m, flat rugged rock, Vazella glass sponge, Sagartiidae, Nephtheidae, Laemonema, basketstar, Echiura worm, Cerianthidae, flytrap anemone, Pachastrellidae plate, streamer base.

10:41- top edge, 256 m, 100% rock cobble, small boulders 25 cm, no ledges, Stylaster, rock slabs 2 m diameter, ½ m relief, 254 m, sargassum detritus, Serpulidae worms along rock edges, Aphrocallistes beatrix, Stylaster, several species of asteroids.

11:01- still on upper slope of scour, 260 m, small boulders, same biota, fat starfish, 30 cm Leiopathes.

11:10- on promontory of MB, 262 m, dense Stylaster, rock slabs, boulders, ½ m, yellow fan gorgonian.

11:17- 261 m, end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- Solitary corals

Stylasteridae

Antipatharia coral- *Leiopathes* sp.

Gorgonia coral- 2 spp. White fan, yellow fan

Alcyonacea- Nephtheidae

Actiniaria- Sagartiidae, fly trap anemone

Echiura

Hydroida

Porifera- *Desmacella* (blue) sp., *Vazella*, *Pachastrellidae* (plate), various encrusting, *Aphrocallistes beatrix*

Annelida- Sabellidae, Serpulidae

Decapoda- *Cancer* sp., *Eumunida*, spider crab

Echinodermata- several spp. Asteroids, Gorgonocephalidae,

Human Debris: None.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Deep Iceberg Scour; 250 m; ROV 18-22, UNCW 592; 21-V-18-1

CPCe Percent Cover Analysis:

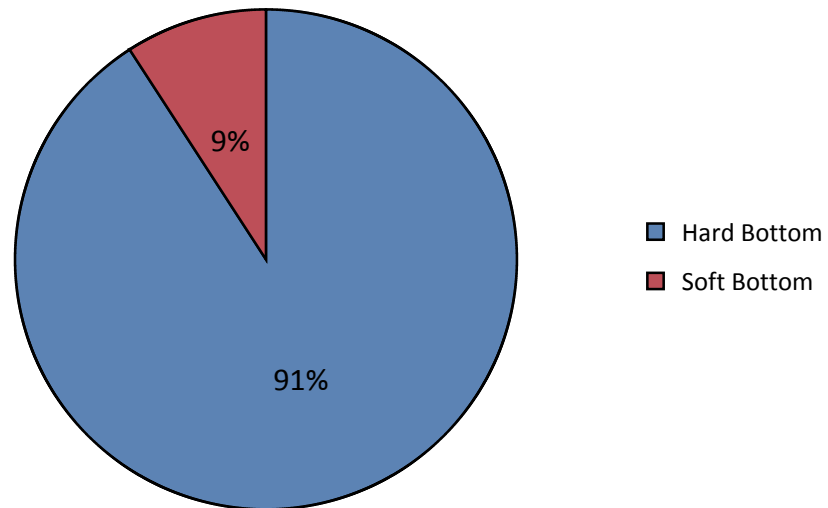


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-22. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

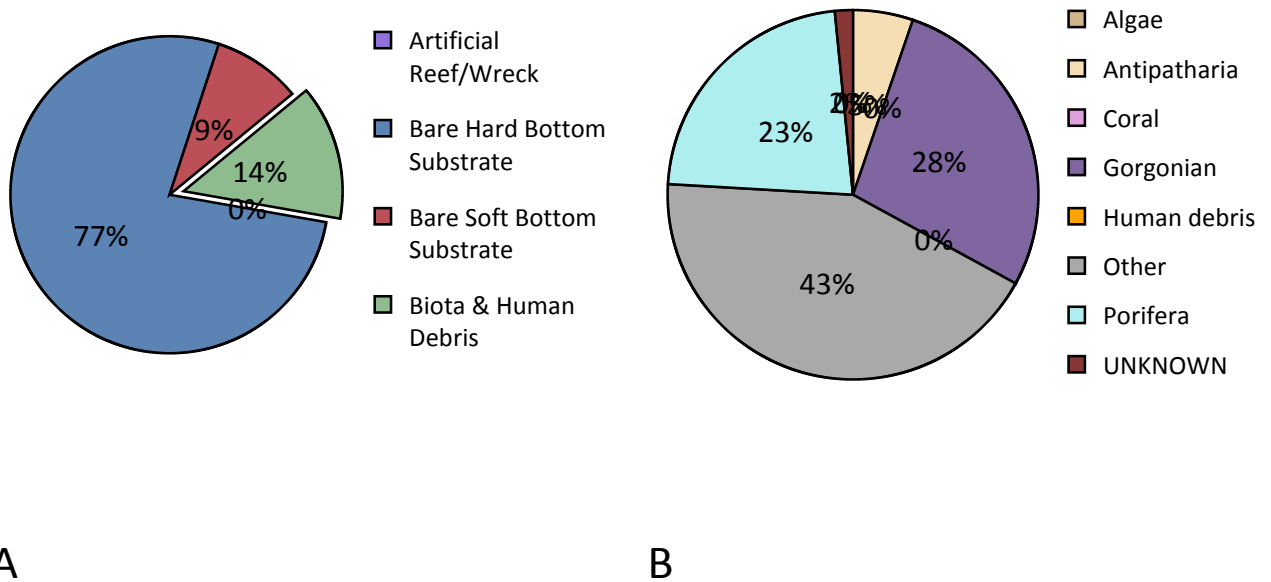


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-22. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Deep Iceberg Scour; 250 m; ROV 18-22, UNCW 592; 21-V-18-1

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-22.

	ROV 18-22	
	%	Note
Biota	13.75%	X
Porifera	3.10%	X
Demospongiae	0.50%	X
Demospongiae- unid. sp.	0.43%	X
<i>Desamcella</i> sp.- blue morph		X
Pachastrellidae	0.07%	X
Hexactinellida	1.22%	X
<i>Aphrocallistes beatrix</i> Gray, 1858	0.07%	X
Hexactinellida	1.15%	
<i>Vazella pourtalesii</i> (Schmidt, 1870)		X
Porifera	1.37%	
Coral		X
Coral- Scleractinia		X
Scleractinia- unid cup		X
Gorgonian	3.82%	X
Alcyonacea - gorgonian	3.82%	X
Alcyonacea- gorgonian	0.50%	X
Gorgonacea- white fan		X
Paramuriceidae		X
Plexauridae- yellow	0.22%	
<i>Plumarella pourtalesii</i> (Verrill, 1883)		X
<i>Plumarella</i> sp.	2.95%	
Primnoidae	0.14%	
Antipatharia	0.72%	X
Antipatharia	0.72%	X
<i>Leiopathes</i> sp.	0.72%	X
Other	6.12%	X
Hydrozoa	1.15%	X
Hydroidolina	0.86%	
<i>Stylaster</i> sp.		X
Stylasteridae	0.29%	
Alcyonacea - Alcyoniina	0.29%	X
Alcyoniina	0.07%	
Nephthidae	0.22%	X
Anthozoa - Non Coral	2.88%	X

Dive Site: South Carolina, Outside Northern South Carolina MPA; Deep Iceberg Scour; 250 m; ROV 18-22, UNCW 592; 21-V-18-1

<i>Actinoscyphia</i> sp.		X
Actinoscyphiidae/Hormathiidae	0.29%	
Cerianthidae	0.07%	X
Pennatulacea		X
Sagartiidae	2.52%	X
<i>Virgularia presbytes</i> Bayer, 1955		X
Annelida	0.22%	X
Echiura		X
Sabellidae	0.07%	
Serpulidae	0.14%	X
Arthropoda	0.29%	X
<i>Cancer borealis</i> Stimpson, 1859		X
<i>Eumunida picta</i> Smith, 1883	0.14%	X
<i>Eumunida</i> sp.		X
Majidae	0.14%	X
Mollusca		X
Pleurotomariidae		X
Echinodermata	0.65%	X
Asteroidea		X
Cidaroidea	0.07%	
Crinoidea	0.22%	
Goniasteridae	0.07%	X
Gorgonocephalidae	0.22%	X
Ophiuroidea		X
<i>Stylocidaris</i> sp.		X
<i>Tamaria</i> sp.	0.07%	
Chordata - Invertebrate	0.07%	
Ascidacea	0.07%	
Chordata - Vertebrate	0.36%	X
Actinopterygii	0.36%	X
UNKNOWN	0.22%	
Bare Substrate	86.25%	
Bare Hard Bottom	77.25%	
Bare Hard Bottom	77.25%	
Bare rock, pavement, boulder, ledge	77.18%	
Bare rubble/cobble	0.07%	
Bare Soft Bottom	9.00%	
Grand Total	100.00%	X

Dive Site: South Carolina, Outside Northern South Carolina MPA; Deep Iceberg Scour; 250 m; ROV 18-22, UNCW 592; 21-V-18-1

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-22.

Taxa, Author- Common name	ROV 18-22
Actinopterygii	
Aulopiformes	
<i>Aulopus</i> sp.- flagfin	0.43
<i>Chlorophthalmus agassizi</i> Bonaparte, 1840- shortnose greeneye	1.30
Beryciformes	
<i>Gephyroberyx darwinii</i> (Johnson, 1866)- big roughy	0.43
<i>Hoplostethus occidentalis</i> Woods, 1973- western roughy	0.86
Gadiformes	
<i>Laemonema barbatulum</i> Goode & Bean, 1883- shortbeard codling	10.81
Perciformes	
Anthiadae- anthiid	18.16
<i>Jeboehlkia gladifer</i> Robins, 1967- bladefin basslet	0.86
<i>Synagrops</i> sp.- lanternbelly	1.30
Scorpaeniformes	
<i>Helicolenus dactylopterus</i> (Delaroche, 1809)- blackbelly rosefish	58.37
UNKNOWN	0.43

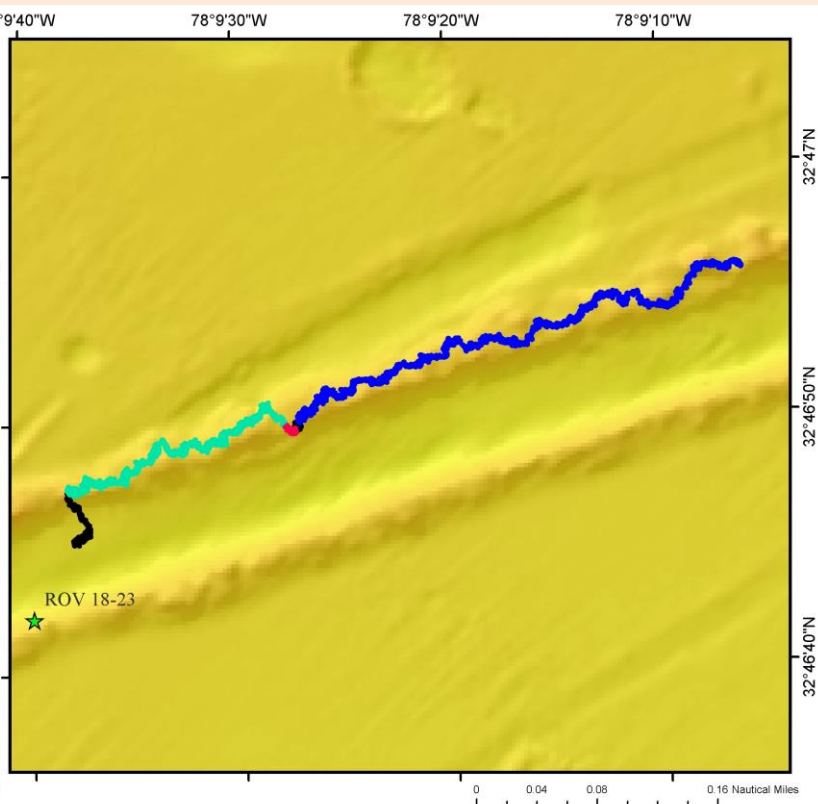
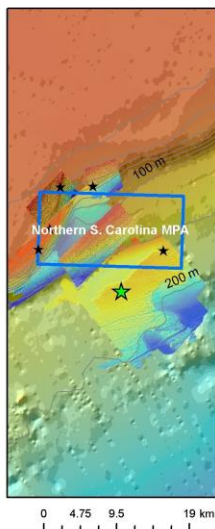
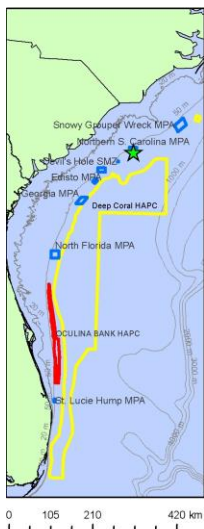
Dive Site: South Carolina, Outside Northern South Carolina MPA; Iceberg Scour SC-2; 165 m; ROV 18-23, UNCW 593; 21-V-18-2

General Location and Dive Track:

South Carolina, Outside Northern South Carolina MPA; Iceberg Scour SC-2; 165 m; ROV 18-23, UNCW 593; 21-V-18-2

- ★ ROV 18-23
- ★ Mohawk ROV
- ★ CTD
- 201805212 - Transect 01
- 201805212 - Transect 02
- 201805212 - Transect 03
- ROV Track

- Oculina HAPC
- MPA
- Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst:

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: NancyFoster_14_08_MPA_NorthernSC_Grid

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/21/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 273

No. DVD: 2

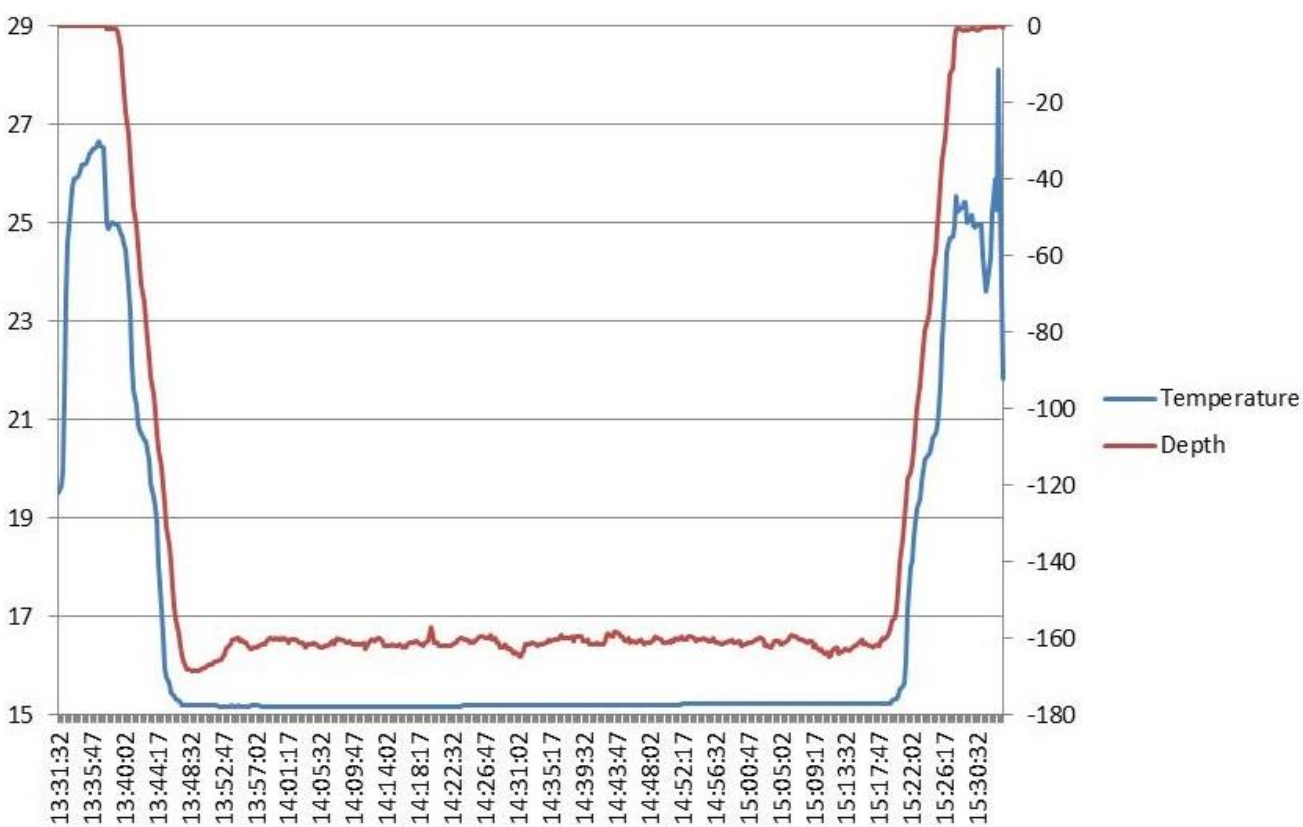
No. Hard Drive: 1

Dive Site: South Carolina, Outside Northern South Carolina MPA; Iceberg Scour SC-2; 165 m; ROV 18-23, UNCW 593; 21-V-18-2

Dive Data:

Minimum Bottom Depth (m):	156.7	Total Transect Length (km):	0.966
Maximum Bottom Depth (m):	170	Surface Current (kn):	0.5
On Bottom (Time- EDST):	13:48	On Bottom (Lat/Long):	32.7792°N; -78.1606°W
Off Bottom (Time- EDST):	15:18	Off Bottom (Lat/Long):	32.7822°N; -78.1518°W
Physical (bottom); Temp (°C):	15.2	Salinity: N/A	Visibility (m): 8
			Current (kn): 0.1

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-23 are as follows: Depth Maximum: 168.5 m, Temperature: 15.2-15.2 °C.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Iceberg Scour SC-2; 165 m; ROV 18-23, UNCW 593; 21-V-18-2

Dive Imagery:



Figure 1: -163.7 m
Slitshell, possibly *Perotrochus maureri*.



Figure 2: -168.1 m
Yellowedge grouper along rocky edge of ice-berg scour.



Figure 3: -163.1 m
Darwin slimehead. Large rock boulders line the upper edges of the ice-berg scar.

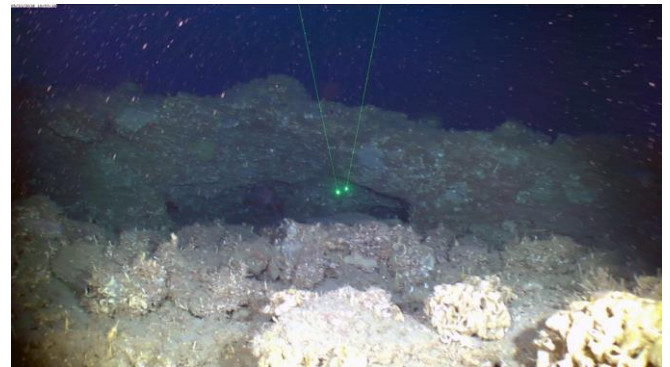


Figure 4: -163.8 m
Cauliflower sponge, lower right (*Leiodermatium* sp.) which has potent anti-cancer compounds.



Figure 5: -163.6 m
Greater amberjacks along the upper edge of the ice-berg scour.



Figure 6: -161.7 m
Closeup of small (4 cm) holothurian (*Paracolochirus mysticus*) which has potent anti-cancer compounds. Unlike most sea cucumbers, this species sits on top of rocks to filter feed.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Iceberg Scour SC-2; 165 m; ROV 18-23, UNCW 593; 21-V-18-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 21-V-18-2; ROV 18-23, UNCW Dive 593; South Carolina, Outside Northern South Carolina MPA, SC2, Ice Berg Scour Site, 160 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (green; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital still camera failed at bottom again. Use video screen grabs for transect photos.

Site Description/Habitat/Biota:

Depth range: 162- 168 m

MB map shows E-W scour, 11 km long, 150 m wide, depth on rim 159 m, 165 on N plateau, 168 in scour; transect along north rim.

Weather- Sunny, seas 2 ft swell from SW, wind 8 kn from 206 dg, air- 26.57 C, surface water- 24.97 C, salinity- 35.8 PSU, current- 0.5 kn to 320 dg.

13:37- Launch

13:48- On bottom- 71 m; visibility 8 m, current 0.1- ¼ kn from N.

In scour, coarse grey and black sand, flat; head N to north rim.

168 m- base of slope, yellow edge grouper, blueline tilefish, rocks with 2 spp. Gorgonians, yellow and white. 1 m rock boulders, 1 m ledge, Serpulidae, Sabellidae, dense *Leiodermatium*, sea weenie *Paracoloichirus mysticus*, red orange gorgonian, yellow branching sponge, hydroids, white gorgonian, lite purple gorgonian, slit shell, *Perotrochus maureri*, asteroids, boarfish, orange roughy, anthiids, *Stylocidaris*.

162 m- heading NE along rim, near top rim, boulders, ledges, 1 m relief, high rugosity, *Holothuria lentiginosa*

Dive Site: South Carolina, Outside Northern South Carolina MPA; Iceberg Scour SC-2; 165 m; ROV 18-23, UNCW 593; 21-V-18-2

enodis, black bar drum, *Corallistes* plate sponge, snowy grouper, hermit crab, red porgy, *Corallistes typus*, red barbier, 6 spp. Of gorgonians, almaco jack.

14:19- lost video feed, on top N rim, video back, but no still camera, 163 m, snowy, blueline tilefish.

14:31- 166 m, in scour, flat sand; back on slope, ½-1 m rock ledges, boulders, 163 m, 10 cm hydroids on rock edges, snowy, *Tamaria* starfish, amberjack.

162 m- top rim, 1-2 m relief; bulleye, slit shell, snowy, barrel fish.

14:48- North rim, same biota, habitat, 162 m, *Prognathodes aya*, Darwin slimehead, anchor line, streamer bass, *Perotrochus maureri*, fishing line.

15:18- 162 m, top rim, end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- none

Antipatharia coral- none.

