

Cruise Report
Cuba's Twilight Zone Reefs:
Remotely Operated Vehicle Surveys of Deep/Mesophotic Coral Reefs
And Associated Fish Communities of Cuba

Joint Cuba- U.S. Expedition
R/V F.G. Walton Smith
NMSF Mohawk Remotely Operated Vehicle (ROV)
May 14- June 13, 2017

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October 31, 2017

Photo Album- Mesophotic Reefs of Cuba

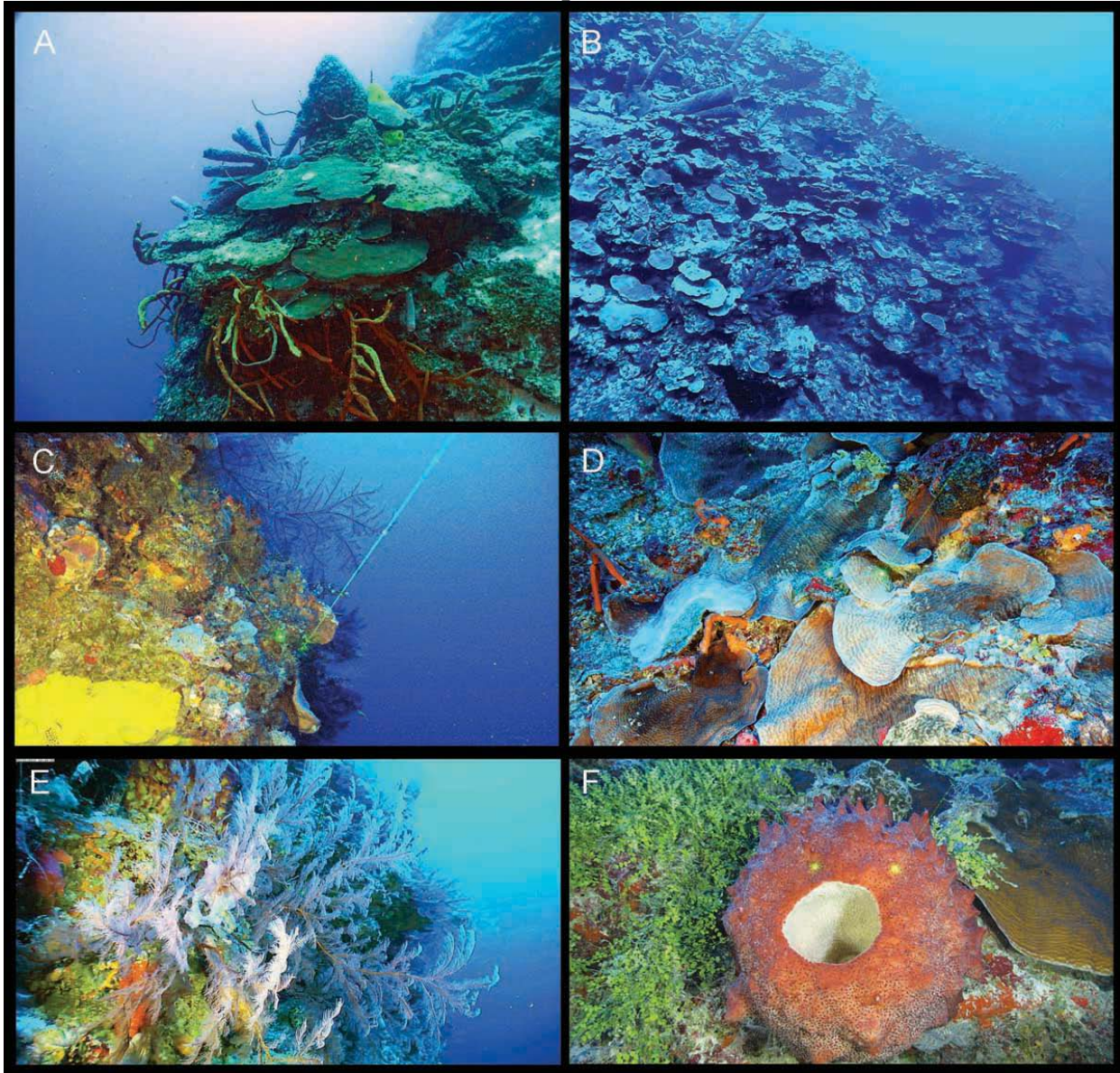


Figure 1. Habitat and reef biota of Cuba's mesophotic reefs. Deep fore-reef slope: A) 1-m diameter plates of *Orbicella faveolata*, conical *Montastraea cavernosa*, tube sponges (*Aplysina archeri*), and rope sponges (*Agelas sceptrum*, *Aplysina cauliformis*), Punta de Pedernales MPA, Station C-21, 35 m; B) dense shingle-like corals *O. faveolata*, *Agaricia* spp., *Montastraea cavernosa*, Bahía de Cochinos, Station C-33A, 30 m. Deep fore-reef escarpments (the 'Wall'): C) rock buttress with dense array of sponges (yellow sponge- *Siphonodictyon coralliphagum*), black corals, gorgonian octocorals, and stylaster corals, Guanahacabibes National Park, Station C-12B, 82 m (lasers 10 cm); D) plates of *Agaricia* including *A. grahamae*, and *A. fragilis*, Guanahacabibes National Park, Station C-12B, 64 m (lasers 10 cm); E) black coral bushes *Plumapathes* sp. on vertical wall, Guanahacabibes National Park, Station C-12B, 79 m; F) large barrel sponge *Xestospongia* sp., green alga *Halimeda* sp., and scleractinian *Agaricia* sp., Cayo Largo del Sur MPA, Station C-29, 61 m.

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SUMMARY

A joint Cuba-U.S. expedition was conducted from May 14 to June 13, 2017 to map and characterize, for the first time, the extent and health of mesophotic coral ecosystems (MCEs) along the entire coastline of Cuba. Total ship transit around the island covered ~2,778 km (~1,500 nmi). Forty-three Remotely Operated Vehicle (ROV) dives at 36 stations confirmed the presence of MCEs habitat on all coasts of Cuba. ROV dives surveyed reefs from depths of 188 m to 18 m, covered 27 km, totaled 99 hours of bottom time, and resulted in 110 hours of high-definition video. A total of 21,146 digital still images documented habitat and species, and photo transect images (7,248) will be used for future analyses of percent cover of benthic biota (corals, sponges, algae) and density of corals. The high-definition video will be used to document species composition and density of fish. 345 specimens of benthic macroinvertebrates and macroalgae were collected from mesophotic depths with the ROV, and 258 specimens from shallow snorkel dive sites; these will be used to verify taxonomy and assess population structure.

A total of 22 shipboard CTD casts were made around Cuba. Temperature and salinity data recorded by the ROV-mounted sensors showed surface temperatures ranging from 27.09 to 29.52°C for all dives. In general, temperatures were greatest along the south coast (29.52°C) and the coolest temperatures were found along the northeast coast (27.09°C). $p\text{CO}_2$ ranged between 386-490 μatm , typically having highest values in the deepest zone, and the lowest values at depths between 80-120 m, and a second peak at 60-80 m. pH ranged from 7.95 to 8.10 with the lowest values being found in the deepest zone but with no clear pattern with depth in shallower areas. Aragonite saturation state was calculated, which ranged from 3 to 5, indicating a generally healthy carbonate chemistry condition over these reefs.