Gorgonia coral- 4-6 spp. White fan, yellow fan, orange fan

Hydroida

Porifera- *Desmacella* (yellow) sp., dense abundant *Leiodermatium* sp., *Corallistes typus*, Corallistidae

Annelida- Sabellidae, Serpulidae

Mollusca- *Perotrochus maureri*

Decapoda- hermit crabs

Echinodermata- several spp. Asteroids, *Tamaria?* Sp., *Holothuria lentiginosa enodis*, *Stylocidaris*, *Paracolochirus mysticus*

Human Debris: anchor line, fishing line.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Iceberg Scour SC-2; 165 m; ROV 18-23, UNCW 593; 21-V-18-2

CPCe Percent Cover Analysis:

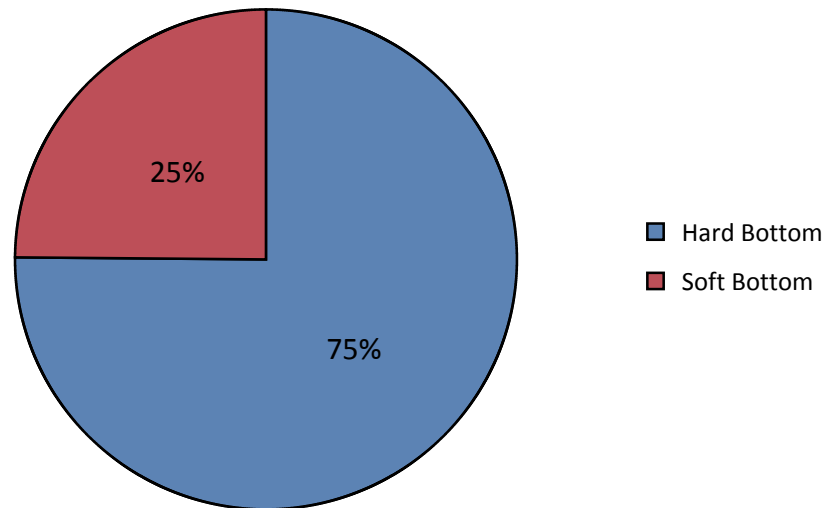


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-23. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

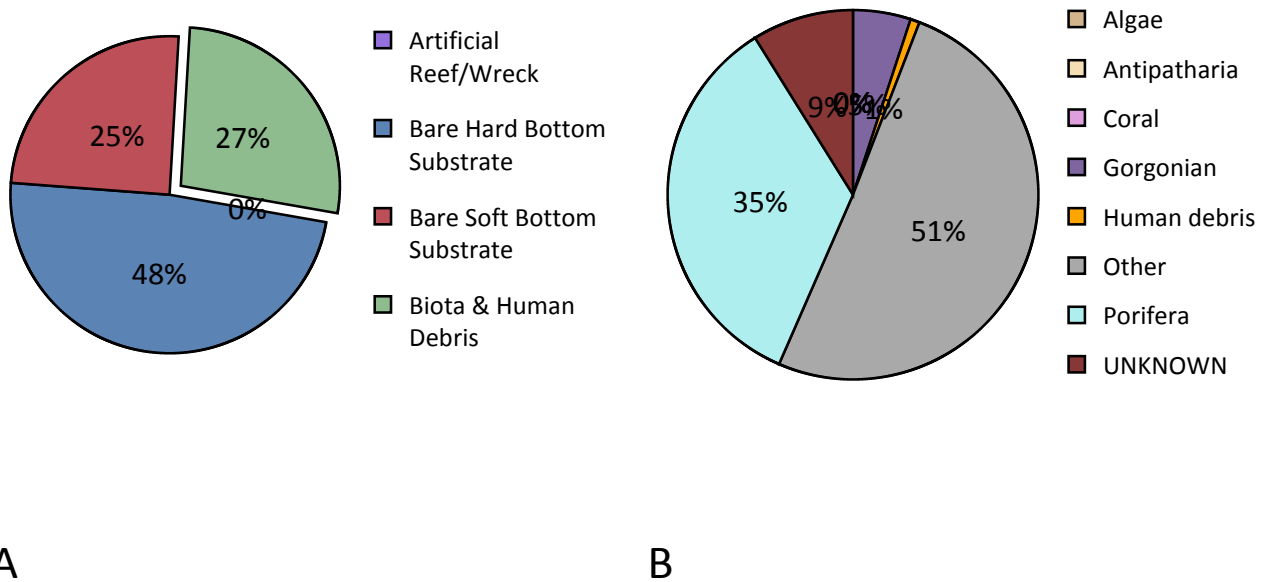


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-23. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Iceberg Scour SC-2; 165 m; ROV 18-23, UNCW 593; 21-V-18-2

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-23.

	ROV 18-23	
	%	Note
Biota	26.65%	X
Porifera	9.30%	X
Demospongiae	7.68%	X
<i>Corallistes</i> sp.		X
<i>Corallistes typus</i> Schmidt, 1870		X
Corallistidae	0.49%	
Demospongiae- unid. sp.	3.08%	
Leiodermatium sp.	4.11%	X
Hexactinellida	1.24%	
Porifera	0.38%	
Gorgonian	1.35%	X
Alcyonacea - gorgonian	1.35%	X
Alcyonacea- gorgonian	0.05%	X
Plexauridae	1.30%	
Other	16.00%	X
Hydrozoa	8.43%	X
Hydroidolina	8.43%	X
Annelida	4.22%	X
Annelida Unid.	0.05%	
Sabellidae		X
Serpulidae	4.16%	X
Arthropoda		X
Anomura		X
Majidae		X
Mollusca	0.16%	X
Bivalvia	0.11%	
Gastropoda	0.05%	
Pleurotomariidae		X
<i>Scaphella junonia</i> (Lamarck, 1804)		X
Echinodermata	0.11%	X
Asteroidea		X
Cidaroidea	0.05%	
<i>Holothuria (Vaneyothuria) lentiginosa enodis</i> Miller & Pawson, 1979		X
<i>Paracolochirus mysticus</i> (Deichmann, 1930)	0.05%	X
<i>Stylocidaris</i> sp.		X

Dive Site: South Carolina, Outside Northern South Carolina MPA; Iceberg Scour SC-2; 165 m; ROV 18-23, UNCW 593; 21-V-18-2

<i>Tamaria</i> sp.		X
Chordata - Vertebrate	0.65%	X
Actinopterygii	0.65%	X
UNKNOWN	2.38%	
Detritus	0.05%	
Bare Substrate	73.14%	
Bare Hard Bottom	48.43%	
Bare Hard Bottom	48.43%	
Bare rock, pavement, boulder, ledge	47.73%	
Bare rubble/cobble	0.70%	
Bare Soft Bottom	24.70%	
Human debris	0.22%	X
Human debris	0.22%	X
Human debris- anchor line	0.11%	X
Human debris- fishing line		X
Human debris- other	0.11%	
Grand Total	100.00%	X

Dive Site: South Carolina, Outside Northern South Carolina MPA; Iceberg Scour SC-2; 165 m; ROV 18-23, UNCW 593; 21-V-18-2

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-23.

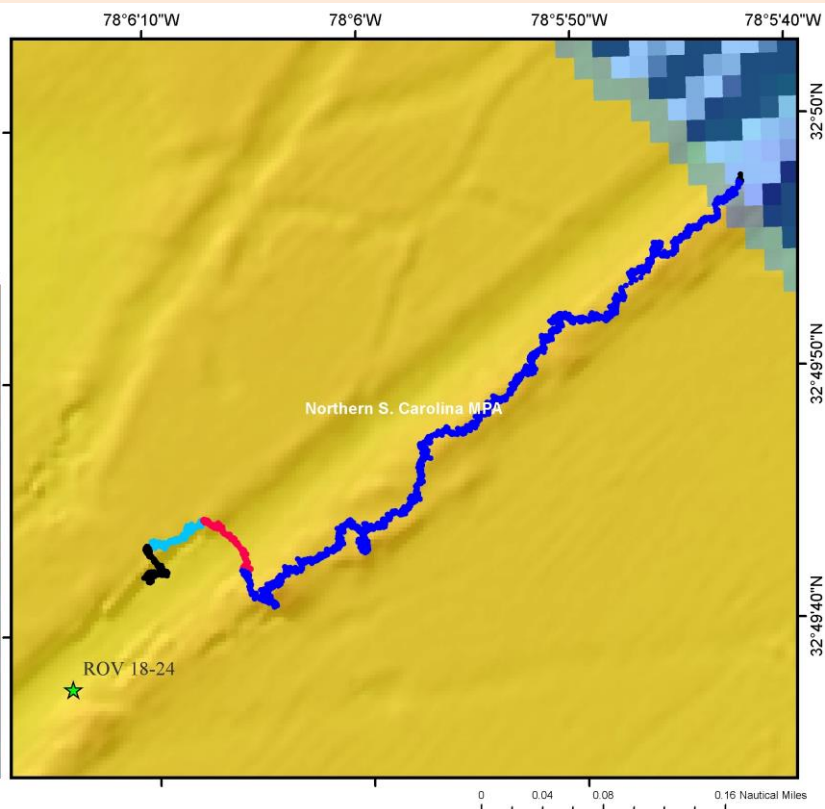
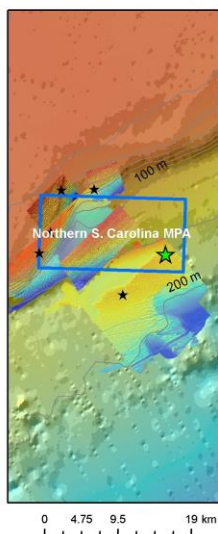
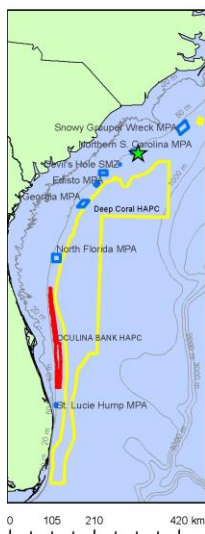
Taxa, Author- Common name	ROV 18-23
Actinopterygii	
Aulopiformes	
<i>Synodus</i> sp.- lizardfish	0.15
Beryciformes	
<i>Gephyroberyx darwinii</i> (Johnson, 1866)- big roughy	1.52
Holocentridae- soldierfish	0.15
<i>Ostichthys trachypoma</i> (Günther, 1859)- bigeye soldierfish	1.22
Gadiformes	
<i>Laemonema barbatulum</i> Goode & Bean, 1883- shortbeard codling	1.52
Perciformes	
Anthiadae- anthiid	171.81
<i>Anthias nicholsi</i> Firth, 1933- yellowfin bass	57.47
<i>Antigonia capros</i> Lowe, 1843- deepbody boarfish	18.25
<i>Baldwinella vivanus</i> (Jordan & Swain, 1885)- red barbier	7.75
<i>Caulolatilus microps</i> Goode & Bean, 1878- blueline tilefish	1.37
<i>Cookeolus japonicus</i> (Cuvier, 1829)- bulleye	0.61
<i>Decodon puellaris</i> (Poey, 1860)- red hogfish	4.41
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	0.46
<i>Hyperoglyphe perciformis</i> (Mitchill, 1818)- barrelfish	1.37
<i>Hyporthodus flavolimbatus</i> (Poey, 1865)- yellowedge grouper	0.15
<i>Hyporthodus niveatus</i> (Valenciennes, 1828)- snowy grouper	2.43
<i>Hyporthodus</i> sp.- grouper	0.15
<i>Jeboehlkia gladifer</i> Robins, 1967- bladefin basslet	0.15
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	0.15
<i>Pagrus pagrus</i> (Linnaeus, 1758)- red porgy	4.11
<i>Pareques iwamotoi</i> Miller & Woods, 1988- blackbar drum	2.58
<i>Plectranthias garrupellus</i> Robins & Starck, 1961- apricot bass	11.56
<i>Priacanthidae</i> Günther, 1859- bulleye/bigeye	0.30
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	0.30
<i>Pronotogrammus martinicensis</i> (Guichenot, 1868)- roughtongue bass	1.22
<i>Seriola dumerili</i> (Risso, 1810)- greater amberjack	0.91
<i>Seriola rivoliana</i> Valenciennes, 1833- almaco jack	0.15
<i>Seriola</i> sp.- amberjack	1.37
<i>Serranus notospilus</i> Longley, 1935- saddle bass	0.61
Scorpaeniformes	
<i>Pontinus rathbuni</i> Goode & Bean, 1896- highfin scorpionfish	0.15
Scorpaenidae- scorpionfish	5.02
Syngnathiformes	
<i>Macroramphosus</i> sp.- snipefish	0.46
UNKNOWN	0.76

Dive Site: South Carolina, Northern South Carolina MPA; Iceberg Scour SC-4; 160 m; ROV 18-24, UNCW 594; 21-V-18-3

General Location and Dive Track:

South Carolina, Northern South Carolina MPA; Iceberg Scour SC-4; 160 m; ROV 18-24, UNCW 594; 21-V-18-3

- ★ ROV 18-24
- ★ Mohawk ROV
- ★ CTD
- 201805213 - Transect 01
- 201805213 - Transect 02
- 201805213 - Transect 03
- ROV Track



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst:

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Sedberry_OEBlock2_5m_UTM1 7N_MB

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/21/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 302

No. DVD: 2

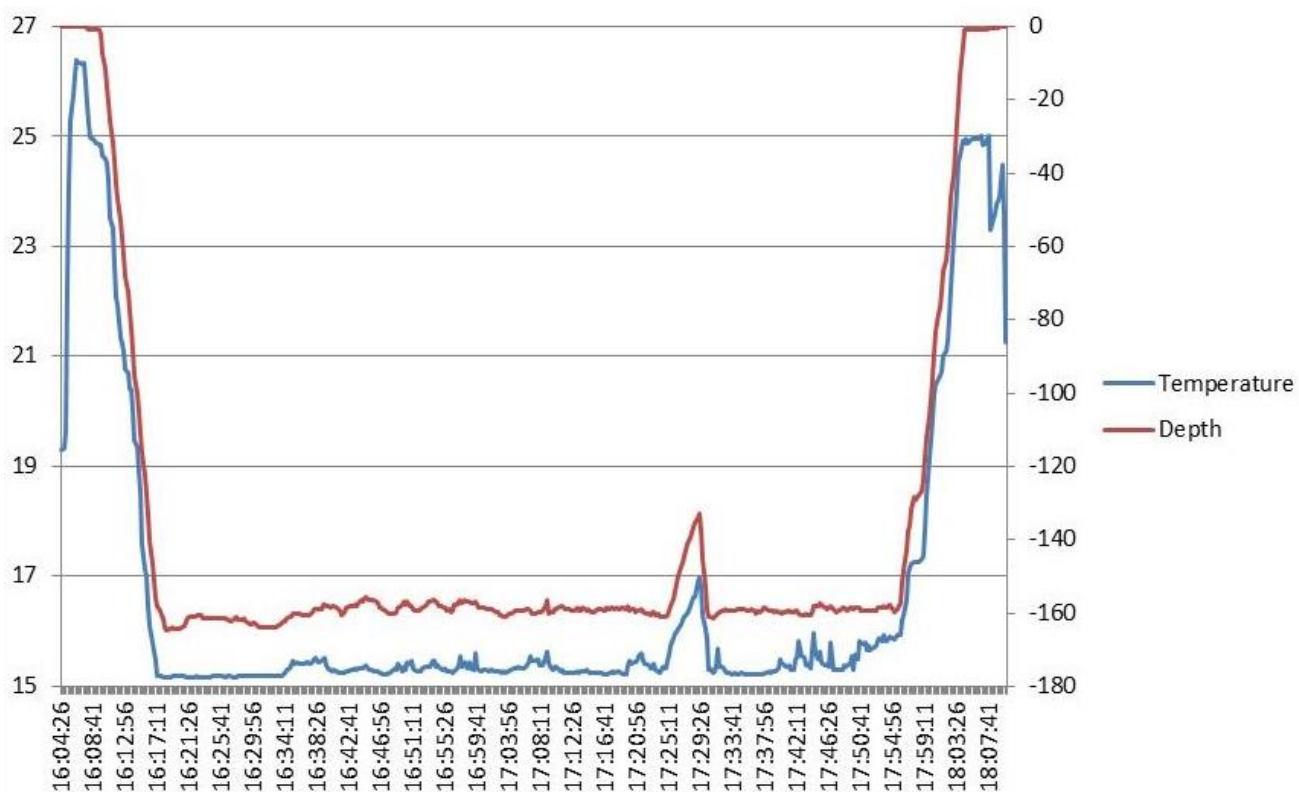
No. Hard Drive: 1

Dive Site: South Carolina, Northern South Carolina MPA; Iceberg Scour SC-4; 160 m; ROV 18-24, UNCW 594; 21-V-18-3

Dive Data:

Minimum Bottom Depth (m): 158.3	Total Transect Length (km): 1.090
Maximum Bottom Depth (m): 166.1	Surface Current (kn): 0.3
On Bottom (Time- EDST): 16:18	On Bottom (Lat/Long): 32.8284°N; -78.103°W
Off Bottom (Time- EDST): 17:55	Off Bottom (Lat/Long): 32.8324°N; -78.0953°W
Physical (bottom); Temp (°C): 15.2	Salinity: N/A Visibility (m): 5 Current (kn): 0.1

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-24 are as follows: Depth Maximum: 164.6 m, Temperature: 15.2-17 °C.

Dive Site: South Carolina, Northern South Carolina MPA; Iceberg Scour SC-4; 160 m; ROV 18-24, UNCW 594; 21-V-18-3

Dive Imagery:



Figure 1: -163.7 m
Hake under rock at ice-berg scour site.



Figure 2: -161 m
Pair of snipefish.



Figure 3: -160.2 m
Scamp grouper and sea cucumber (*Holothuria lentigenosa enodis*).



Figure 4: -158.6 m
French butterfly fish and rocks covered with hydroids.



Figure 5: -160.8 m
Scorpionfish and several species of unidentified gorgonians.

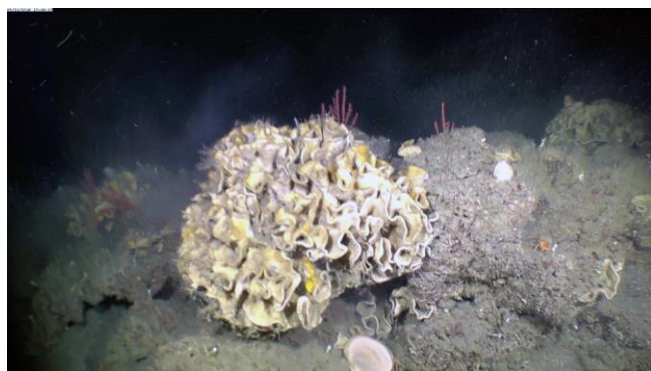


Figure 6: -159.8 m
Large cauliflower sponge (*Leiodermatium* sp.) which has potent anti-cancer compounds.

Dive Site: South Carolina, Northern South Carolina MPA; Iceberg Scour SC-4; 160 m; ROV 18-24, UNCW 594; 21-V-18-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 21-V-18-3; ROV 18-24, UNCW Dive 594; South Carolina, Inside Northern South Carolina MPA, SC4, Ice Berg Scour Site, 160 m

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (green; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital still camera failed at bottom again. Only few photos usable. Used video screen grabs for transect photos.

Site Description/Habitat/Biota:

Depth range: 161- 167 m

MB map shows NE-SW scour, 4 km long, 89 m wide, depth on north rim 161 m, south rim 156, 161 on N plateau, 164 in scour; transect along north rim.

Weather- Sunny, seas 2 ft swell from SW, wind 9 kn from 196 dg, air- 27.61 C, surface water- 25.18 C, salinity- 35.97 PSU, current- 0.5 kn to N.

16:07- Launch

16:18- On bottom- 167 m; visibility 5 m, current 0.1 from NE.

In scour, flat sand, black pebbles, heading N up north slope. Base of slope, 165 m, sediment, scattered 25 cm rock boulders, orange fan gorgonian, white fan gorgonian, *Paracolo-chirus*,

163.5, top of rim, flat sand, ½ m flat boulders, *Leiodermatium*, hermit crabs, Serpulidae, Sabellidae, thin white translucent sponges, boarfish, eel, heading to Wp on N rim, fishing line, scorpionfish, tatlers.

16:20- Head SE to south rim, in scour 166 m (MB shows 164 m); flat sand, pebbles, half way across scour, 162

Dive Site: South Carolina, Northern South Carolina MPA; Iceberg Scour SC-4; 160 m; ROV 18-24, UNCW 594; 21-V-18-3

m at south base, bearded brotulid.

16:37- heading upslope.

16:40- top south rim, 161 m, flat rock slabs, boulders <1/2 m relief, same biota, gorgonians, *Leiodermatium*; Head NE along south rim, snowy, flounder, snowy, bulleye, Darwin roughy, streamer bass, *Cancer* sp., fishing line pile, area of larger boulders 1 m relief, spider crab, hydroids; 161 m, small boulders, sediment, *Holothuria lentiginosa*, < 1/2 m relief, *P. aya*, dense anthiids, *Stylocidaris*, packing strap, snowy, blueline tilefish, spider crab, yellow *Desmacella?* sp.

162 m- top of south rim, snipe fish, roughy, black bar drum, cloth bag.

17:08- video camera failed, video back. Heading NE along south rim, *Perotrochus maureri*, water bottle, low relief rock boulders <1/2 m, batfish, snowy, scamp.

17:24- lost video again.

17:30- base of slope 163 m, head back up slope, 162 m, small boulders, same biota; 161.5 m,

17:53- shower curtain, and bearded brotula, with red solo cup. The south rim top continues to be LR rocks boulders

5:55- end dive 161 m; 32 49.941N; 78 05.720W; top of south slope, low relief rock boulders and cobbles <.5 m relief.

Dominant Benthic Macrobiota:

Scleractinia coral- none

Antipatharia coral- none.