Topographically, the most consistently conspicuous features were the Deep Island Slope (125->150 m), Deep Fore-Reef Escarpment (the 'Wall', 50-125 m), and Deep Fringing Reef (30-50 m). The Wall had the greatest diversity and density of macrobiota; nearly all vertical surfaces were covered with diverse sponges, algae, gorgonians, and black corals. A total of 424 taxa of benthic macroinvertebrates, 124 macroalgae, and 180 fish taxa have been identified to date from the surveys and from the collected specimens. These are preliminary results and taxonomy analysis continues. A total of 109 Cnidarian taxa (including, Scleractinia- 50, Alcyonacea- "gorgonians"- 32, Antipatharia- 15, Alcyonacea-Alcyoniina- 2) were identified. The deepest occurrences of zooxanthellate corals were *Stephanocoenia intersepta* (133 m), *Agaricia* sp. (122 m), and *Montastraea cavernosa* (101 m). Of these, *Agaricia* spp. were the most common corals, followed by *M. cavernosa* and *O. faveolata*. *Agaricia* was the most abundant scleractinian in the lower mesophotic zone, particularly from 50-75 m.

Cuban MCEs proved to be a very favorable habitat for marine sponges in both species richness and abundance. 297 distinct sponge taxa have been identified to date: 280 Demospongiae, 9 Homoscleromorpha, and 8 Calcarea, of which 115 (39%) were identified to species and 107 to genus (36%). The most frequently recorded species were the barrel sponge *Xestospongia muta* (shallow reef to 70 m), *Xestospongia* sp. Cu-1 (50-150 m), an encrusting unidentified bright yellow Verongiida (100-150 m), a large tubular *Aplysina archeri*, and several species of *Agelas*. A total of 124 taxa of macroalgae (48 Chlorophyta, 52 Rhodophyta, 24 Ochrophyta, and 1

Cyanophyta) have been identified to date. The most frequently occurring taxa were crustose coralline algae (CCA), *Halimeda copiosa*, *Lobophora* spp., and species of *Dictyota*.

A total of 149 species of fish have been identified to date from the ROV video. Between 60-150 m depths, fish diversity and abundances were low at all sites, whereas between 30-60 m the diversity increased, as well as the frequency and abundance of fish species. In the western region, sites that coincided with marine protected areas (Banco de San Antonio MPA, Guanahacabibes National Park, and Cayo Rosario MPA) showed a greater abundance of commercially important species: snapper (Lutjanidae), grouper (Serranidae), jack (Carangidae) and mackerel (Scombridae). The sites outside of marine protected areas had a lower abundance of these species, which could be an indicator of historical overfishing. Lionfish were observed at most sites but abundances were low compared to other Caribbean regions.

Regarding coral health, only 12 colonies of Scleractinia (mainly *Agaricia* sp.) out of 2,415 colonies that were recorded and annotated during the ROV dives (0.50%) showed signs of bleaching; one *Agaricia* had black band disease, and one had an unidentified disease. In general, the Cuban mesophotic corals appeared quite healthy compared to some other Caribbean reef sites. Lost or discarded fishing gear were relatively uncommon; in total, fishing line or long line were found at eight sites and one lost net was observed. In general, most dive sites appeared quite pristine with little signs of human impact.

This cruise report provides a preliminary overview of the oceanography, habitats, geomorphology, biozonation, biodiversity, and health of these reefs. Further analyses of the specimens, along with quantitative analyses of the video and photo data, will allow a more precise characterization of the diversity and relative abundance of the mesophotic communities of Cuba, as well as a better understanding of the connectivity of Cuban reefs with the Sister Sanctuaries in the U.S. and elsewhere in the Caribbean. In addition, Appendix 6 provides a detailed characterization of each dive site which will provide benchmark data for comparisons with future studies and the effects of climate change.

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INTRODUCTION

Mesophotic coral reef ecosystems (MCEs) are light-dependent benthic communities that occur in the 'twilight zone' below shallow reefs and typically range from depths of 30 m to the bottom of the photic zone, which may extend to >150 m in some regions (Baker et al. 2016). MCEs are critical habitat for diverse communities of corals, sponges, algae, and associated important commercial and recreational fisheries. However, many questions remain regarding MCEs: Do they act as refugia for shallow-water species? How are they affected by fishing impacts, global warming, ocean acidification, land based-pollution, and coral disease? What is the genetic connectivity between mesophotic and shallow reef species?

MCEs are quite common throughout the Western Atlantic regions of the Caribbean, Bahamas, Gulf of Mexico, and southeastern U.S. While considerable data have been reported regarding the distribution, ecology, and health of Cuba's shallow reefs (Alcolado et al. 2001 a, b, 2003, Aguilar et al. 2004, González-Díaz et al. 2010, 2014, Pedro, et al. 2013, Alcolado et al. 2015, González-Díaz et al. 2015, Suárez et al. 2015, Caballero et al. 2016, Ferrer Rodríguez et al. 2016), very little is known about the distribution, community structure and health of Cuba's deep mesophotic reefs.

In 2015, a Joint Statement was developed between the United States and the Republic of Cuba on Cooperation on Environmental Protection (November 24, 2015), and a Memorandum of Understanding (MOU) was signed by the U.S. National Oceanic and Atmospheric Administration (NOAA), the U.S. National Park Service and Cuba's National Center for Protected Areas. This MOU establishes a 'Sister-Sanctuary' relationship between Guanahacabibes and Banco de San Antonio marine sanctuaries in Cuba, and the Florida Keys National Marine Sanctuary (FKNMS) and Flower Garden Banks National Marine Sanctuary

(FGBNMS) in the United States. It is recognized that these regions are all inextricably linked through the flow of the ocean. In support of these agreements, a joint research cruise was conducted from May 14 to June 13, 2017 on the University of Miami's ship *F.G. Walton Smith* using a *Mohawk* Remotely Operated Vehicle (ROV), operated by the Undersea Vehicle Program, University of North Carolina at Wilmington, to survey the mesophotic reefs of Cuba.

This cruise report provides a preliminary overview of the oceanography, habitats, geomorphology, biozonation, and biodiversity of these reefs. Future analyses of the benthic specimens, along with quantification of video and photo survey data, and analysis of oceanographic data, will allow a more precise characterization of Cuba's MCEs, as well as a better understanding of the connectivity of Cuban reefs with the Sister Sanctuaries in the U.S.

PARTNERS AND COLLABORATORS

This project was jointly planned and in collaboration with organizations in Cuba and the U.S., including Centro de Investigaciones Marinas at University of Havana (CIM-UH), Centro Nacional de Áreas Protegidas (CNAP), Instituto de Ciencias del Mar (ICIMAR), Geocuba Estudios Marinos, Guanahacabibes National Park-Sistema Nacional de Areas Protegidas (PNG-SNAP), Acuario Nacional de Cuba (ANC); and for the U.S., two NOAA Cooperative Institutes: the Cooperative Institute for Ocean Exploration, Research, and Technology (CIOERT) at Harbor Branch Oceanographic Institute/Florida Atlantic University (HBOI-FAU), and the Cooperative Institute for Marine and Atmospheric Studies (CIMAS) at the University of Miami. Science personnel who participated on the cruise are listed in Table 1. The cruise was divided into two legs, and for each leg, scientists from both Cuba and the U.S. included specialists in corals, sponges, algae, fish, and oceanography.

Table 1. Science participants during *F.G. Walton Smith* cruise, May 17 to June 10, 2017.

Science Team	Institution	Position	Leg 1/2
Silvia Patricia González-Díaz	CIM-UH	Co- Chief Scientist; Marine Biology- Coral	1
Linnet Busutil López	ICIMAR	Co- Chief Scientist; Marine Biology- Sponges	1,2
Beatriz Martínez Daranas	CIM-UH	Marine Biology- Algae	1
Dorka Cobián Rojas	SNAP ECOVIDA	Marine Biology- Fish, MPAs	1
Jorge Luis Viamontes Fernández	GEOCUBA	Oceanography	1
Juliett González Méndez	CNAP	Marine Biology- Coral	2
Patricia María González Sánchez	ICIMAR-ANC	Marine Biology- Algae	2
Alain García Rodríguez	ICIMAR	Marine Biology- Fish	2
Daniel Estrada Pérez	GEOCUBA	Oceanography	2
John Keith Reed	HBOI-FAU	Co- Chief Scientist; Marine Biology- Corals, Geology	1,2
Stephanie Frances Farrington	HBOI-FAU	Marine Biology, Database Manager	1,2