Gorgonia coral- ~4 spp. White fan, yellow fan, orange fan

Hydroida

Porifera- *Desmacella* (yellow) sp., dense abundant *Leiodermatium* sp., *Corallistes typus*, Corallistidae

Annelida- Sabellidae, Serpulidae

Mollusca- *Perotrochus maureri*

Decapoda- hermit crabs, *Cancer* sp., Majid spider crab

Echinodermata- Asteroidea, *Holothuria lentiginosa enodis*, *Paracoloichirus mysticus*, *Stylocidaris*

Human Debris: anchor line, fishing line, plastic- common

Dive Site: South Carolina, Northern South Carolina MPA; Iceberg Scour SC-4; 160 m; ROV 18-24, UNCW 594; 21-V-18-3

CPCe Percent Cover Analysis:

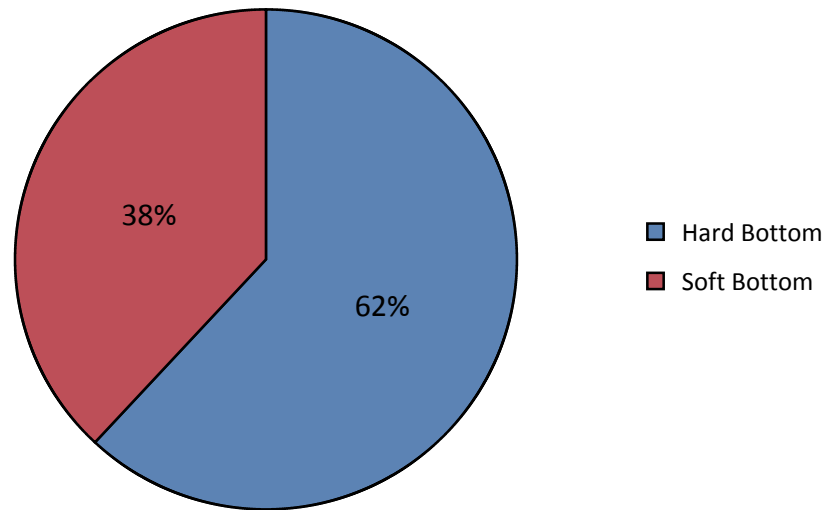


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-24. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

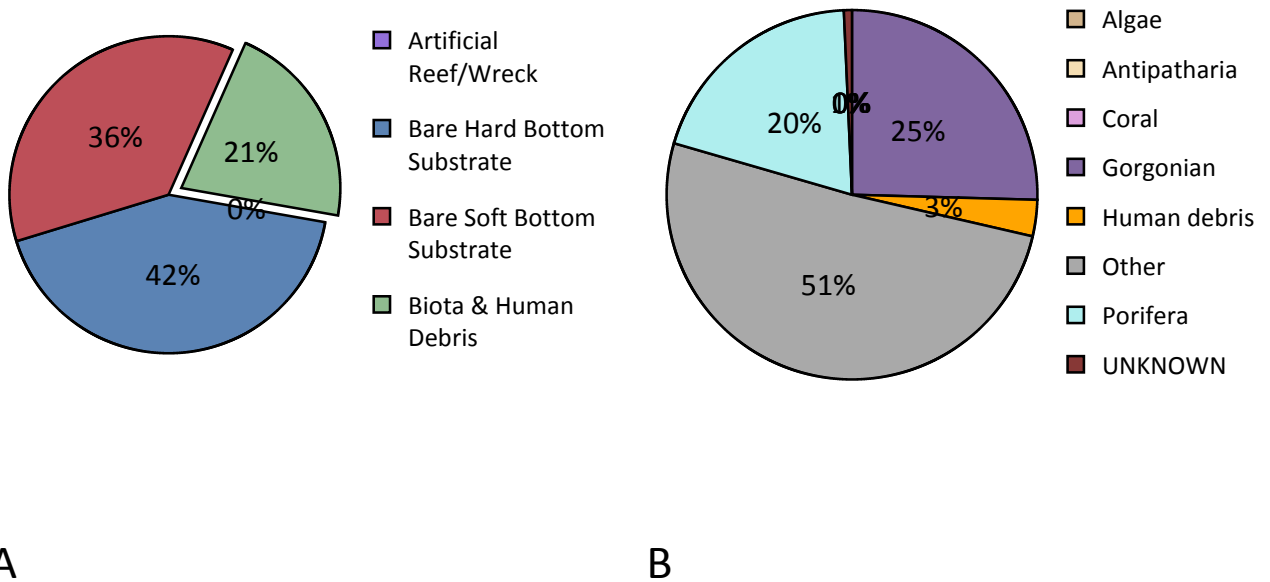


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-24. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: South Carolina, Northern South Carolina MPA; Iceberg Scour SC-4; 160 m; ROV 18-24, UNCW 594; 21-V-18-3

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-24.

	ROV 18-24	Note
	%	
Biota	20.49%	X
Porifera	4.19%	X
Demospongiae	4.04%	X
<i>Corallistes</i> sp.	0.07%	
Corallistidae	0.30%	
Demospongiae- unid. sp.	1.05%	X
<i>Leiodermatium</i> sp.	2.62%	X
Hexactinellida	0.07%	
Porifera	0.07%	
Gorgonian	5.39%	X
Alcyonacea - gorgonian	5.39%	X
Alcyonacea- gorgonian	0.22%	X
Ellisellidae	0.07%	
Plexauridae	5.09%	
Other	10.92%	X
Hydrozoa	3.96%	X
Hydroidolina	3.96%	X
Annelida	3.59%	X
Sabellidae	0.07%	X
Serpulidae	3.52%	
Arthropoda	0.07%	X
Anomura		X
<i>Cancer borealis</i> Stimpson, 1859		X
Majidae		X
Paguroidea	0.07%	
Mollusca		X
Pleurotomariidae		X
Echinodermata	0.07%	X
<i>Holothuria (Vaneyothuria) lentiginosa enodis</i> Miller & Pawson, 1979		X
Holothuroidea	0.07%	
<i>Paracolochirus mysticus</i> (Deichmann, 1930)		X
<i>Stylocidaris</i> sp.		X
Chordata - Vertebrate	1.42%	X
Actinopterygii	1.42%	X
UNKNOWN	0.15%	

Dive Site: South Carolina, Northern South Carolina MPA; Iceberg Scour SC-4; 160 m; ROV 18-24, UNCW 594; 21-V-18-3

Detritus	1.65%	
Bare Substrate	78.83%	X
Bare Hard Bottom	42.48%	X
Bare Hard Bottom	42.48%	X
Bare rock, pavement, boulder, ledge	42.11%	
Bare rubble/cobble	0.37%	
Burrow		X
Bare Soft Bottom	36.35%	
Human debris	0.67%	X
Human debris	0.67%	X
Human debris- anchor line		X
Human debris- fishing line		X
Human debris- net		X
Human debris- other	0.67%	X
Human debris- plastic		X
Grand Total	100.00%	X

Dive Site: South Carolina, Northern South Carolina MPA; Iceberg Scour SC-4; 160 m; ROV 18-24, UNCW 594; 21-V-18-3

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-24.

Taxa, Author- Common name	ROV 18-24
Actinopterygii	
Aulopiformes	
<i>Synodus</i> sp.- lizardfish	0.14
Beryciformes	
<i>Gephyroberyx darwinii</i> (Johnson, 1866)- big roughy	3.11
<i>Ostichthys trachypoma</i> (Günther, 1859)- bigeye soldierfish	0.71
Gadiformes	
<i>Laemonema barbatulum</i> Goode & Bean, 1883- shortbeard codling	0.42
Lophiiformes	
<i>Ogcocephalus</i> sp.- batfish	0.99
Ophidiiformes	
<i>Brotula barbata</i> (Bloch & Schneider, 1801)- bearded brotula	0.28
Perciformes	
Anthiadae- anthiid	215.65
<i>Anthias nicholsi</i> Firth, 1933- yellowfin bass	1.84
<i>Antigonia capros</i> Lowe, 1843- deepbody boarfish	19.21
<i>Baldwinella vivanus</i> (Jordan & Swain, 1885)- red barbr	5.08
<i>Caulolatilus microps</i> Goode & Bean, 1878- blueline tilefish	0.85
<i>Cookeolus japonicus</i> (Cuvier, 1829)- bulleye	2.26
<i>Decodon puellaris</i> (Poey, 1860)- red hogfish	10.87
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	0.99
<i>Halichoeres</i> sp.- wrasse	0.42
<i>Hyporthodus flavolimbatus</i> (Poey, 1865)- yellowedge grouper	0.14
<i>Hyporthodus niveatus</i> (Valenciennes, 1828)- snowy grouper	2.26
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	0.56
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	0.56
<i>Pagrus pagrus</i> (Linnaeus, 1758)- red porgy	0.71
<i>Pareques iwamotoi</i> Miller & Woods, 1988- blackbar drum	1.41
<i>Plectranthias garrupellus</i> Robins & Starck, 1961- apricot bass	7.77
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye	1.98
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	0.14
<i>Prognathodes guyanensis</i> (Durand, 1960)- french butterflyfish	0.14
<i>Pronotogrammus martinicensis</i> (Guichenot, 1868)- roughtongue bass	9.89
<i>Rhomboplites aurorubens</i> (Cuvier, 1829)- vermilion snapper	0.85
<i>Serranus notospilus</i> Longley, 1935- saddle bass	4.24
<i>Serranus</i> sp.- sea bass	0.28
<i>Synagrops</i> sp.- lanternbelly	0.14
Pleuronectiformes	

Dive Site: South Carolina, Northern South Carolina MPA; Iceberg Scour SC-4; 160 m; ROV 18-24, UNCW 594; 21-V-18-3

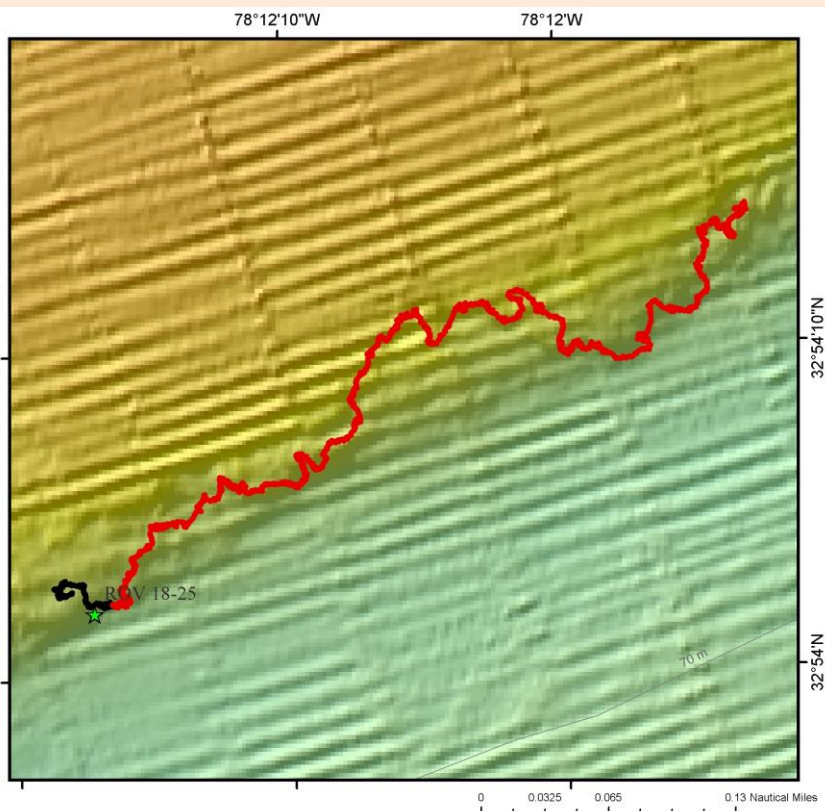
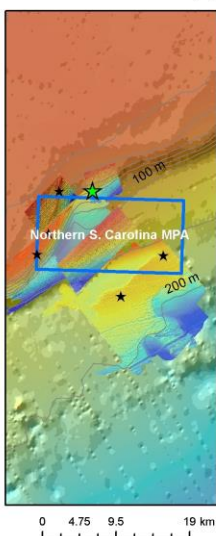
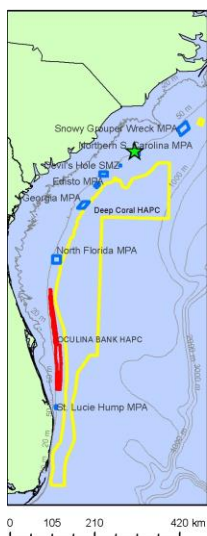
Paralichthyidae- flounder	0.14
Scorpaeniformes	
Scorpaenidae- scorpionfish	5.65
Syngnathiformes	
<i>Macroramphosus scolopax</i> (Linnaeus, 1758)- longspine snipefish	0.42
UNKNOWN	0.71

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-5; 65 m; ROV 18-25, UNCW 595; 22-V-18-1

General Location and Dive Track:

South Carolina, Outside Northern South Carolina MPA; Ridge SC-5; 65 m; ROV 18-25, UNCW 595; 22-V-18-1

- ★ ROV 18-25
 - ★ Mohawk ROV
 - ★ CTD
 - 201805221 - Transect 01
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst:

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Pisces_2018_North_SC_area_4 m_Grid

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/22/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 265

No. DVD: 2

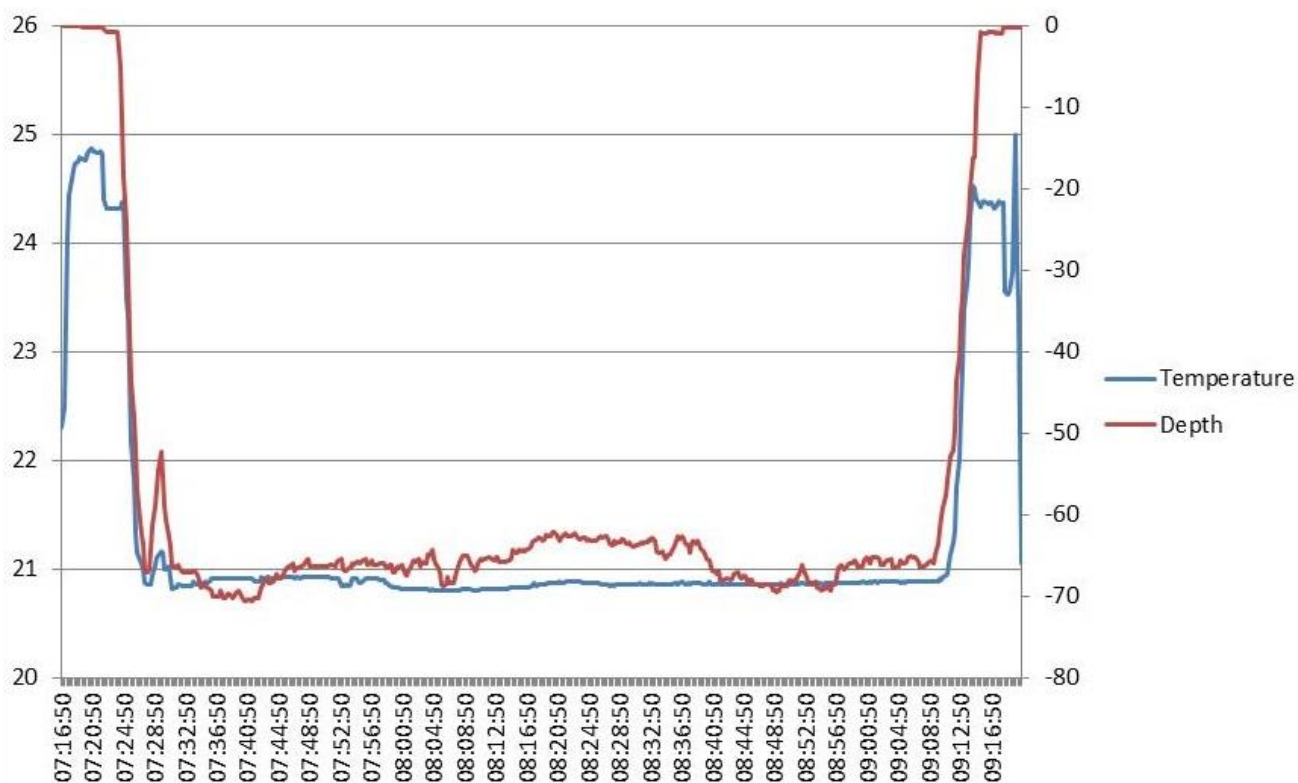
No. Hard Drive: 1

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-5; 65 m; ROV 18-25, UNCW 595; 22-V-18-1

Dive Data:

Minimum Bottom Depth (m): 52.8	Total Transect Length (km): 1.000
Maximum Bottom Depth (m): 71.4	Surface Current (kn): 0.1
On Bottom (Time- EDST): 7:27	On Bottom (Lat/Long): 32.9007°N; -78.2051°W
Off Bottom (Time- EDST): 9:09	Off Bottom (Lat/Long): 32.904°N; -78.1983°W
Physical (bottom); Temp (°C): 20.9	Salinity: N/A Visibility (m): 8 Current (kn): 0.1

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-25 are as follows: Depth Maximum: 70.5 m, Temperature: 20.8-21.2 °C.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-5; 65 m; ROV 18-25, UNCW 595; 22-V-18-1

Dive Imagery:



Figure 1: -69 m
Sea star (*Narcissia trigonaria*).



Figure 2: -72 m
Spotted moray eel.



Figure 3: -69.5 m
Yellowtail reef fish.

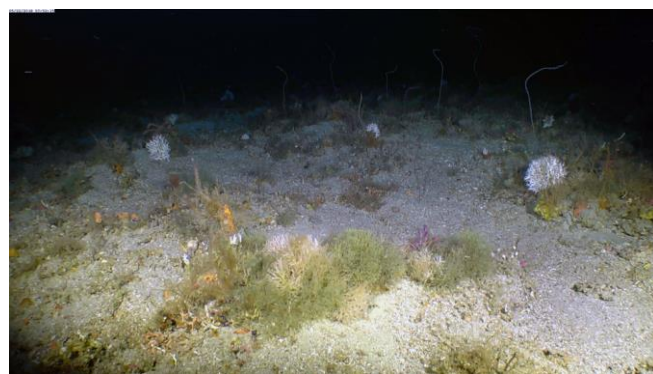


Figure 4: -67.4 m
Low relief hard bottom with sediment veneer, various algae, and white ball *Filograna* annelids.



Figure 5: -71 m
Large spherical sponges (*Geodia* sp.) on east slope of ridge.



Figure 6: -65.9 m
Ellisella sp. gorgonians.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-5; 65 m; ROV 18-25, UNCW 595; 22-V-18-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 22-V-18-1; ROV 18-25, UNCW Dive 595; South Carolina, Outside Northern South Carolina MPA, SC5, 65 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (green; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital still camera and video screen grabs used for transect photos.

Site Description/Habitat/Biota:

Depth range: 63.9- 68 m

MB map shows NE-SW ridge, top of ridge- 63 m, east base- 70 m; transect NE along ridge.

Weather- Pt/cloudy, seas 1 ft from SW, wind 8 kn from 200 dg, air- 25.4 C, surface water- 24.36 C, salinity- 35.12 PSU, current- 0.1 kn to 162.

7:22- Launch

7:27- On bottom- 63.9 m; visibility 8-10 m, current 0.1.

Top edge of ridge, on WP 1, coarse sand; loss of video. Video back, altitude 13 m.

68.6m- flat coarse sand, sparse hardbottom, *Narcissia trigonaria*, *Filograna*, hydroids, *Diodogorgia*, Heading SE, *Stichopathes*, ½ m ledge.

7:36, heading NE along slope; undercut ledge, flat rock ½-1 m, 72 m, base of ridge, encrusting orange and yellow sponges, *Eucidaris tribuloides*, lionfish, amberjack. Ledges appear to be at base of slope rather than the top. Balls of light green- not Dictyota, doesn't appear to be hydroid, maybe brown or red algae. Flat hard bottom and sediment. 71 m- flat sediment patchy hard bottom, lizard fish, yellow tail reef fish, tatler, reef

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-5; 65 m; ROV 18-25, UNCW 595; 22-V-18-1

butterfly, spotfin butterfly, porgy, bushy red algae, possible *Dictyota*.

7:58- 67 m, edge of ridge, ½ m ledges and rock boulders, 10 dg slope, low relief, low slope, low rugosity, sand at base, Calamus porgy, blue angelfish, graysby, *Muricea*, *Ircinia*, *Scyllarides nodifer*, P. aya, orange macro sponges, 67 m- flat, patchy exposed hard bottom, no ledges, orange whips *Ellisella* sp., spotted goatfish, white grunt, *Aplysina*, *Sargassum* detritus. Patchy regions of low relief ledges and outcrops ½ m relief.

8:31- 65 m, same habitat, biota, ballonfish, cowfish.

8:37- 67.5 m- top of plateau, flat sand, hard bottom, head south to edge, hog snapper. 68.5 m- top of edge, low slope, rock, low relief, ½ m, single stalk *Tanacetipathes*, Almaco, bigeye, Didemnidae, bushy light brown red algae, 30 cm *Neofibularia* fire sponge, jackknife fish, 30 cm *Geodia neptuni*, Spirastrellidae, dense orange whip *Ellisella* sp., cardinal fish, rock beauty, school white grunt.

9:03- 68 m, same habitat and biota, flat, low relief hard bottom and sediment, dense biota on rock, scamp, red snapper.

9:09- 68 m, end dive.