Maria Cristina Diaz Rhonda	HBOI-FAU	Marine Biology- Sponges	1,2
Mingshun Jiang	HBOI-FAU	Oceanography	1
Andrew Whitney David	NOAA Fisheries	Marine Biology- Fish	1
Michael Scott Studivan	HBOI-FAU	Marine Biology- Coral	1
Michael Dennis Hanisak	HBOI-FAU	Marine Biology- Algae; Website	2
Joshua Daniel Voss	HBOI-FAU	Marine Biology- Coral	2
Felicia Marie Drummond	NOAA Fisheries	Marine Biology- Fish	2
Lance Wesley Horn	UNCW	ROV Operator	1,2
Jason Henry White	UNCW	ROV Operator	1,2

Leg 1- May 17- May 29; Leg 2- May 30- June 12, 2017

CIM-UH: Centro de Investigaciones Marinas, Universidad de La Habana

SNAP ECOVIDA: Sistema Nacional de Areas Protegidas; Parque Nacional Guanahacabibes

ICIMAR: Instituto de Ciencias del Mar

Geocuba Estudios Marinos

ANC: Acuario Nacional de Cuba

HBOI-FAU: Harbor Branch Oceanographic Institute at Florida Atlantic University

NOAA Fisheries: National Marine Fisheries Service, Southeast Fisheries Science Center

PURPOSE AND OBJECTIVES

The purpose of this research cruise was to discover and characterize, for the first time, the extent of mesophotic reefs along the entire coastline of Cuba, and to compare the health and connectivity (physical, genetic and ecological) among both mesophotic and previously well-characterized shallow reef systems in Cuba, the southeastern United States, and Gulf of Mexico (in particular, the FGBNMS and FKNMS). Moreover, the project will directly address a recommendation in the Report from MarCuba (2015) in which the U.S. and Cuban participants in this project stated their intention to initiate an international collaboration.

We intend to share information ranging from scientific research outputs to education and outreach materials – all of which will help us better understand and manage some of the most ecologically significant marine habitats in both countries. Main themes for collaboration with our international institutions include: academic exchange and capacity building, regional modeling of marine connectivity, mesophotic reef studies, and exchange of information and methodologies. Never before has it been possible to study the distribution and basic oceanographic, biological and ecological processes that take place in MCEs around Cuba. This research cruise is of special significance to understanding the ecological processes at local and regional levels.

The specific objectives of this expedition were to:

1. Characterize Cuba's mesophotic coral reef ecosystems (MCEs) using ROV video/photographic surveys of the benthic habitat, benthic macroinvertebrate and macroalgal communities, and fish populations.

2. Conduct fish surveys including counts of reef fish, commercially important grouper/snapper species, documentation of spawning aggregations, and lionfish counts.
3. Understand the genetic connectivity of Cuba's MCEs with mesophotic and shallow reefs upstream and cross-stream (including the Sister-Sanctuaries: Guanahacabibes and Banco de San Antonio in Cuba, and the FGBNMS and FKNMS in the U.S.).
4. Characterize the health of Cuba's MCEs as compared to other MCEs.
5. Conduct research related to the role of Cuba's MCEs as potential refugia for shallow reef species and reef-associated species in Cuba's shallow reef system.
6. Conduct ROV collections of benthic species for taxonomy and molecular analyses (samples will be archived at a designated institution in Cuba with a duplicate collection at an archival institution in the U.S.).
7. Collect oceanographic data: the ship continuously recorded surface water hydrography including near surface temperature, salinity, fluorescence, and dissolved oxygen as well water column current structure using an Acoustic Doppler Current Profiler (ADCP). This will provide a physical oceanographic survey in support of collaboration among HBOI-FAU, the University of Miami/CIMAS Ocean Modeling Center, and Cuba's ICIMAR with respect to regional connectivity.
8. Characterize the water column and benthic carbonate chemistry including aragonite saturation state for the mesophotic reefs using the ROV CTD data (temperature, salinity, dissolved oxygen, as well as recently developed state-of-the-art $p\text{CO}_2$ and pH sensors mounted aboard the ROV), and shipboard CTD/water casts with bottle samples at selected depths at each station. Water samples were also collected at the surface and bottom of each CTD station by the Cuban oceanographers and will be analyzed for nutrients (N, P), microbes, phytoplankton, and aromatic compounds.