Dominant Benthic Macrobiota:

Scleractinia coral- none

Antipatharia coral- Single stalk *Tanacetipathes*, *Stichopathes luetkeni*

Gorgonia coral- *Muricea* sp., orange whip *Ellisella* sp., *Diodogorgia* (abundant)

Hydroida

Porifera- encrusting orange and yellow, orange macro sponges, *Aplysina*, *Ircinia campana*, *Ircinia* spp., Spirastrellidae, *Geodia neptuni*, *Neofibularia nolitangere*

Echinodermata- *Eucidaris tribuloides*. *Narcissia trigonaria*

Decapoda- *Scyllarides nodifer*

Ascidiacea- Didemnidae

Annelida- *Filograna*

Algae- Rhodophyta (bushy), several species, possible *Dictyota*

Human Debris:

Plastic trash

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-5; 65 m; ROV 18-25, UNCW 595; 22-V-18-1

CPCe Percent Cover Analysis:

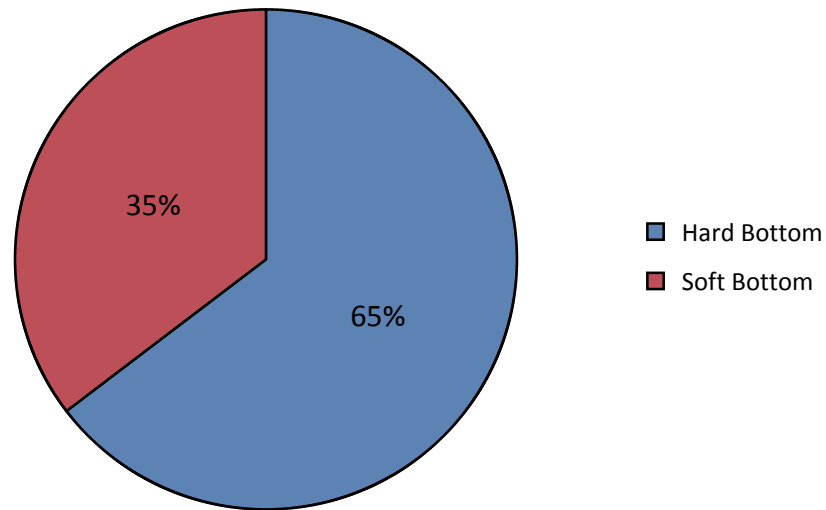


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-25. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

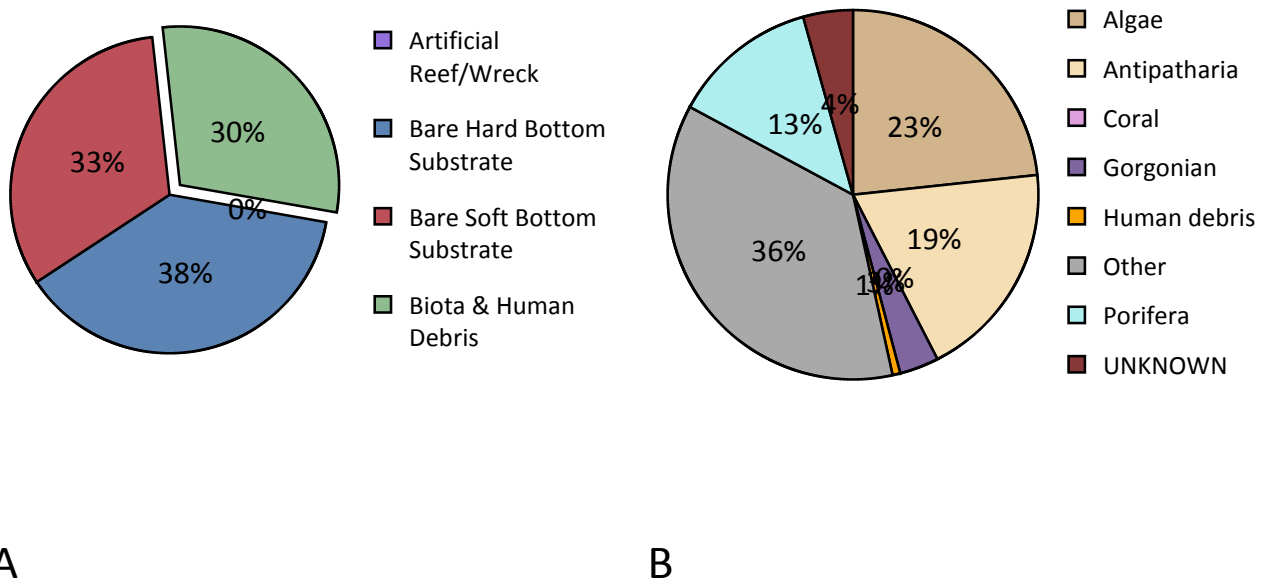


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-25. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-5; 65 m; ROV 18-25, UNCW 595; 22-V-18-1

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-25.

	ROV 18-25	Note
	%	
Biota	29.31%	X
Algae	6.87%	X
Algae- Unid.	1.15%	
Ochrophyta		X
Ochrophyta		X
<i>Sargassum</i> sp.		X
Rhodophyta	5.73%	X
Corallinales	0.74%	
Corallinophycidae		X
Rhodophyta	4.99%	X
Porifera	3.77%	X
Demospongiae	3.77%	X
<i>Aplysina</i> sp.		X
Axinellidae		X
Demospongiae- orange encrusting porous		X
Demospongiae- unid. sp.	2.09%	X
<i>Geodia neptuni</i> (Sollas, 1886)		X
<i>Geodia neptuni</i> complex (Sollas, 1886)	0.27%	
<i>Geodia</i> sp.	0.07%	
<i>Ircinia campana</i> (Lamarck, 1814)		X
<i>Ircinia</i> sp.	0.13%	
<i>Neofibularia</i> sp.	0.47%	X
Spirastrellidae	0.74%	
Gorgonian	1.01%	X
Alcyonacea - gorgonian	1.01%	X
Alcyonacea- gorgonian	0.07%	X
<i>Diodogorgia</i> sp.	0.40%	X
<i>Ellisella</i> sp.	0.27%	X
Ellisellidae	0.07%	X
<i>Muricea</i> sp.		X
Plexauridae	0.20%	X
Antipatharia	5.66%	X
Antipatharia	5.66%	X
<i>Antipathes atlantica</i> Gray, 1857	0.07%	
<i>Antipathes furcata</i> Gray, 1857	0.13%	

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-5; 65 m; ROV 18-25, UNCW 595; 22-V-18-1

<i>Stichopathes luetkeni</i> Brook, 1889	5.32%	X
<i>Tanacetipathes tanacetum</i> (Pourtalès, 1880)	0.13%	X
Other	11.99%	X
Hydrozoa	4.78%	X
Hydroidolina	4.78%	X
Annelida	1.21%	X
Annelida Unid.	0.20%	
<i>Filograna</i> sp.	0.94%	X
Sabellidae	0.07%	
Bryozoa	0.94%	X
Arthropoda	0.07%	X
Paguroidea	0.07%	
Scyllarides sp.		X
Mollusca		X
<i>Spondylus</i> sp.		X
Echinodermata		X
Asteroidea		X
<i>Eucidaris tribuloides</i> (Lamarck, 1816)		X
<i>Narcissia trigonaria</i> Sladen, 1889		X
Chordata - Invertebrate	0.40%	
Ascidiacea	0.07%	
Didemnidae	0.34%	
Chordata - Vertebrate	0.54%	X
Actinopterygii	0.54%	X
UNKNOWN	1.28%	
Detritus	2.76%	
Bare Substrate	70.49%	
Bare Hard Bottom	37.94%	
Bare Hard Bottom	37.94%	
Bare rock, pavement, boulder, ledge	34.64%	
Bare rubble/cobble	3.30%	
Bare Soft Bottom	32.55%	
Human debris	0.20%	X
Human debris	0.20%	X
Human debris- other	0.20%	X
Human debris- plastic		X
Grand Total	100.00%	X

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-25.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-5; 65 m; ROV 18-25, UNCW 595; 22-V-18-1

Taxa, Author- Common name	ROV 18-25
Actinopterygii	
Anguilliformes	
<i>Gymnothorax moringa</i> (Cuvier, 1829)- spotted moray	0.21
Aulopiformes	
<i>Synodus intermedius</i> (Spix & Agassiz, 1829)- sand diver	0.62
<i>Synodus</i> sp.- lizardfish	0.83
Beryciformes	
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	3.51
Gadiformes	
<i>Urophycis earllii</i> (Bean, 1880)- carolina hake	0.21
Perciformes	
<i>Acanthurus</i> sp.- surgeonfish	1.86
<i>Apogon pseudomaculatus</i> Longley, 1932- twospot cardinalfish	0.21
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	2.89
<i>Calamus</i> sp.- porgy	7.01
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	2.89
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	5.57
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	11.76
<i>Chromis enchrysurus</i> Jordan & Gilbert, 1882- yellowtail reefish	4.54
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	17.54
<i>Chromis scotti</i> Emery, 1968- purple reefish	1.24
<i>Chromis</i> sp.- damselfish	0.21
<i>Equetus lanceolatus</i> (Linnaeus, 1758)- jackknife fish	0.21
<i>Haemulon plumierii</i> (Lacepède, 1801)- white grunt	15.47
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	4.13
<i>Halichoeres</i> sp.- wrasse	68.08
<i>Holacanthus</i> sp.- angelfish	4.54
<i>Holacanthus tricolor</i> (Bloch, 1795)- rock beauty	0.62
<i>Lachnolaimus maximus</i> (Walbaum, 1792)- hogfish	0.83
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	5.16
<i>Lutjanus campechanus</i> (Poey, 1860)- red snapper	0.21
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	0.41
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	9.90
<i>Pomacanthus paru</i> (Bloch, 1787)- french angelfish	0.21
<i>Priacanthus arenatus</i> Cuvier, 1829- bigeye	3.71
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye	12.79
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	2.68
<i>Pseudupeneus maculatus</i> (Bloch, 1793)- spotted goatfish	0.21
<i>Seriola rivoliana</i> Valenciennes, 1833- almaco jack	0.41
<i>Seriola</i> sp.- amberjack	0.21
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	5.16

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-5; 65 m; ROV 18-25, UNCW 595; 22-V-18-1

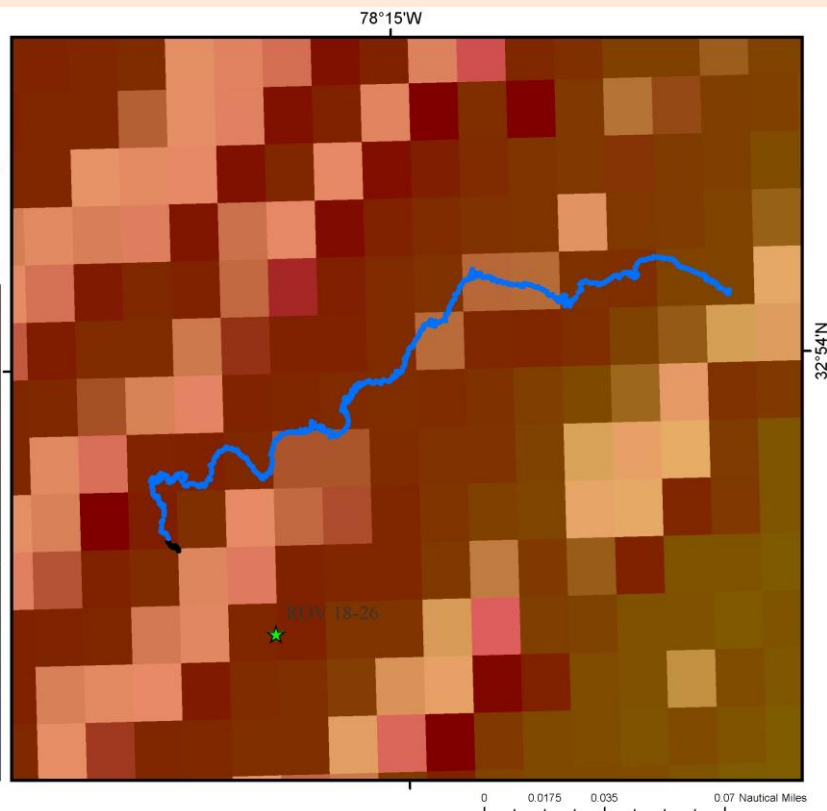
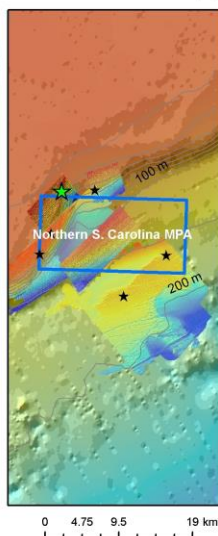
<i>Serranus baldwini</i> (Evermann & Marsh, 1899)- lantern bass	1.03
<i>Serranus phoebe</i> Poey, 1851- tattler	25.38
<i>Sparisoma atomarium</i> (Poey, 1861)- greenblotch parrotfish	1.03
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	8.46
Tetraodontiformes	
<i>Acanthostracion polygonius</i> Poey, 1876- honeycomb cowfish	0.21
<i>Balistes capriscus</i> Gmelin, 1789- grey triggerfish	0.21
<i>Canthigaster</i> sp.- puffer	10.73
<i>Chilomycterus antillarum</i> Jordan & Rutter, 1897- web burrfish	0.21
<i>Diodon holocanthus</i> Linnaeus, 1758- balloonfish	0.21
<i>Sphoeroides spengleri</i> (Bloch, 1785)- bandtail puffer	1.44
UNKNOWN	4.33

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-6; 65 m; ROV 18-26, UNCW 596; 22-V-18-2

General Location and Dive Track:

South Carolina, Outside Northern South Carolina MPA; Ridge SC-6; 65 m; ROV 18-26, UNCW 596; 22-V-18-2

- ★ ROV 18-26
 - ★ Mohawk ROV
 - ★ CTD
 - 201805222 - Transect 01
 - ROV Track
- Oculina HAPC
 - MPA
 - Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst:

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Pisces_2017_SC2

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/22/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 97

No. DVD: 1

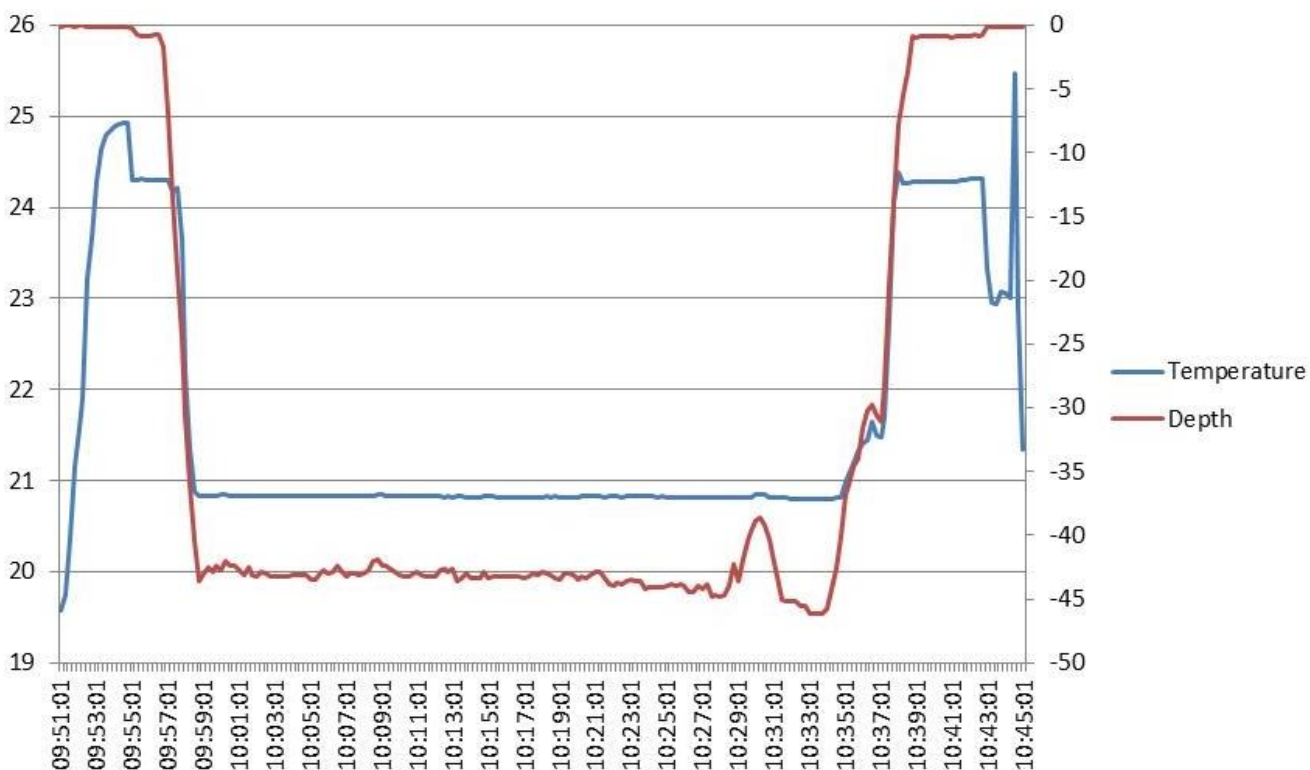
No. Hard Drive: 1

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-6; 65 m; ROV 18-26, UNCW 596; 22-V-18-2

Dive Data:

Minimum Bottom Depth (m):		Total Transect Length (km):	0.289
Maximum Bottom Depth (m):	46.9	Surface Current (kn):	0.6
On Bottom (Time- EDST):	9:58	On Bottom (Lat/Long):	32.8991°N; -78.2514°W
Off Bottom (Time- EDST):	10:33	Off Bottom (Lat/Long):	32.9003°N; -78.2481°W
Physical (bottom); Temp (°C):	20.8	Salinity: N/A	Visibility (m): 10 Current (kn): 0

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-26 are as follows: Depth Maximum: 46.2 m, Temperature: 20.8-20.8 °C.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-6; 65 m; ROV 18-26, UNCW 596; 22-V-18-2

Dive Imagery:



Figure 1: -44.6 m
Multibeam showed a ridge, but ROV mostly found sand and low relief hard bottom. Unidentified brown algae (Phaeophyta).

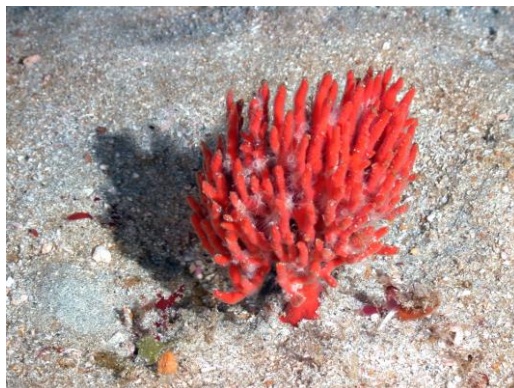


Figure 2: -45 m
Stalked bushy Axinellidae sponge.



Figure 3: -45.2 m
School of jackknife fish.



Figure 4: -45.2 m
Jackknife fish and short bigeye.



Figure 5: -45.2 m
Unidentified demosponge.



Figure 6: -46.5 m
Juvenile greenband wrasse.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-6; 65 m; ROV 18-26, UNCW 596; 22-V-18-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 22-V-18-2; ROV 18-26, UNCW Dive 596; South Carolina, Outside Northern South Carolina MPA, SC6, 45 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (green; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital still camera and video screen grabs used for transect photos.

Site Description/Habitat/Biota:

Depth range: 45- 48 m

MB map (very poor resolution) shows N-S ridge, 5 km long, 500 m wide, top- 39 m, east base- 42 m

Weather- Cloudy, seas 1-2 ft from SW, wind 6 kn from 198 dg, air- 25.48 C, surface water- 24.44 C, salinity- 35.6 PSU, current- 0.6 kn to 285.

9:55- Launch

9:58 - On bottom- 45 m; visibility 10 m, current 0.

On MB, ROV on top of ridge, flat sediment, sand waves, some scoured rock pits 10 cm with fish, sparse exposed hard bottom, jackknife fish, bushy brown flat blades Phaeophyta, wide blade *Dictyota*. Heading E to apparent ridge. Mostly sand, *Titanideum* common.

10:14- top of ridge, ROV 45 m (MB shows 39 m). Sand, sparse scoured out rock 10 cm, with jackknife fish, bigeye, lionfish, Rhodophyta- thin red blade, 10 cm gorgonian, blue angelfish, DMST, 25 cm yellow orange sphere sponge, *Ircinia*, triggerfish, tomtate, amberjack.

10:28- 100% sediment, coarse sand. Heading E to go to base of MB slope.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-6; 65 m; ROV 18-26, UNCW 596; 22-V-18-2

10:32- 48 m, east base on MB, 100% sediment.

10:33- end dive.

Dominant Benthic Macrobiota:

Gorgonia coral- unid fan, *Titanideum frauenfeldii*

Porifera- Ircinia sp., yellow orange Demosponge, stalked bushy Axinellidae

Algae- Rhodophyta- thin blade; Phaeophyta- wide blade *Dictyota*, flat blade like *Dictyopteris* but without midrib

Human debris:

None

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-6; 65 m; ROV 18-26, UNCW 596; 22-V-18-2

CPCe Percent Cover Analysis:

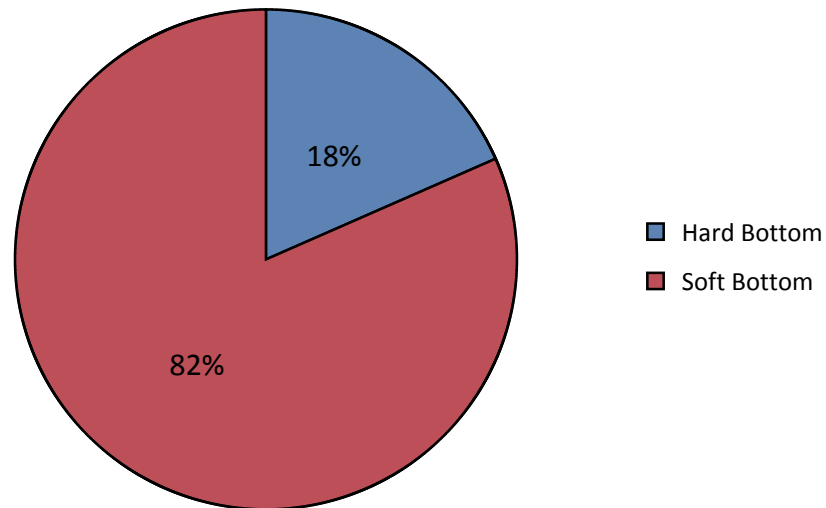


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-26. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

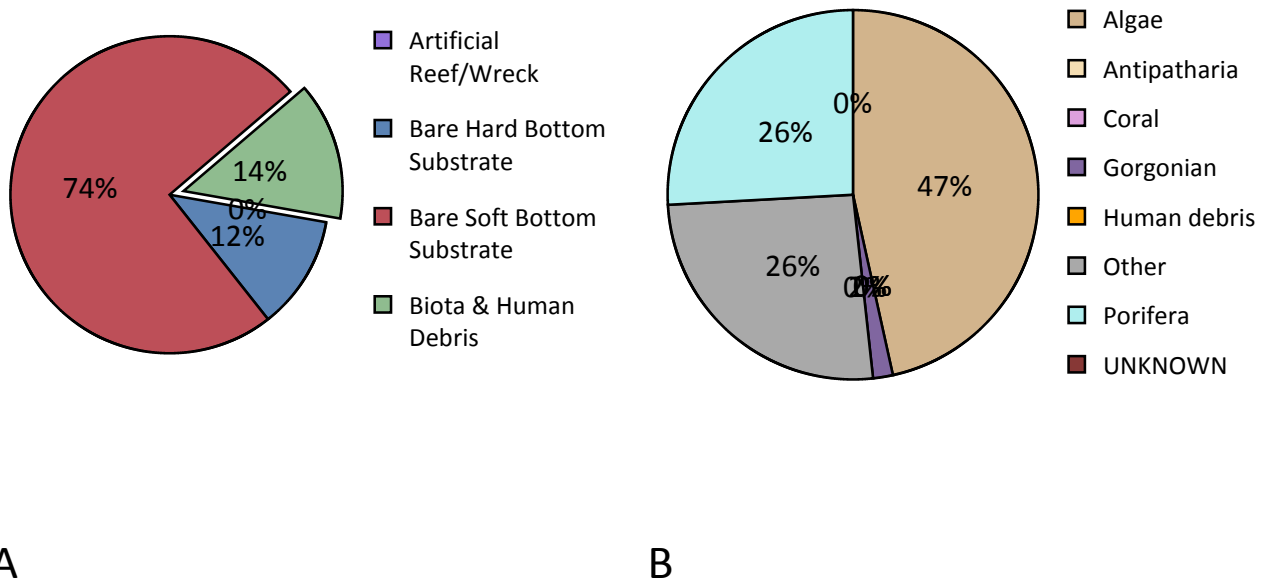


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-26. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-6; 65 m; ROV 18-26, UNCW 596; 22-V-18-2

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-26.

	ROV 18-26	
	%	Note
Biota	14.04%	X
Algae	6.54%	X
Algae- Unid.	0.24%	
Cyanobacteria		X
Ochrophyta	3.39%	X
<i>Dictyota</i> sp.		X
Ochrophyta	3.39%	
<i>Styopodium</i> sp.		X
Rhodophyta	2.91%	X
Corallinales	1.94%	
Rhodophyta	0.97%	X
Porifera	3.63%	X
Demospongiae	3.63%	X
Axinellidae		X
<i>Clathria</i> sp.	0.97%	
<i>Cliona</i> sp.	1.69%	
Demospongiae- DMST	0.73%	X
Demospongiae- unid. sp.	0.24%	X
<i>Ircinia campana</i> (Lamarck, 1814)		X
Gorgonian	0.24%	X
Alcyonacea - gorgonian	0.24%	X
Alcyonacea- gorgonian		X
<i>Titanideum frauenfeldii</i> (Kölliker, 1865)	0.24%	X
Antipatharia		X
Antipatharia		X
<i>Stichopathes luetkeni</i> Brook, 1889		X
Other	3.63%	X
Chordata - Vertebrate	3.63%	X
Actinopterygii	3.63%	X
Bare Substrate	85.96%	
Bare Hard Bottom	11.62%	
Bare Hard Bottom	11.62%	
Bare rock, pavement, boulder, ledge	11.38%	
Bare rubble/cobble	0.24%	
Bare Soft Bottom	74.33%	
Grand Total	100.00%	X

Dive Site: South Carolina, Outside Northern South Carolina MPA; Ridge SC-6; 65 m; ROV 18-26, UNCW 596; 22-V-18-2

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-26.

Taxa, Author- Common name	ROV 18-26
Actinopterygii	
Anguilliformes	
<i>Gymnothorax moringa</i> (Cuvier, 1829)- spotted moray	0.40
Beryciformes	
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	1.62
Perciformes	
<i>Acanthurus</i> sp.- surgeonfish	0.81
<i>Calamus</i> sp.- porgy	3.23
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	2.02
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	4.04
<i>Chromis enchrysur</i> Jordan & Gilbert, 1882- yellowtail reeffish	6.87
<i>Equetus lanceolatus</i> (Linnaeus, 1758)- jackknife fish	12.52
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	100.97
<i>Haemulon plumieri</i> (Lacepède, 1801)- white grunt	0.40
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	20.19
<i>Halichoeres</i> sp.- wrasse	12.12
<i>Holacanthus</i> sp.- angelfish	0.40
<i>Lachnolaimus maximus</i> (Walbaum, 1792)- hogfish	0.40
<i>Pristigenys alta</i> (Gill, 1862)- short bigeye	8.08
<i>Seriola dumerili</i> (Risso, 1810)- greater amberjack	0.81
<i>Serranus phoebe</i> Poey, 1851- tattler	3.63
<i>Stegastes partitus</i> (Poey, 1868)- bicolor damselfish	0.81
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	2.42
Tetraodontiformes	
<i>Balistes capriscus</i> Gmelin, 1789- grey triggerfish	0.81
<i>Canthigaster</i> sp.- puffer	4.04
UNKNOWN	1.21

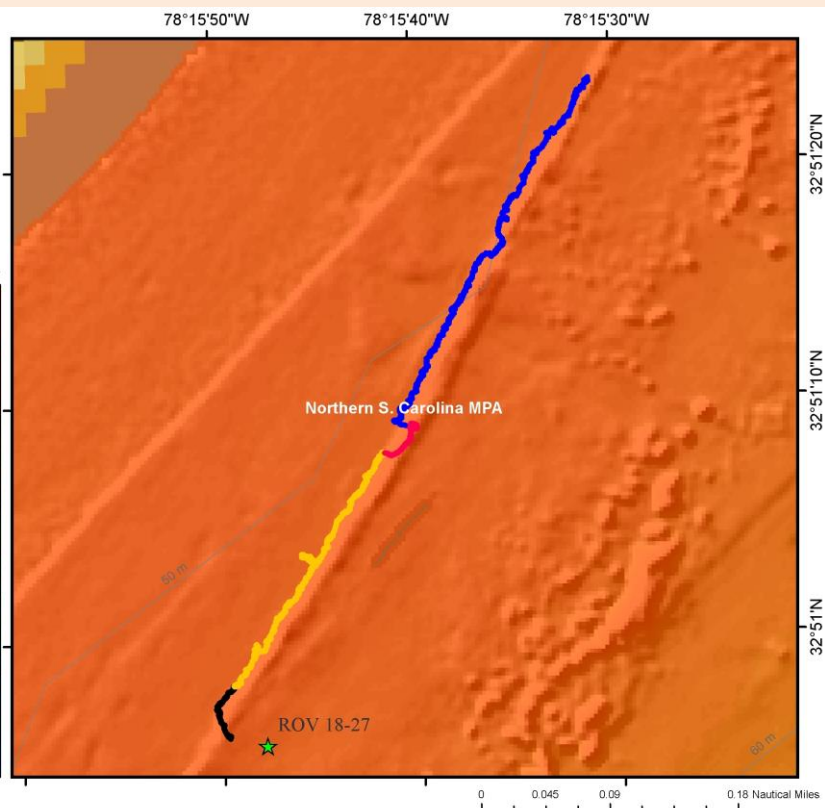
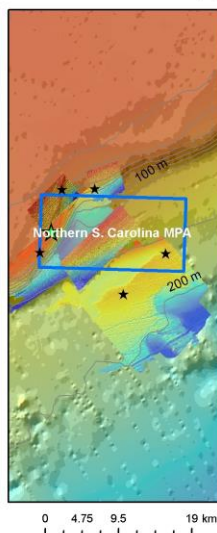
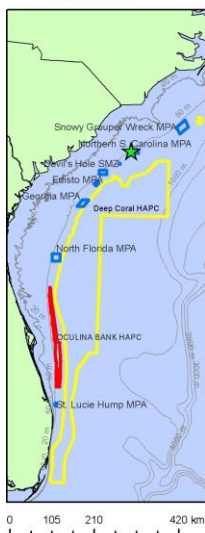
Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-7; 50 m; ROV 18-27, UNCW 597; 22-V-18-3

General Location and Dive Track:

South Carolina, Northern South Carolina MPA; Ridge SC-7; 50 m; ROV 18-27, UNCW 597; 22-V-18-3

- ★ ROV 18-27
- ★ Mohawk ROV
- ★ CTD
- 201805223 - Transect 01
- 201805223 - Transect 02
- 201805223 - Transect 03
- ROV Track

- Oculina HAPC
- MPA
- Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst:

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Sedberry_OEBlock1_5m_UTM1 7N_MB_Grid

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/22/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 476

No. DVD: 2

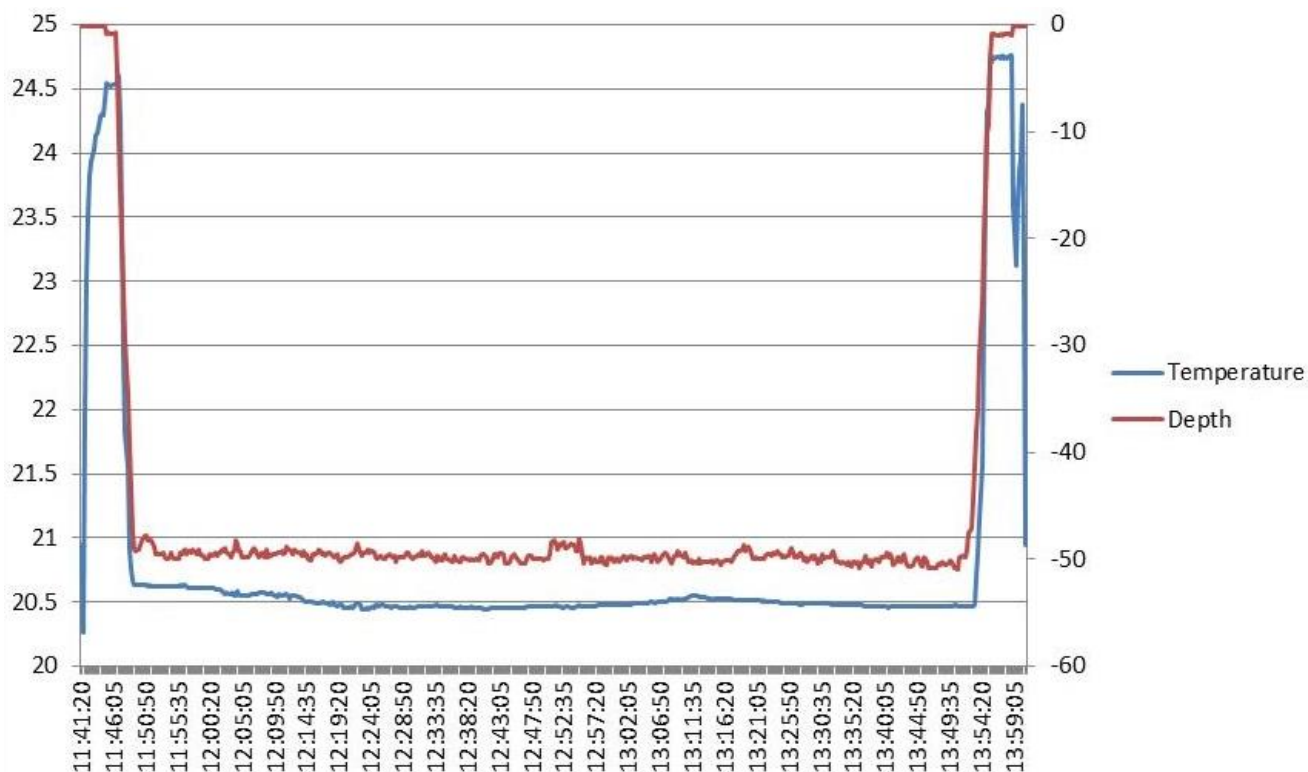
No. Hard Drive: 1

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-7; 50 m; ROV 18-27, UNCW 597; 22-V-18-3

Dive Data:

Minimum Bottom Depth (m): 48.5	Total Transect Length (km): 1.059
Maximum Bottom Depth (m): 51.7	Surface Current (kn): 0.8
On Bottom (Time- EDST): 11:48	On Bottom (Lat/Long): 32.8489°N; -78.2639°W
Off Bottom (Time- EDST): 13:51	Off Bottom (Lat/Long): 32.8565°N; -78.2587°W
Physical (bottom); Temp (°C): 20.7	Salinity: N/A Visibility (m): 15 Current (kn): 0.1

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-27 are as follows: Depth Maximum: 50.9 m, Temperature: 20.4-20.7 °C.

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-7; 50 m; ROV 18-27, UNCW 597; 22-V-18-3

Dive Imagery:



Figure 1: -51.5 m
Dense fields of *Padina* sp. brown algae on west slope of plateau.

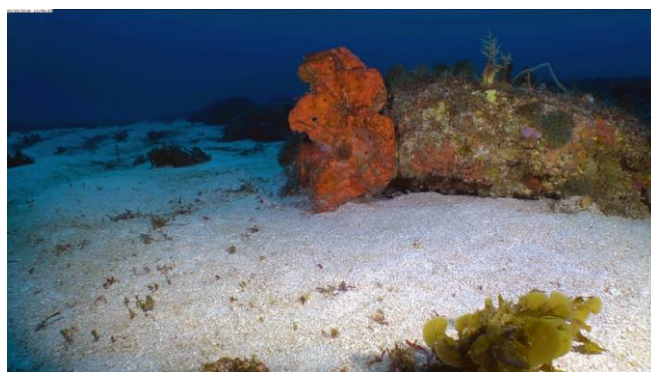


Figure 2: -51.9 m
Large demosponge (*Agelas clathrodes*).

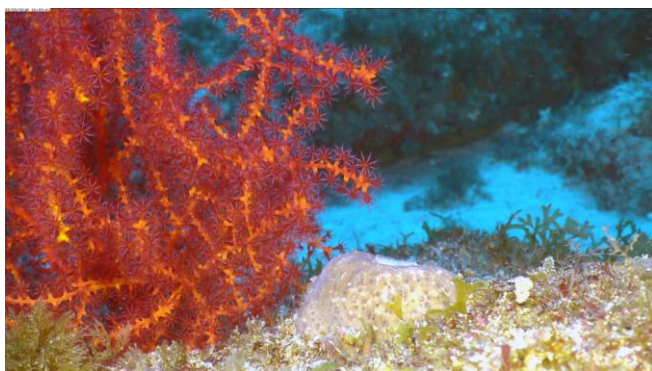


Figure 3: -51.7 m
Swiftia exserta gorgonian, and *Dictyota* sp. brown algae.



Figure 4: -51.8 m
West slope of plateau with flat rock boulders; scamp grouper, cubbyu, white grunt, and school of tomtate.

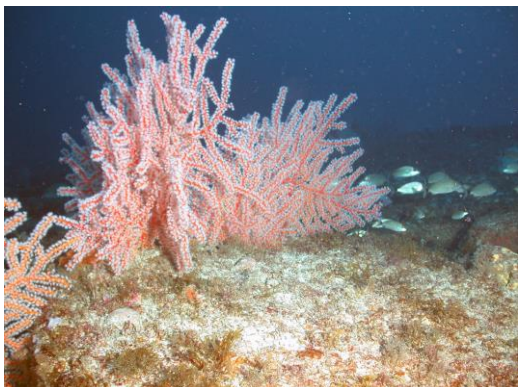


Figure 5: -52.1 m
Swiftia exserta gorgonians were scattered but abundant in some areas.



Figure 6: -51.5 m
Ellisella sp. gorgonian.

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-7; 50 m; ROV 18-27, UNCW 597; 22-V-18-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 22-V-18-3; ROV 18-27, UNCW Dive 597; South Carolina, Inside Northern South Carolina MPA, SC7, 50 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (green; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital still camera and video screen grabs used for transect photos.

Site Description/Habitat/Biota:

Depth range: 51.5- 52 m

MB map shows NE-SW ridge along the west slope of a narrow plateau; ridge 3.3 km long, 34 m wide, 37.7 m top, 48.1 west base; transect NE along west slope of ridge.

Weather- Pt/cloudy, seas 1-2 ft from SW, wind 5 kn from 200 dg, air- 26.37 C, surface water- 24.66 C, salinity- 35.61 PSU, current- 0.8 kn to 281.

11:45- Launch

11:49 - On bottom- 51.5 m; visibility 15 m, current 0.1 kn from S.

On MB ROV is on top of ridge; 51 sm, flat boulders 1-2 m diameter, ½ m relief, slope ½ m, dense algae, flat sheets brown? Algae, Dictyota, 52 m- west base of slope, sand to west, flat rock boulders, *Agelas clathrodes*. Dense flat blade algae (*Padina* sp.), orange and yellow encrusting sponges, CCA, tomtate, hogfish, scamp, tomtate, flat top boulders on slope ½ m relief, Axinellida, rock relatively barren, low diversity, no gorgonians, no black coral, few macro sponges.

12:03- 52 m, on sand at base of slope. Hd NE along slope. Overall relief <1m, scamp common, DMST, *Agelas*

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-7; 50 m; ROV 18-27, UNCW 597; 22-V-18-3

clathrodes, lionfish, rock beauty, graysby, goatfish, spanish hog, squirrel fish, *Antipathes atlantica*, *Xestospongia* creeping branching, spotfin butterfly, reef butterfly, orange seawhips *Ellisella* sp., *Filograna*. 52 m- flat sand rubble, west of base of ridge.

12:16- on slope, juvenile yellow edge grouper, *Padina* still dominant, *Aiolochoia crassa*; short region of 1 m relief rock at upper slope, goat fish, barracuda; back to <1/2 m relief rock on slope <10o, single stalk *Tanacetipathes*, Didemnidae, hydroids, school white grunt, *Swiftia exserta* (1- red orange), file fish, scamp common, *Swiftia*, trumpet fish.

12:41- 52 m, lower slope, field of *Swiftia* (15), some exsert, some not, *Swiftia* (21).

12:50- Transect heading to east slope of west ridge; top 51.5 m, hard bottom; east slope, low relief, flat hard bottom.

12:55- Back to west slope of west ridge, 52 m, low relief rock slabs, almaco, *Muricea*, DMST, 1 m ledge with hundreds of tomtate, *Leiopathes?*, scamp.

13:18- fractured rock slabs, 2 m overall relief, dense tomtate, 52 m; change to single ledge 1-2 m, lizard fish.

13:23- MB ledge becomes less distinct and narrower; ROV- hard bottom habitat, no ledges, or rock slabs, 51.5 m; ridge ended, series of rounded knolls 1 m relief. Ridge starts up again, rock slabs, ½ m, *Ellisella* sp. orange multiple branches, 52.5m- base of slope.

13:37- 52 m, trawl net, base of reef, red hind, lobster, *Spirobranchus gigantea*, *Diodogorgia*, fishing line; occasional ledge 1 m relief, mostly rock slabs <1/2m.

13:52- 52 m, end of dive.

Dominant Benthic Macrobiota:

Antipatharia- *Leiopathes?* Sp.

Gorgonians- yellow 5 cm gorgonian, *Ellisella* sp., *Muricea* sp., *Diodogorgia*, *Swiftia exserta* (one area with ~ 40)

Porifera- *Agelas clathrodes* (common), orange and yellow encrusting sponges, *Xestospongia* (creeping branching), DMST

Annelida- *Filograna* sp., *Spirobranchus gigantea*

Asciacea- Didemnidae

Algae- Phaeophyta- *Dictyota* sp., Dense abundant *Padina* sp.

Human debris:

Large trawl net, fishing line (1)

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-7; 50 m; ROV 18-27, UNCW 597; 22-V-18-3

CPCe Percent Cover Analysis:

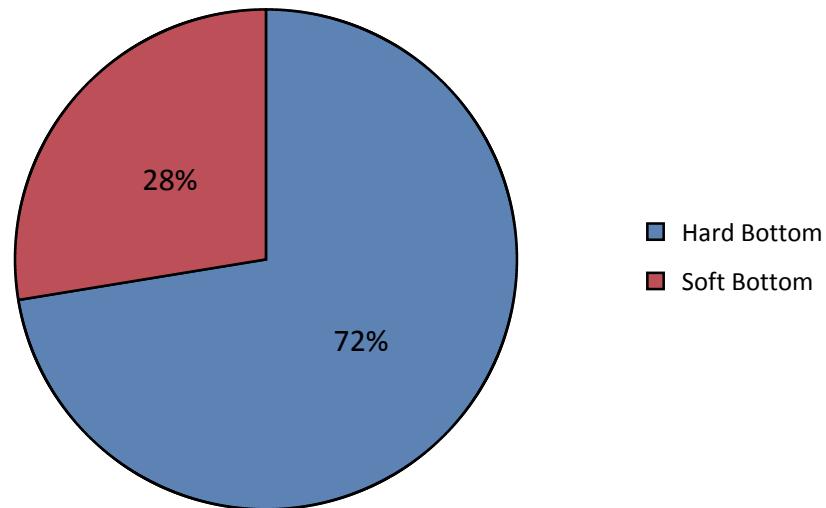


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-27. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

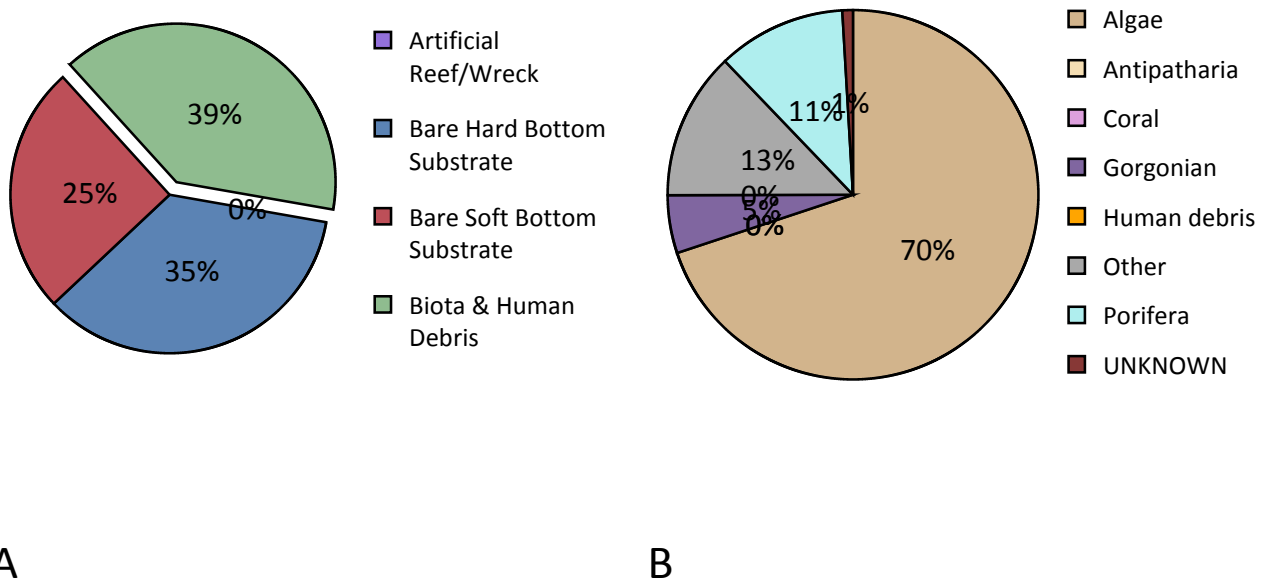


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-27. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-7; 50 m; ROV 18-27, UNCW 597; 22-V-18-3

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-27.

	ROV 18-27	
	%	Note
Biota	39.48%	X
Algae	27.59%	X
Algae- Unid.	17.89%	
Cyanobacteria	0.18%	
Ochrophyta	5.28%	X
<i>Dictyota</i> sp.	2.18%	X
Ochrophyta	3.09%	X
<i>Padina</i> sp.		X
<i>Styopodium</i> sp.		X
Rhodophyta	4.24%	X
Corallinales	1.52%	
Corallinophycidae		X
Rhodophyta	2.73%	X
Porifera	4.43%	X
Demospongiae	4.43%	X
<i>Agelas clathrodes</i> (Schmidt, 1870)	0.24%	X
<i>Agelas</i> sp.		X
<i>Aiolochoira crassa</i> (Hyatt, 1875)		X
Axinellidae		X
Demospongiae- DMST	0.12%	X
Demospongiae- unid. sp.	2.55%	X
<i>Ircinia</i> sp.	0.24%	
<i>Niphates</i> sp.	0.06%	
Spirastrellidae	1.09%	X
<i>Xestospongia</i> sp.	0.12%	X
Gorgonian	2.00%	X
Alcyonacea - gorgonian	2.00%	X
Alcyonacea- gorgonian	0.12%	
<i>Diodogorgia</i> sp.	0.12%	X
<i>Ellisella</i> sp.		X
Ellisellidae	0.49%	X
<i>Muricea</i> sp.	0.12%	X
<i>Swiftia exserta</i> (Ellis & Solander, 1786)	1.15%	X
Antipatharia		X
Antipatharia		X

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-7; 50 m; ROV 18-27, UNCW 597; 22-V-18-3

<i>Antipathes atlantica</i> Gray, 1857		X
<i>Leiopathes</i> sp.		X
<i>Stichopathes luetkeni</i> Brook, 1889		X
<i>Tanacetipathes</i> sp.		X
<i>Tanacetipathes tanacetum</i> (Pourtalès, 1880)		X
Other	5.46%	X
Hydrozoa	2.30%	X
Hydroidolina	2.30%	X
Annelida		X
<i>Filograna</i> sp.		X
<i>Spirobranchus giganteus</i> (Pallas, 1766)		X
Bryozoa	0.06%	X
Arthropoda		X
<i>Panulirus argus</i> (Latreille, 1804)		X
Chordata - Invertebrate	0.30%	X
Asciacea	0.24%	
Didemnidae	0.06%	
<i>Eudistoma</i> sp.		X
Chordata - Vertebrate	1.94%	
Actinopterygii	1.94%	
UNKNOWN	0.36%	
Detritus	0.49%	
Bare Substrate	60.52%	
Bare Hard Bottom	35.17%	
Bare Hard Bottom	35.17%	
Bare rock, pavement, boulder, ledge	34.20%	
Bare rubble/cobble	0.97%	
Bare Soft Bottom	25.35%	
Human debris		X
Human debris		X
Human debris- fishing line		X
Human debris- net		X
Grand Total	100.00%	X

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-7; 50 m; ROV 18-27, UNCW 597; 22-V-18-3

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 18-27.

Taxa, Author- Common name	ROV 18-27
Actinopterygii	
Anguilliformes	
<i>Gymnothorax moringa</i> (Cuvier, 1829)- spotted moray	0.16
Aulopiformes	
<i>Synodus</i> sp.- lizardfish	0.16
<i>Synodus synodus</i> (Linnaeus, 1758)- red lizardfish	0.16
Beryciformes	
Holocentridae- soldierfish/squirrelfish	0.16
Holocentridae- squirrelfish	2.37
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	6.48
<i>Myripristis jacobus</i> Cuvier, 1829- blackbar soldierfish	0.63
Ostraciidae	
Ostraciidae- boxfish	0.32
Perciformes	
<i>Acanthurus</i> sp.- surgeonfish	7.11
<i>Apogon pseudomaculatus</i> Longley, 1932- twospot cardinalfish	0.16
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	10.91
<i>Bodianus rufus</i> (Linnaeus, 1758)- spanish hogfish	0.47
<i>Calamus</i> sp.- porgy	4.90
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	2.85
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	3.64
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	11.22
<i>Chromis enchrysurus</i> Jordan & Gilbert, 1882- yellowtail reefish	0.32
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	3.32
<i>Chromis scotti</i> Emery, 1968- purple reefish	2.85
<i>Clepticus parrae</i> (Bloch & Schneider, 1801)- creole wrasse	8.69
<i>Epinephelus guttatus</i> (Linnaeus, 1758)- red hind	0.47
<i>Epinephelus</i> sp. Bloch, 1793- grouper	0.16
<i>Equetus lanceolatus</i> (Linnaeus, 1758)- jackknife fish	3.00
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	1730.95
<i>Haemulon plumierii</i> (Lacepède, 1801)- white grunt	15.49
<i>Haemulon striatum</i> (Linnaeus, 1758)- striped grunt	213.40
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	0.16
<i>Halichoeres cyanocephalus</i> (Bloch, 1791)- yellowcheek wrasse	1.74
<i>Halichoeres garnoti</i> (Valenciennes, 1839)- yellowhead wrasse	45.37
<i>Halichoeres</i> sp.- wrasse	11.22
<i>Holacanthus</i> sp.- angelfish	4.90
<i>Holacanthus tricolor</i> (Bloch, 1795)- rock beauty	1.74

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-7; 50 m; ROV 18-27, UNCW 597; 22-V-18-3

<i>Kyphosus</i> sp.- chub	0.47
<i>Lachnolaimus maximus</i> (Walbaum, 1792)- hogfish	0.95
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	2.85
<i>Lutjanus</i> sp.- snapper	0.16
<i>Mulloidichthys martinicus</i> (Cuvier, 1829)- yellow goatfish	0.16
<i>Mycteroperca interstitialis</i> (Poey, 1860)- yellowmouth grouper	0.32
<i>Mycteroperca microlepis</i> (Goode & Bean, 1879)- gag grouper	0.47
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	4.27
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	40.63
<i>Pomacanthus paru</i> (Bloch, 1787)- french angelfish	0.47
<i>Priacanthus arenatus</i> Cuvier, 1829- bigeye	0.63
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	0.16
<i>Pseudupeneus maculatus</i> (Bloch, 1793)- spotted goatfish	14.23
<i>Rhomboplites aurorubens</i> (Cuvier, 1829)- vermilion snapper	0.16
<i>Rypticus saponaceus</i> (Bloch & Schneider, 1801)- greater soapfish	1.11
<i>Seriola dumerili</i> (Risso, 1810)- greater amberjack	0.32
<i>Seriola rivoliana</i> Valenciennes, 1833- almaco jack	0.95
<i>Seriola</i> sp.- amberjack	0.16
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	0.95
<i>Serranus baldwini</i> (Evermann & Marsh, 1899)- lantern bass	0.63
<i>Serranus phoebe</i> Poey, 1851- tattler	0.63
<i>Serranus tigrinus</i> (Bloch, 1790)- harlequin bass	0.32
<i>Sparisoma atomarium</i> (Poey, 1861)- greenblotch parrotfish	1.74
<i>Sphyræna barracuda</i> (Edwards, 1771)- barracuda	0.16
<i>Stegastes partitus</i> (Poey, 1868)- bicolor damselfish	1.58
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	13.12
Scorpaenidae- scorpionfish	0.16
Syngnathiformes	
<i>Aulostomus maculatus</i> Valenciennes, 1841- trumpetfish	0.47
<i>Fistularia tabacaria</i> Linnaeus, 1758- bluespotted cornetfish	0.32
Tetraodontiformes	
<i>Balistes vetula</i> Linnaeus, 1758- queen triggerfish	0.47
<i>Cantherhines macrocerus</i> (Hollard, 1853)- whitespotted filefish	0.79
<i>Cantherhines pullus</i> (Ranzani, 1842)- orangespotted filefish	0.16
<i>Canthigaster</i> sp.- puffer	26.56
<i>Sphoeroides spengleri</i> (Bloch, 1785)- bandtail puffer	0.16

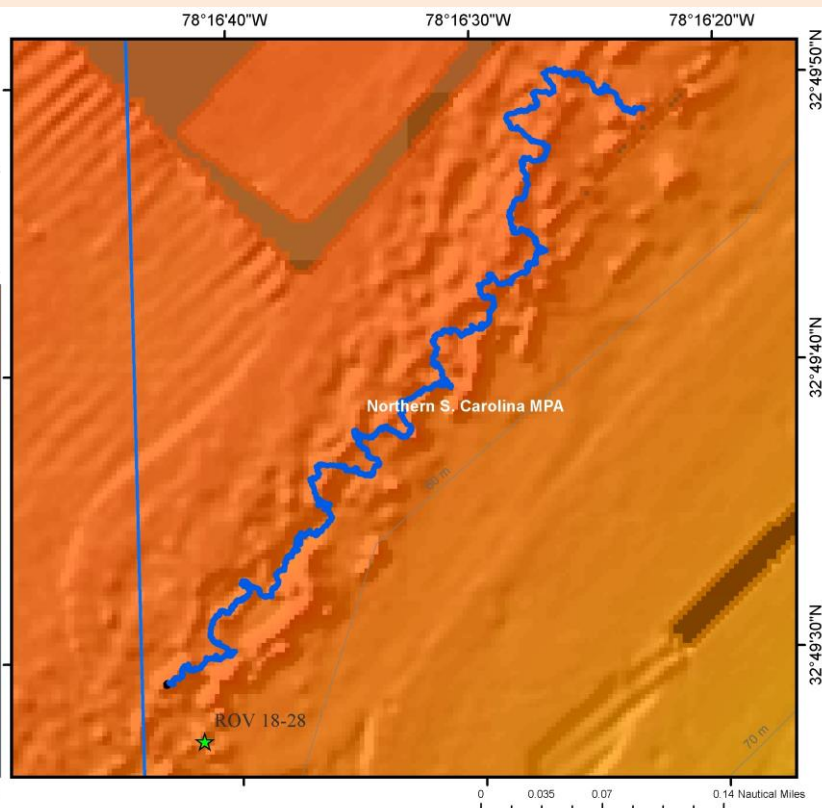
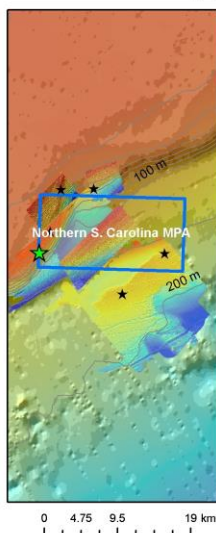
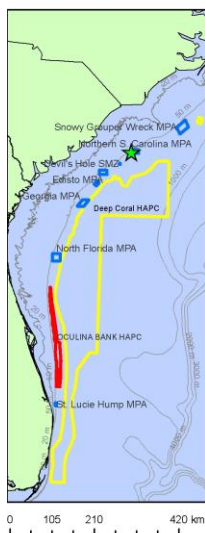
Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-8; 48 m; ROV 18-28, UNCW 598; 22-V-18-4

General Location and Dive Track:

South Carolina, Northern South Carolina MPA; Ridge SC-8; 48 m; ROV 18-28, UNCW 598; 22-V-18-4

- ★ ROV 18-28
- ★ Mohawk ROV
- ★ CTD
- 201805224 - Transect 01
- ROV Track

- Oculina HAPC
- MPA
- Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst:

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Pisces_2013_EdistoNorthOfMPA_MB

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/22/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 180

No. DVD: 2

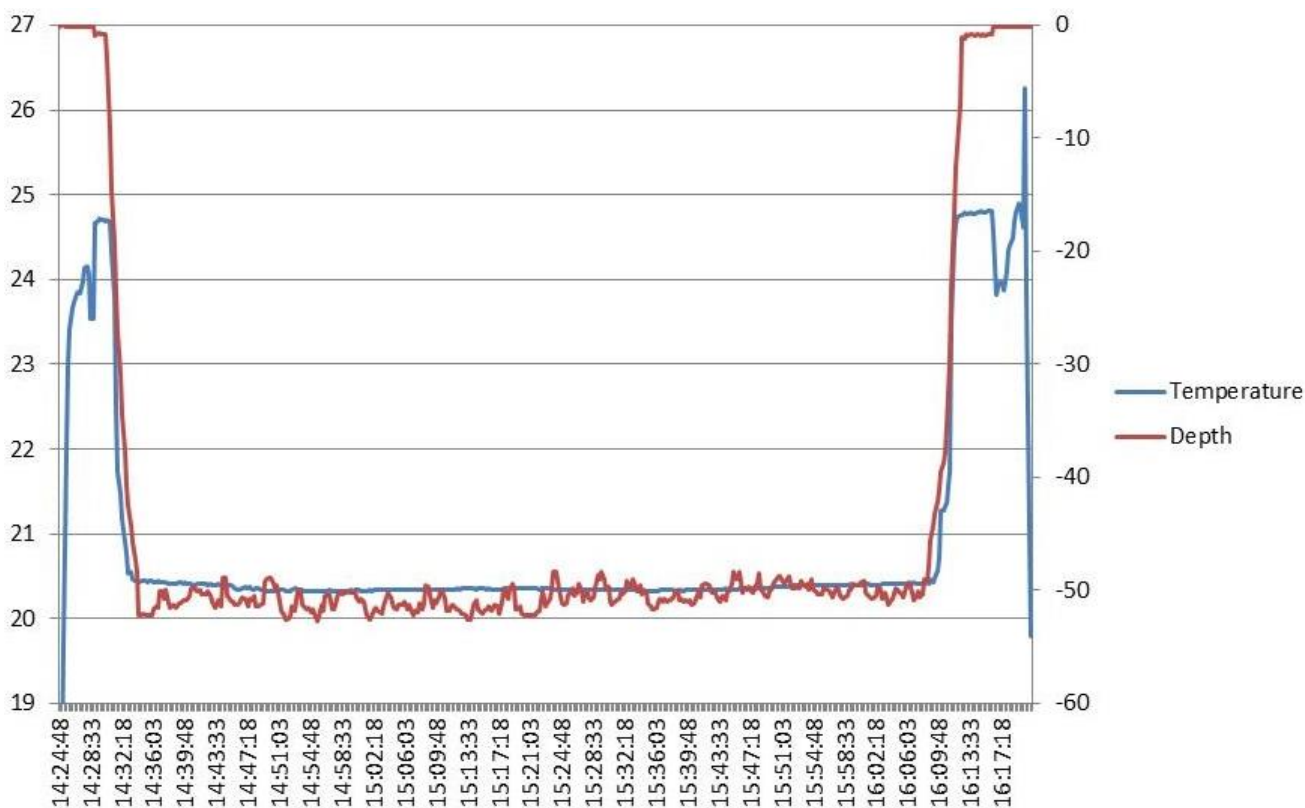
No. Hard Drive: 1

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-8; 48 m; ROV 18-28, UNCW 598; 22-V-18-4

Dive Data:

Minimum Bottom Depth (m): 49	Total Transect Length (km): 0.947
Maximum Bottom Depth (m): 53.7	Surface Current (kn): 0.7
On Bottom (Time- EDST): 14:34	On Bottom (Lat/Long): 32.8248°N; -78.2787°W
Off Bottom (Time- EDST): 16:08	Off Bottom (Lat/Long): 32.8302°N; -78.2732°W
Physical (bottom); Temp (°C): 20.4	Salinity: N/A Visibility (m): 10 Current (kn): 0

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-28 are as follows: Depth Maximum: 52.7 m, Temperature: 20.3-20.4 °C.

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-8; 48 m; ROV 18-28, UNCW 598; 22-V-18-4

Dive Imagery:

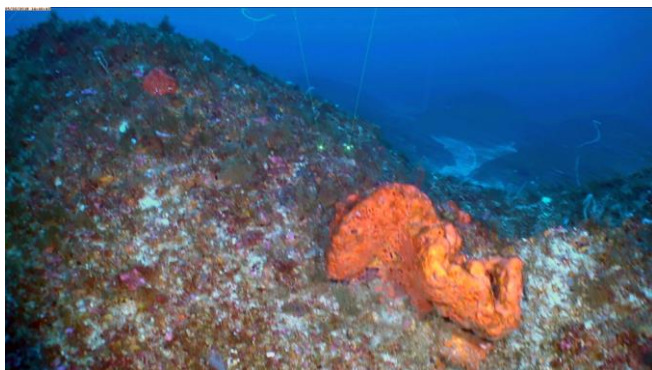


Figure 1: -52.4 m
Unusual 1-3 m tall, smooth rock knolls cover this plateau. Orange sponge (*Agelas clathrodes*).

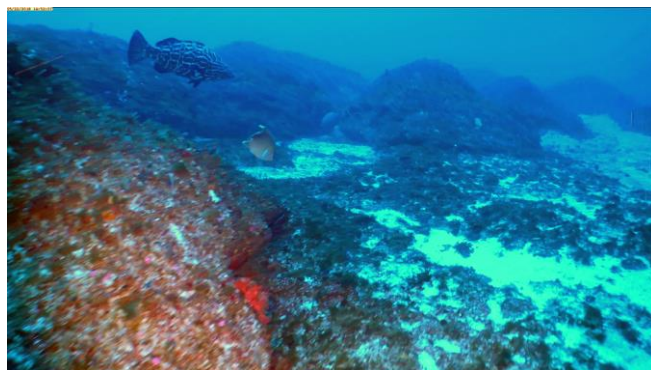


Figure 2: -53.2 m
Black grouper. Several 2-3 m rock knolls in background.



Figure 3: -54.5 m
Hogfish.



Figure 4: -51.9 m
Icilogorgia schrammi gorgonian.



Figure 5: -51.8 m
Agelas sp. sponge and *Tanacetipathes* sp. black coral.

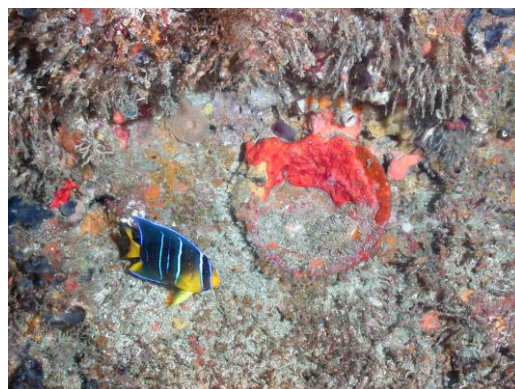


Figure 6: -53.9 m
Juvenile blue angelfish.

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-8; 48 m; ROV 18-28, UNCW 598; 22-V-18-4

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 22-V-18-4; ROV 18-28, UNCW Dive 598; South Carolina, Inside Northern South Carolina MPA, SC8, 48 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (green; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital still camera and video screen grabs used for transect photos.

Site Description/Habitat/Biota:

Depth range: 51.5- 54.5 m

MB map shows NE-SW wide ridge, lumpy on top, 9 km long, 350 m wide, 48 m on top.

Weather- Sunny, seas 1 ft from SW, wind 8 kn from 200 dg, air- 26.06 C, surface water- 24.83 C, salinity- 35.33 PSU, current- 0.7 kn to 257.

14:28- Launch

14:34- On bottom- 54.5 m; visibility- 15 m, current- 0.

Flat sand with dense rounded rock knolls, conical, 30-45 dg slope, top 52.6 m, smooth rock, no ledges, 2-5 m wide sand chutes between the mounds, vary from 1-3 m high. High relief, low rugosity, moderate slope. *Agelas clathrodes*, *Stichopathes*, *Ellisella* sp. multiple branched, hydroid, *Agelas* fan, spotfin butterfly, goatfish, scamp, black grouper, lionfish, *Ircinia*, scamp, hogfish, sand tilefish, blue anglefish, squirrel fish, *Icilogorgia schrammi* with brittlestar, single stalk *Tanacetipathes*, *Diodogorgia*, spanish hogfish, *Stylaster*?, Some with undercut caves, Nephtheidae, unid. algae green and brown colored, *Ircinia campana*, *Tanacetipathes* white bushy, *Callyspongia vaginalis*.

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-8; 48 m; ROV 18-28, UNCW 598;
22-V-18-4

15:23- lost video feed, back. Green clumps- *Dictyota*, CCA, soapfish.

15:29- 51.5 mound top, 3 m relief, rock beauty, *Filograna*, Didemnidae, french angel, tatler,

15:58- lower relief mounds, none with caves, 52 m on top, low relief hard bottom, mounds 1 m, sand 53 m, fewer fish, cowfish.

16:08- 52 m, end dive.

Dominant Benthic Macrobiota:

Antipatharia- *Stichopathes luetkeni*, *Tanacetipathes* sp. white bushy, single stalk

Gorgonians- *Diodogorgia nodulifera*, *Icilogorgia schrammi*, *Ellisella* sp.

Alcyonacea- Nephtheidae

Porifera- *Agelas* fan, *Ircinia campana*, *Callyspongia vaginalis*, *Agelas clathrodes*

Annelida- *Filograna* sp.

Echinodermata- brittlestar on gorgonian

Ascidiacea- Didemnidae

Algae- Green film on sand, CCA, *Dictyota* balls 5 cm

Human debris:

None

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-8; 48 m; ROV 18-28, UNCW 598; 22-V-18-4

CPCe Percent Cover Analysis:

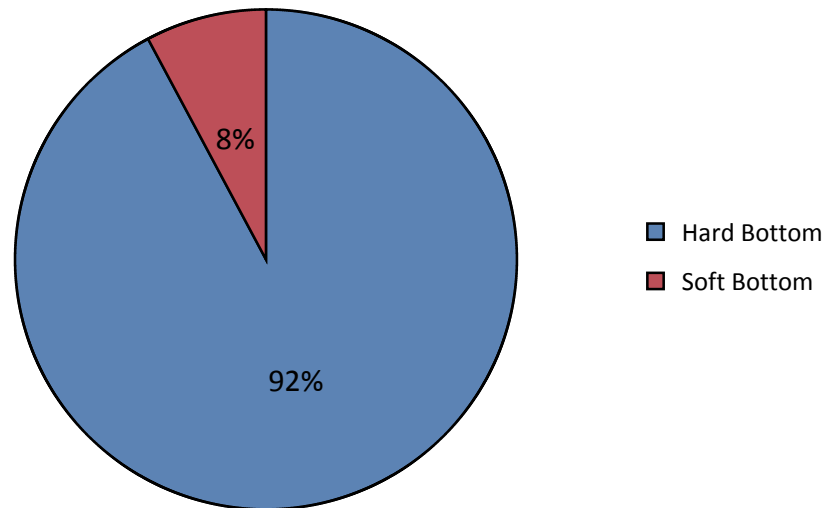


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-28. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

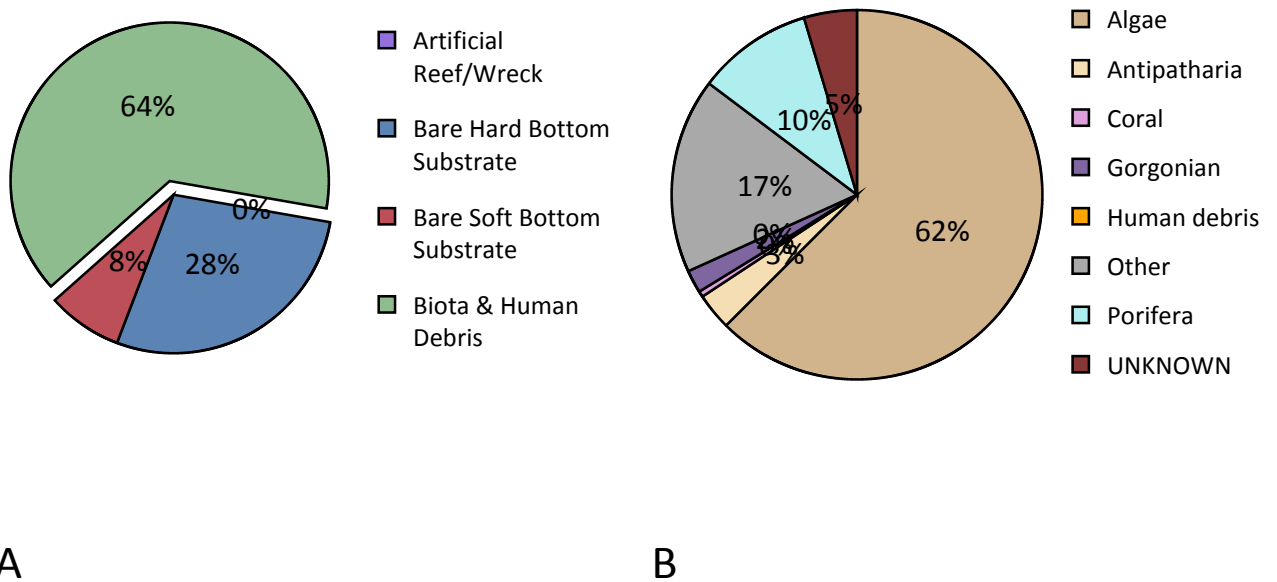


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-28. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-8; 48 m; ROV 18-28, UNCW 598; 22-V-18-4

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-28.

	ROV 18-28	Note
	%	
Biota	64.37%	X
Algae	40.21%	X
Algae- Unid.	29.37%	
Chlorophyta	0.16%	
Cyanobacteria	0.80%	X
Ochrophyta	1.12%	X
<i>Dictyota</i> sp.	0.64%	X
Ochrophyta	0.48%	
<i>Padina</i> sp.		X
Rhodophyta	8.75%	X
Corallinales	2.17%	
Corallinophycidae		X
Rhodophyta	6.58%	
Porifera	6.50%	X
Demospongiae	6.50%	X
<i>Agelas clathrodes</i> (Schmidt, 1870)	1.69%	X
<i>Agelas</i> sp.	0.16%	
<i>Aplysina</i> sp.	0.08%	
Axinellidae		X
<i>Callyspongia (Cladochalina) vaginalis</i> (Lamarck, 1814)	0.08%	X
<i>Cliona</i> sp.	0.16%	
Demospongiae- unid. sp.	3.77%	
<i>Ircinia campana</i> (Lamarck, 1814)		X
<i>Ircinia</i> sp.	0.32%	
Spirastrellidae	0.24%	
Coral	0.32%	
Coral- Scleractinia	0.32%	
<i>Madracis myriaster</i> (Milne Edwards & Haime, 1850)	0.32%	
Gorgonian	1.28%	X
Alcyonacea - gorgonian	1.28%	X
Alcyonacea- gorgonian	0.08%	
<i>Diodogorgia</i> sp.	0.08%	X
<i>Ellisella</i> sp.	0.48%	X
Ellisellidae	0.64%	
<i>Iciligorgia schrammi</i> Duchassaing, 1870		X

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-8; 48 m; ROV 18-28, UNCW 598; 22-V-18-4

<i>Muricea</i> sp.		X
Antipatharia	2.09%	X
Antipatharia	2.09%	X
Antipatharia unid. sp.	0.16%	
<i>Antipathes atlantica</i> Gray, 1857		X
<i>Stichopathes luetkeni</i> Brook, 1889	0.32%	X
<i>Tanacetipathes</i> sp.		X
<i>Tanacetipathes</i> sp.- bushy	1.36%	X
<i>Tanacetipathes tanacetum</i> (Pourtalès, 1880)	0.24%	X
Other	13.96%	X
Hydrozoa	7.87%	X
Hydroidolina	7.87%	X
<i>Stylaster</i> sp.		X
Alcyonacea - Alcyoniina	0.16%	X
Nephtheidae	0.16%	X
Bryozoa	0.40%	
Chordata - Invertebrate	2.41%	X
Ascidiacea	2.17%	
Didemnidae	0.24%	
<i>Eudistoma</i> sp.		X
Chordata - Vertebrate	0.16%	X
Actinopterygii	0.16%	X
UNKNOWN	2.97%	
Bare Substrate	35.63%	
Bare Hard Bottom	28.01%	
Bare Hard Bottom	28.01%	
Bare rock, pavement, boulder, ledge	27.85%	
Bare rubble/cobble	0.16%	
Bare Soft Bottom	7.62%	
Grand Total	100.00%	X

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-8; 48 m; ROV 18-28, UNCW 598; 22-V-18-4

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 16-01.

Taxa, Author- Common name	ROV 18-28
Actinopterygii	
Beryciformes	
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	2.87
<i>Holocentrus rufus</i> (Walbaum, 1792)- longspine squirrelfish	0.75
<i>Plectrypops retrospinis</i> (Guichenot, 1853)- cardinal soldierfish	0.12
Ostraciidae	
Ostraciidae- boxfish	0.25
Perciformes	
<i>Acanthurus</i> sp.- surgeonfish	1.75
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	3.24
<i>Bodianus rufus</i> (Linnaeus, 1758)- spanish hogfish	0.25
<i>Calamus</i> sp.- porgy	1.00
<i>Centropyge argi</i> Woods & Kanazawa, 1951- cherubfish	0.25
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	0.12
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	3.12
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	13.97
<i>Chromis enchrysurus</i> Jordan & Gilbert, 1882- yellowtail reeffish	0.50
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	42.79
<i>Chromis scotti</i> Emery, 1968- purple reeffish	2.00
<i>Chromis</i> sp.- damselfish	31.94
<i>Clepticus parrae</i> (Bloch & Schneider, 1801)- creole wrasse	0.37
<i>Epinephelus adscensionis</i> (Osbeck, 1765)- rock hind	0.12
<i>Haemulon plumierii</i> (Lacepède, 1801)- white grunt	0.62
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	0.12
<i>Halichoeres cyanocephalus</i> (Bloch, 1791)- yellowcheek wrasse	1.62
<i>Halichoeres garnoti</i> (Valenciennes, 1839)- yellowhead wrasse	11.60
<i>Halichoeres</i> sp.- wrasse	14.60
<i>Holacanthus</i> sp.- angelfish	2.74
<i>Holacanthus tricolor</i> (Bloch, 1795)- rock beauty	0.87
<i>Lachnolaimus maximus</i> (Walbaum, 1792)- hogfish	1.00
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	0.50
<i>Lutjanus analis</i> (Cuvier, 1828)- mutton snapper	0.25
<i>Malacanthus plumieri</i> (Bloch, 1786)- sand tilefish	0.12
<i>Mycteroperca bonaci</i> (Poey, 1860)- black grouper	0.25
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	0.50
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	0.12
<i>Pomacanthus paru</i> (Bloch, 1787)- french angelfish	0.12
<i>Prognathodes aculeatus</i> (Poey, 1860)- longsnout butterflyfish	0.62

Dive Site: South Carolina, Northern South Carolina MPA; Ridge SC-8; 48 m; ROV 18-28, UNCW 598; 22-V-18-4

<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	0.25
<i>Pseudupeneus maculatus</i> (Bloch, 1793)- spotted goatfish	0.25
<i>Rypticus saponaceus</i> (Bloch & Schneider, 1801)- greater soapfish	0.25
<i>Seriola dumerili</i> (Risso, 1810)- greater amberjack	0.12
<i>Seriola rivoliana</i> Valenciennes, 1833- almaco jack	0.12
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	4.74
<i>Serranus baldwini</i> (Evermann & Marsh, 1899)- lantern bass	3.37
<i>Serranus phoebe</i> Poey, 1851- tattler	3.99
<i>Serranus tigrinus</i> (Bloch, 1790)- harlequin bass	0.12
<i>Serranus tortugarum</i> Longley, 1935- chalk bass	0.62
<i>Sparisoma atomarium</i> (Poey, 1861)- greenblotch parrotfish	3.12
<i>Sphyaena barracuda</i> (Edwards, 1771)- barracuda	0.12
<i>Stegastes partitus</i> (Poey, 1868)- bicolor damselfish	1.50
<i>Xyrichtys</i> sp.- razorfish	0.25
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	7.61
Tetraodontiformes	
<i>Cantherhines macrocerus</i> (Hollard, 1853)- whitespotted filefish	0.12
<i>Cantherhines pullus</i> (Ranzani, 1842)- orangespotted filefish	0.25
<i>Canthigaster</i> sp.- puffer	8.86
Monacanthidae- filefish	0.12
UNKNOWN	1.00

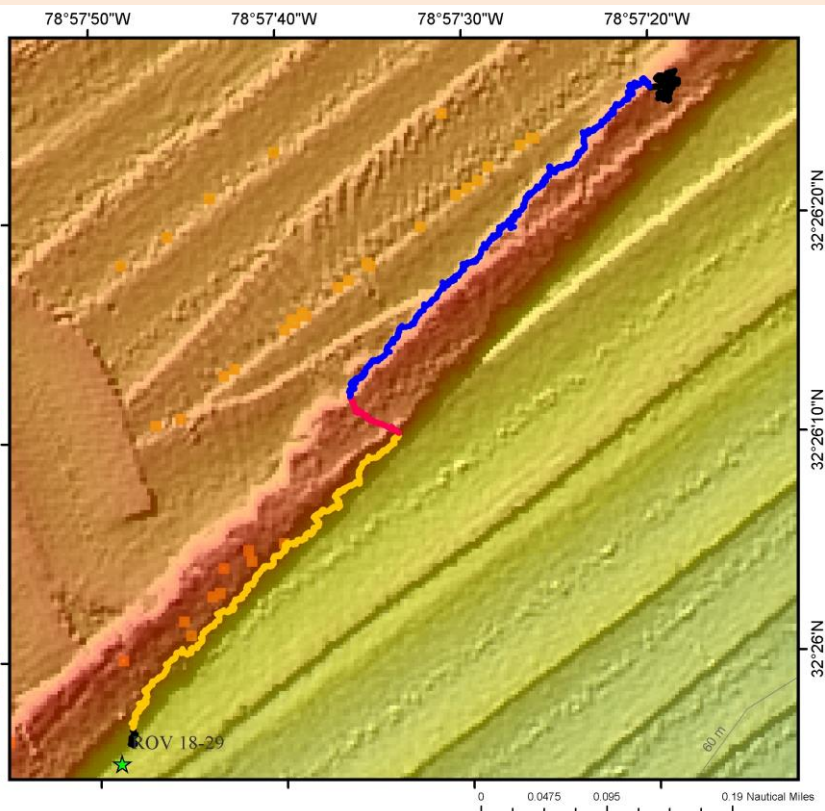
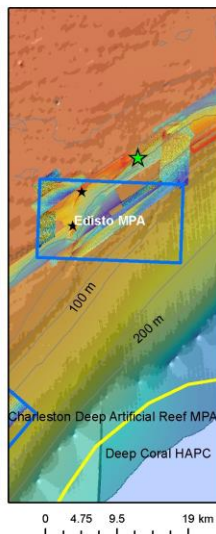
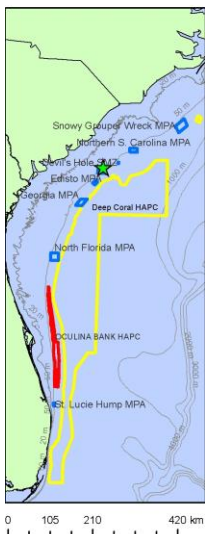
Dive Site: South Carolina, Outside Edisto MPA; Ridge ED-4; 52 m; ROV 18-29, UNCW 599; 23-V-18-1

General Location and Dive Track:

South Carolina, Outside Edisto MPA;
Ridge ED-4; 52 m; ROV 18-29,
UNCW 599; 23-V-18-1

- ★ ROV 18-29
- ★ Mohawk ROV
- ★ CTD
- 201805231 - Transect 01
- 201805231 - Transect 02
- 201805231 - Transect 03
- ROV Track

- Oculina HAPC
- MPA
- Deep Coral HAPC



Site Overview:

Project: MPA Grant

Principal Investigator: Stacey Harter

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

Webpage: <https://noaateacheratsea.blog/author/jenniferkdean2018/>

Scientific Observers: John Reed, Stephanie Farrington, Andrew W. David, Stacey Harter, Jason White, Felicia Drummond, Eric Glidden, Elizabeth Gugliotti, Jennifer Dean

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst:

Date Compiled: 6/13/2019

Dive Overview:

Vessel: NOAA Ship *Pisces* Cruise 18-02

Vehicle: Mohawk ROV

Sonar Data: Pisces_2013_EdistoNorthOfMPA_MB

Purpose: Survey the SAFMC Shelf Edge MPAs

Sensors: Temperature (°C), Depth (m)

Date of Dive: 5/23/2018

Data Management: Access Database

No. Specimens: 0

No. Photos: 335

No. DVD: 3

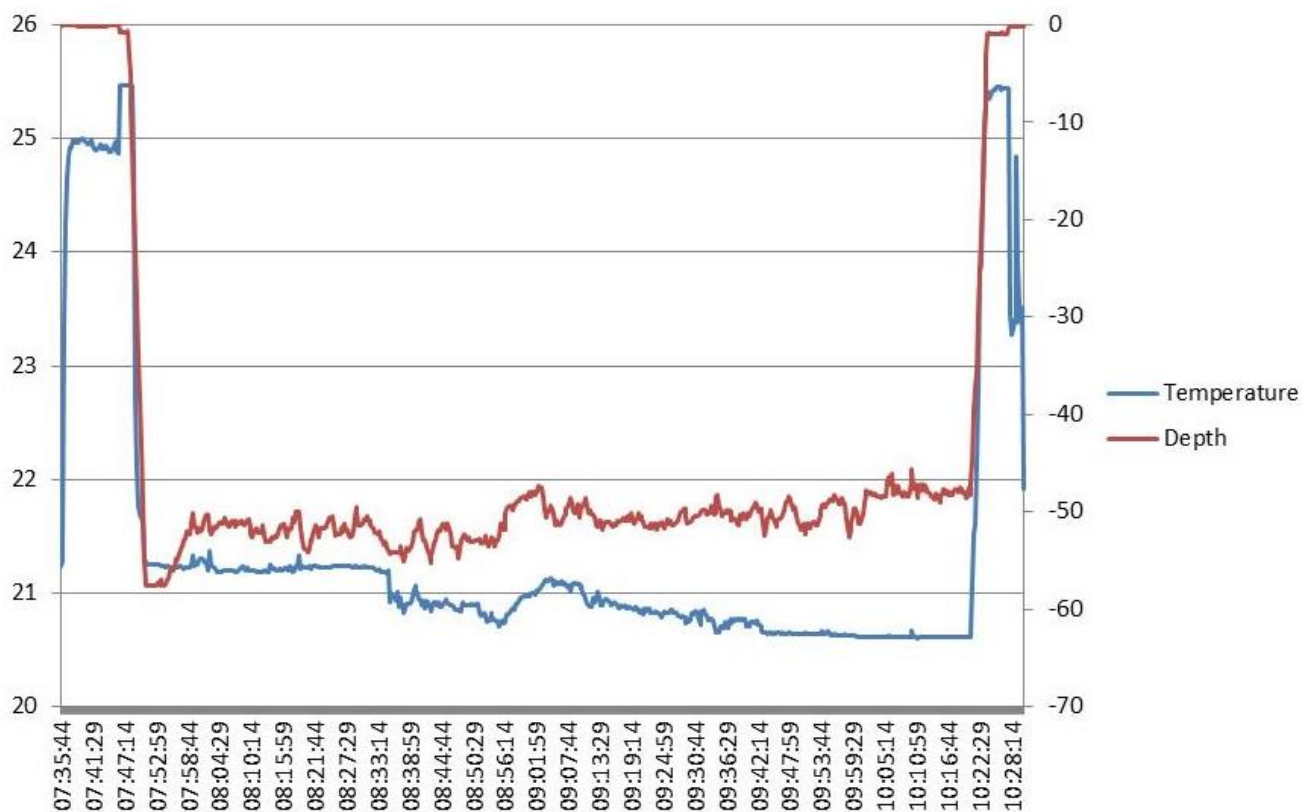
No. Hard Drive: 1

Dive Site: South Carolina, Outside Edisto MPA; Ridge ED-4; 52 m; ROV 18-29, UNCW 599; 23-V-18-1

Dive Data:

Minimum Bottom Depth (m):	46.3	Total Transect Length (km): 1.482		
Maximum Bottom Depth (m):	58.9	Surface Current (kn):	0.3	
On Bottom (Time- EDST):	7:50	On Bottom (Lat/Long):	32.4323°N; -78.9634°W	
Off Bottom (Time- EDST):	10:19	Off Bottom (Lat/Long):	32.4406°N; -78.9553°W	
Physical (bottom); Temp (°C):	21.3	Salinity: N/A	Visibility (m): 10	Current (kn): 0

Physical Environment:



Temperature and Depth were collected with a Sea-Bird CTD attached to the ROV (recording descent, bottom and ascent). The ranges of the bottom data recorded during ROV 18-29 are as follows: Depth Maximum: 57.6 m, Temperature: 20.6-21.4 °C.

Dive Site: South Carolina, Outside Edisto MPA; Ridge ED-4; 52 m; ROV 18-29, UNCW 599; 23-V-18-1

Dive Imagery:



Figure 1: -57.3 m
Swiftia exserta gorgonian. An incredible 1,737 were counted on the dive.



Figure 2: -52.3 m
Field of *Swiftia exserta* (white with polyps extended).

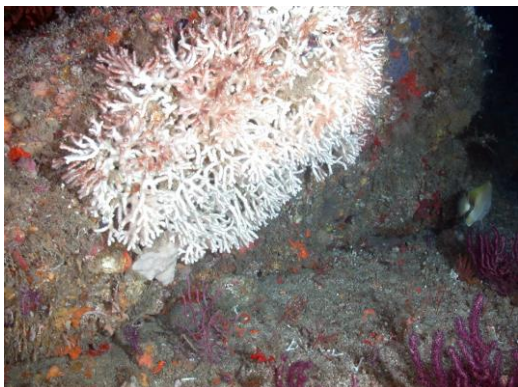


Figure 3: -52.8 m
Large white azooxanthellate coral (*Madracis myriaster*) on rock boulder.

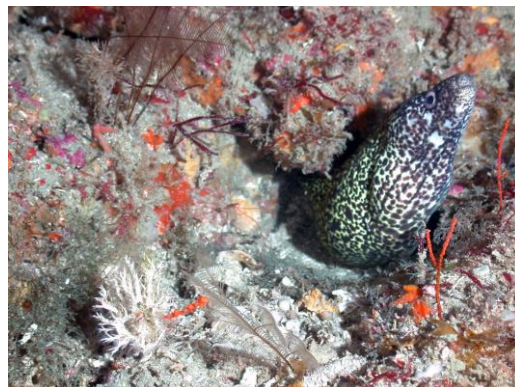


Figure 4: -53.4 m
Spotted moray eel.



Figure 5: -53.6 m
Pair of hogfish on slope of ridge.



Figure 6: -53.5 m
Spiny lobster (*Panulirus argus*) takes shelter under rock.

Dive Site: South Carolina, Outside Edisto MPA; Ridge ED-4; 52 m; ROV 18-29, UNCW 599; 23-V-18-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 23-V-18-1; ROV 18-29, UNCW Dive 599; South Carolina, Outside Edisto MPA, ED4, 55 m.

Objectives- Ground truth MB map; conduct continuous photo/video transect for fish population characterization and digital still photo transects for habitat and benthic macrobiota characterization.

ROV Setup/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in ESDT. Dive Notes were recorded by Farrington/Reed (HBOI) directly into Access database. Fish data were recorded by Stacey Harter, Andy David, and Felicia Drummond (NOAA Fisheries) in separate Access database which was compiled with the benthic database. SBE 39 temperature recorder on ROV.

Replaced Kongsberg camera with Insite Scorpio digital still camera. Images were shot in shutter priority 1/125th, fine mode, strobe on, auto focus; photos were taken every 2 minutes. Quantitative photo transects used the digital still camera pointing straight down or forward on vertical rock, ~1.0 m off bottom. Non-quantitative photos for habitat and species identifications were logged separately as 'Non-XS Photo'. Screen grabs were made from High-Def video with time/date stamp as filenames and also logged as 'Non-XS Photo-screen grab'. Fish counts used the video camera pointed forward and down ~20° to view from the horizon to close up. Still camera had 10-cm parallel lasers for scale (green; in field of view of video camera). Direction of transects were generally along the geological feature, but generally headed N, depending on the ship's maneuverability with the wind and current.

ROV depth off by -1.0 m (1 m too shallow). All depths noted below are actual depth (added 1 m to ROV readout). Collection skid removed.

Digital still camera and video screen grabs used for transect photos.

Site Description/Habitat/Biota:

Depth range: 50- 59.8 m

MB map shows NE-SW ridge, 19 km long, 94 m wide, 52 m top of ridge, 58- east base; 55- west base; transect NE along ridge.

Weather- Cloudy, seas 2-3 ft from SE, wind 9 kn from 245 dg, air- 25.37 C, surface water- 25.47 C, salinity- 36.06 PSU, current- 0.3 kn to 65.

7:46- Launch

7:50- On bottom- 59.8 m; visibility- 10-15 m, current- 0.1 kn from NE

At Wp, base of east slope, sand/shell hash, Lizardfish, rubble, lionfish,

Flat boulders, sponges- yellow orange white encrusting, Spirastrellidae, *Diodogorgia*, *Swiftia exserta*, *Stichopathes*, *Tanacetipathes* bushy, Antipathes fans, 1 m relief boulders, ledges, 10 dg slope, *Schizoporella*, Didemnidae, *Antipathes atlantica*, dense biota, *Ircinia campana*,

7:58- 2-3 m ledge at top of slope, filefish, top of ridge with dense field of *Swiftia*, top of ridge 53 m, high rugosity, 20o slope extends over 15 m wide, hydroids, 25 cm *Oculina/Madracis* white, spotted eel, spotfin butterfly, porgy, black bar soldier fish, blue angel, spotfin, graysby, spanish hog, hogfish, goat fish, red

snapper, rock beauty, tomtate.

8:08- Heading NE along slope, scamp, cubbyu, spherical yellow Demo, stripped grunt, DMST sponge, reef butterfly.

8:17- top edge of ridge- 52 m; flat rock pavement on top, dense biota. Slope- 2-3 m ledge at top, large flat boulders 1-2 m relief, 10-20 dg slope, abundant gorgonians- *Swiftia*, *Diodogorgia*, black coral, *Arbacia punctulata*, lobster, scamp, *Callyspongia vaginalis*, juvenile yellowmouth grouper, Rhodophyta- thin flat purple blade, 10 cm orange *Nicella*, fishing line, snake eel, slipper lobster, long line, mutton snapper.

8:45- 53.5 m, slope, same habitat and biota, longline, *Titanideum* sp., long line, *Ellisella* long branches, *Geodia neptuni*, *Ircinia* sp., 30 cm *Muricea*.

8:57- Change heading, head NW across top of ridge, flat pavement, 100% rock, no ledges, same biota as slope, abundant *Swiftia* and *Diodogorgia*, 50.5 on top. *Aplysina* white tubes, cowfish.

9:02- west slope of ridge, similar to east slope. 2-3 m relief ledge at top, 1-2 flat boulders on slope, 10-20 dg slope, 15 m wide slope, 53.2 m lower slope, 50 cm long branched *Ellisella*, same biota, lower slope with ½ m flat rock slabs, flattens out. Dense tomtate, *Swiftia*, *Ircinia campana*, *Filograna*, CCA.

9:09- base of west slope, 52.4 m, sediment, total relief 2 m. Head NE along west slope. *Carijoa* on wall, big eye, scamp, *Antipathes atlantica*, *Stichopathes*, trumpet fish, pile of fishing line, *Aiolochoia crassa*, scamp.

9:35- 50 m top edge of ridge; back on slope, Cornetfish.

9:43- 54.4 m base of west slope, coarse sand. Total relief of west slope- 4 m. *Prognathodes aya*, Coral-*Madracis/Oculina*, cowfish, grey snapper.

10:01- End west slope transect, head to top of ridge for scientists to drive ROV. Good luck.

First driver- Jennifer Dean, Elizabeth.

10:21- end dive.

Dominant Benthic Macrobiota:

Scleractinia- *Madracis myriaster/Oculina varicosa* (2)

Antipatharia- *Stichopathes luetkeni*, *Tanacetipathes* sp., *Antipathes atlantica*

Gorgonians- *Diodogorgia nodulifera*, *Icilogorgia schrammi*, *Ellisella* sp., *Swiftia exserta* (1737), yellow *Nicella* sp., *Titanideum frauenfeldii*, *Muricea* sp., *Carijoa* sp.

Hydroida

Porifera- orange white yellow encrusting, Spirastrellidae, *Geodia neptuni*, *Ircinia campana*, spherical yellow Demosponge, DMST, *Callyspongia vaginalis*, *Aplysina* spp, *Aiolochoia crassa*

Annelida- *Filograna* sp.

Echinodermata- *Arbacia punctulata*

Decapoda- *Panulirus argus*

Bryozoa- Schizoporella

Ascidiacea- Didemnidae

Algae- CCA, Rhodophyta- thin flat blades

Human debris:

Fishing line, long line- common

Dive Site: South Carolina, Outside Edisto MPA; Ridge ED-4; 52 m; ROV 18-29, UNCW 599; 23-V-18-1

CPCe Percent Cover Analysis:

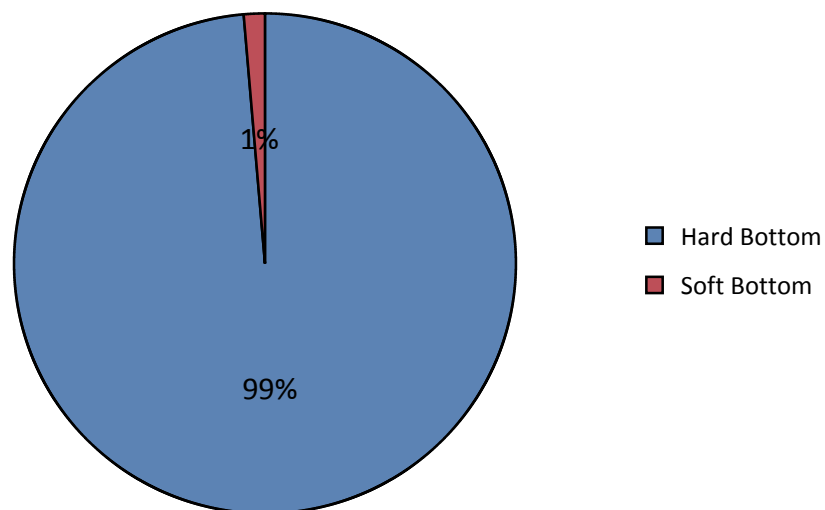


Figure 1. Percent cover of hard and soft bottom substrate at dive site ROV 18-29. CPCe© points on organisms were scored as the underlying substrate (hard or soft).

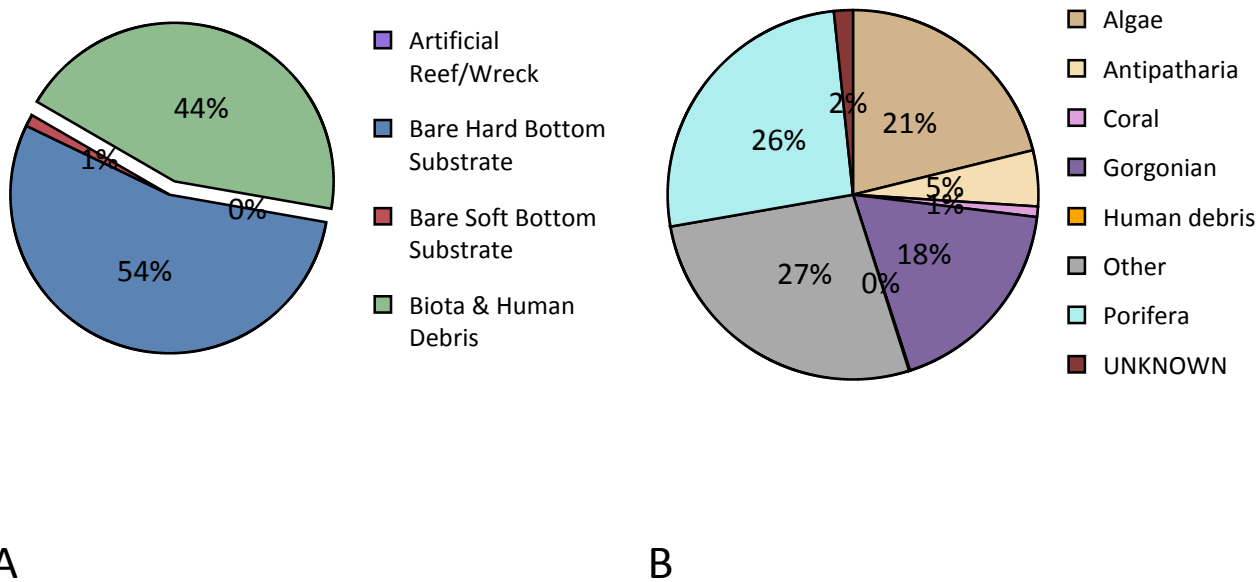


Figure 2. Percent cover of bare substrate and benthic macro-biota at dive site ROV 18-29. A) CPCe percent cover of biota and bare substrate (artificial reef/wreck, hard or soft bottom). B) Relative CPCe percent cover of biota and human debris.

Dive Site: South Carolina, Outside Edisto MPA; Ridge ED-4; 52 m; ROV 18-29, UNCW 599; 23-V-18-1

Percent Cover of Benthic Macro-Biota and Substrate:

Table 1. Dive notes and percent cover (CPCe analysis) of benthic macro-biota and substrate from photographic transects at dive site ROV 18-29.

	ROV 18-29	
	%	Note
Biota	44.35%	X
Algae	9.38%	X
Algae- Unid.	3.64%	
Ochrophyta	0.25%	X
<i>Dictyota</i> sp.	0.12%	
Ochrophyta	0.12%	X
<i>Padina</i> sp.		X
Rhodophyta	5.49%	X
Corallinales	3.52%	
Corallinophycidae		X
Rhodophyta	1.97%	X
Porifera	11.59%	X
Demospongiae	11.59%	X
<i>Agelas clathrodes</i> (Schmidt, 1870)		X
<i>Aiolochoira crassa</i> (Hyatt, 1875)		X
<i>Aplysina</i> sp.	0.04%	X
Axinellidae		X
<i>Callyspongia (Cladochalina) vaginalis</i> (Lamarck, 1814)	0.25%	X
<i>Cinachyrella</i> sp.		X
<i>Clathria</i> sp.	0.12%	
Demospongiae- DMST	0.41%	X
Demospongiae- unid. sp.	6.72%	
<i>Geodia neptuni</i> (Sollas, 1886)		X
<i>Geodia</i> sp.		X
<i>Ircinia</i> sp.	0.04%	
<i>Niphates</i> sp.	0.04%	
Spirastrellidae	3.93%	
<i>Xestospongia</i> sp.	0.04%	
Coral	0.41%	X
Coral- Scleractinia	0.41%	X
<i>Madracis myriaster</i> (Milne Edwards & Haime, 1850)		X
<i>Oculina varicosa</i> Le Sueur, 1820	0.25%	X
Scleractinia- unid cup	0.16%	
Gorgonian	8.03%	X
Alcyonacea - gorgonian	8.03%	X

Dive Site: South Carolina, Outside Edisto MPA; Ridge ED-4; 52 m; ROV 18-29, UNCW 599; 23-V-18-1

Alcyonacea- gorgonian	0.20%	X
<i>Carijoa</i> sp.		X
<i>Diodogorgia</i> sp.	1.84%	X
<i>Ellisella barbadensis</i> (Pallas, 1766) syn. <i>Ellisella elongata</i>		X
<i>Ellisella</i> sp.	0.04%	X
Ellisellidae	0.04%	
<i>Muricea</i> sp.		X
<i>Nicella</i> sp.	0.94%	X
Plexauridae		X
<i>Swiftia exserta</i> (Ellis & Solander, 1786)	4.30%	X
Telesto sp.	0.66%	
<i>Titanideum frauenfeldii</i> (Kölliker, 1865)		X
Antipatharia	2.17%	X
Antipatharia	2.17%	X
Antipatharia unid. sp.	0.25%	X
<i>Antipathes atlantica</i> Gray, 1857	1.23%	X
<i>Stichopathes luetkeni</i> Brook, 1889	0.45%	X
<i>Tanacetipathes</i> sp.		X
<i>Tanacetipathes</i> sp.- bushy	0.08%	X
<i>Tanacetipathes tanacetum</i> (Pourtalès, 1880)	0.16%	X
Other	12.78%	X
Hydrozoa	7.99%	X
Hydroidolina	7.99%	X
Annelida	0.45%	X
<i>Filograna</i> sp.	0.37%	X
Serpulidae	0.04%	
<i>Spirobranchus giganteus</i> (Pallas, 1766)	0.04%	
Bryozoa	0.41%	X
Bryozoa	0.08%	X
<i>Schizoporella</i> sp.	0.33%	X
Arthropoda		X
<i>Panulirus argus</i> (Latreille, 1804)		X
<i>Scyllarides</i> sp.		X
Echinodermata	0.04%	X
<i>Arbacia punctulata</i> (Lamarck, 1816)		X
<i>Davidaster discoideus</i> (Carpenter, 1888) Syn. <i>Davidaster discoidea</i>	0.04%	
Chordata - Invertebrate	2.42%	X
Ascidiacea	0.16%	
Didemnidae	2.25%	X
<i>Eudistoma</i> sp.		X
Chordata - Vertebrate	0.66%	X
Actinopterygii	0.66%	X

Dive Site: South Carolina, Outside Edisto MPA; Ridge ED-4; 52 m; ROV 18-29, UNCW 599; 23-V-18-1

UNKNOWN	0.74%	
Detritus	0.08%	
Bare Substrate	55.61%	
Bare Hard Bottom	54.38%	
Bare Hard Bottom	54.38%	
Bare rock, pavement, boulder, ledge	54.34%	
Bare rubble/cobble	0.04%	
Bare Soft Bottom	1.23%	
Human debris	0.04%	X
Human debris	0.04%	X
Human debris- fish line/gear	0.04%	
Human debris- fishing line		X
Human debris- long line		X
Grand Total	100.00%	X

Dive Site: South Carolina, Outside Edisto MPA; Ridge ED-4; 52 m; ROV 18-29, UNCW 599; 23-V-18-1

Density of Fish:

Table 2. Density (# individuals/1000 m²) of fish from video transects at dive site ROV 28-29.

Taxa, Author- Common name	ROV 18-29
Actinopterygii	
Anguilliformes	
<i>Gymnothorax moringa</i> (Cuvier, 1829)- spotted moray	0.24
<i>Muraena robusta</i> Osório, 1911- stout moray	0.12
<i>Myrichthys breviceps</i> (Richardson, 1848)- sharptail eel	0.35
Aulopiformes	
<i>Synodus</i> sp.- lizardfish	0.24
Beryciformes	
Holocentridae- soldierfish	0.12
Holocentridae- squirrelfish	3.54
<i>Holocentrus adscensionis</i> (Osbeck, 1765)- squirrelfish	4.71
<i>Holocentrus rufus</i> (Walbaum, 1792)- longspine squirrelfish	0.12
<i>Myripristis jacobus</i> Cuvier, 1829- blackbar soldierfish	2.83
<i>Plectrypops retrospinis</i> (Guichenot, 1853)- cardinal soldierfish	0.83
Ostraciidae	
Ostraciidae- boxfish	0.24
Perciformes	
<i>Acanthurus</i> sp.- surgeonfish	0.83
<i>Apogon pseudomaculatus</i> Longley, 1932- twospot cardinalfish	0.12
<i>Apogon</i> sp.- cardinalfish	3.30
<i>Bodianus pulchellus</i> (Poey, 1860)- spotfin hogfish	19.45
<i>Bodianus rufus</i> (Linnaeus, 1758)- spanish hogfish	0.12
<i>Calamus</i> sp.- porgy	4.71
<i>Carangoides bartholomaei</i> (Cuvier, 1833)- yellow jack	1.18
<i>Cephalopholis cruentata</i> (Lacepède, 1802)- graysby	4.60
<i>Chaetodon ocellatus</i> Bloch, 1787- spotfin butterflyfish	3.30
<i>Chaetodon sedentarius</i> Poey, 1860- reef butterflyfish	19.21
Chaetodontidae- butterflyfish	0.24
<i>Chromis enchrysurus</i> Jordan & Gilbert, 1882- yellowtail reeffish	2.12
<i>Chromis insolata</i> (Cuvier, 1830)- sunshinefish	64.47
<i>Chromis scotti</i> Emery, 1968- purple reeffish	25.70
<i>Chromis</i> sp.- damselfish	14.38
<i>Diplodus holbrookii</i> (Bean, 1878)- spottail pinfish	0.35
<i>Haemulon aurolineatum</i> Cuvier, 1830- tomtate	409.59
<i>Haemulon striatum</i> (Linnaeus, 1758)- striped grunt	159.71
<i>Halichoeres bathyphilus</i> (Beebe & Tee-Van, 1932)- greenband wrasse	1.06
<i>Halichoeres garnoti</i> (Valenciennes, 1839)- yellowhead wrasse	4.13
<i>Halichoeres</i> sp.- wrasse	4.71
<i>Holacanthus</i> sp.- angelfish	10.73

<i>Holacanthus tricolor</i> (Bloch, 1795)- rock beauty	0.59
<i>Lachnolaimus maximus</i> (Walbaum, 1792)- hogfish	0.35
<i>Liopropoma eukrines</i> (Starck & Courtenay, 1962)- wrasse bass	2.71
<i>Lutjanus analis</i> (Cuvier, 1828)- mutton snapper	0.12
<i>Lutjanus griseus</i> (Linnaeus, 1758)- grey snapper	1.41
<i>Mulloidichthys martinicus</i> (Cuvier, 1829)- yellow goatfish	2.00
<i>Mycteroperca interstitialis</i> (Poey, 1860)- yellowmouth grouper	0.12
<i>Mycteroperca phenax</i> Jordan & Swain, 1884- scamp	2.48
<i>Mycteroperca</i> sp.- grouper	0.12
<i>Pagrus pagrus</i> (Linnaeus, 1758)- red porgy	0.24
<i>Paranthias furcifer</i> (Valenciennes, 1828)- creolefish	0.24
<i>Pareques umbrosus</i> (Jordan & Eigenmann, 1889)- cubbyu	19.09
<i>Pomacanthus paru</i> (Bloch, 1787)- french angelfish	0.24
<i>Priacanthus arenatus</i> Cuvier, 1829- bigeye	1.30
<i>Pristiglenys alta</i> (Gill, 1862)- short bigeye	1.89
<i>Prognathodes aculeatus</i> (Poey, 1860)- longsnout butterflyfish	0.24
<i>Prognathodes aya</i> (Jordan, 1886)- bank butterflyfish	2.36
<i>Pseudupeneus maculatus</i> (Bloch, 1793)- spotted goatfish	4.01
<i>Rhomboplites aurorubens</i> (Cuvier, 1829)- vermilion snapper	54.22
<i>Rypticus maculatus</i> Holbrook, 1855- whitespotted soapfish	0.12
<i>Seriola dumerili</i> (Risso, 1810)- greater amberjack	0.12
<i>Seriola rivoliana</i> Valenciennes, 1833- almaco jack	4.24
<i>Seriola</i> sp.- amberjack	0.12
<i>Serranus annularis</i> (Günther, 1880)- orangeback bass	4.60
<i>Serranus baldwini</i> (Evermann & Marsh, 1899)- lantern bass	1.77
<i>Serranus phoebe</i> Poey, 1851- tattler	1.18
<i>Serranus tigrinus</i> (Bloch, 1790)- harlequin bass	0.35
<i>Sparisoma atomarium</i> (Poey, 1861)- greenblotch parrotfish	2.95
<i>Stegastes partitus</i> (Poey, 1868)- bicolor damselfish	1.06
Scorpaeniformes	
<i>Pterois volitans</i> (Linnaeus, 1758)- lionfish	11.32
<i>Scorpaena plumieri</i> Bloch, 1789- spotted scorpionfish	0.12
Scorpaenidae- scorpionfish	0.12
Syngnathiformes	
<i>Aulostomus maculatus</i> Valenciennes, 1841- trumpetfish	2.48
<i>Fistularia tabacaria</i> Linnaeus, 1758- bluespotted cornetfish	0.12
Tetraodontiformes	
<i>Acanthostracion polygonius</i> Poey, 1876- honeycomb cowfish	0.12
<i>Acanthostracion quadricornis</i> (Linnaeus, 1758)- scrawled cowfish	0.12
<i>Acanthostracion</i> sp. - cowfish	0.12
<i>Balistes</i> sp.- triggerfish	0.35
<i>Canthigaster</i> sp.- puffer	73.31
Monacanthidae- filefish	0.24

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<i>Sphoeroides spengleri</i> (Bloch, 1785)- bandtail puffer	1.06
UNKNOWN	1.77