METHODS

Ship

UNOLS (University National Oceanographic Laboratory System)
Operated by the University of Miami
R/V *F.G. Walton Smith*- Cruise No.: WS16273
IMO- 8964501; Call Sign- WCZ6292

Oceanographic Data

Shipboard oceanographic sensors continuously recorded surface water data including temperature, salinity, fluorescence, and dissolved oxygen. Three shipboard Acoustic Doppler Current Profilers (ADCP) continuously recorded current profiles down to 1000 m. A shipboard CTD and water sample rosette were cast daily to profile the dive stations including temperature, salinity, fluorescence, and dissolved oxygen. A Seabird Fastcat 49 CTD on the ROV recorded temperature, salinity, oxygen saturation profiles on each dive. SAMI-pH and $p\text{CO}_2$ sensors were mounted aboard the ROV; $p\text{CO}_2$ sampling rate was 1 per minute, whereas pH sampling rate was typically one per minute.

***Mohawk* ROV**

The *Mohawk* remotely operated vehicle (ROV) is owned by the NOAA National Marine Sanctuaries Foundation and operated by the Undersea Vehicles Program at the University of North Carolina in Wilmington. The ROV was deployed with 300-lb down weight from stern of the ship. The fiber optic umbilical and ROV are capable of operations to depths of 300 m but dives were limited to <200 m.

ROV Video Camera

Video was continuously recorded throughout each dive with a high-definition video camera (Insite Pacific Mini Zeus CMOS color zoom camera with 2,000,000 effective pixels). High-definition video was recorded to external hard drives and used as the primary data source for viewing by the science team during the dive. In addition, frame grabs were taken from the high-definition video to document species and habitat. A second standard definition copy was also recorded to a hard drive as well. 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 Chief Scientist.

ROV Digital Still Camera

Digital still images were taken throughout each dive to document habitat and benthic macrobiota with a high-definition digital still camera (Kongsberg OE14-408, with resolution of 3648x2736 pixels). Each image filename was coded with corresponding EDST time and date (using Stamp 2.8 by Tempest Solutions[®]) which was imported into MS Access and linked to the ROV navigation data for site-specific data of coordinates and depth, and then imported into ArcGIS[™] 10.0 Both video and still cameras had 10-cm parallel lasers for scale (green- still; red- video).

ROV Navigation

The *Mohawk* ROV used an integrated navigation system consisting of Hypack Max 2014 software on a 64-bit, 3.4 GHz, rack-mounted computer running Windows 7. Data from an ORE Offshore 4410C Trackpoint II USBL Acoustic Tracking System, Northstar 951XD differential GPS, Azimuth 1000 digital compass, and the *Mohawk* ROV data, fed to this computer. The Trackpoint II system communicated acoustically to an ORE Offshore 4377A transponder with depth telemetry on the ROV to provide slant range, bearing, and depth from the support vessel so that latitude and longitude could be assigned to the ROV. The integrated navigation system provided real time tracking and orientation of the ROV and ship to the ROV pilot and the support vessel’s bridge for navigation. Geo-referenced TIFF files obtained from bathymetric charts and multibeam sonar maps were entered into Hypack as background files to display target sites and features of interest to aid in ROV and ship navigation. Hypack also exported ROV position data in real time as a NMEA data string. Ship and ROV positions, ROV depth, heading and altimeter data, were logged and processed after each dive day and provided to the Chief Scientist in an Excel spreadsheet file.

ROV Collection Skid

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

most dives, and will be used as museum specimens and for taxonomic identification, genetic analysis, and coral health studies.

ROV Survey Protocol

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

1. Two 3-4 hour dives were made each day with the *Mohawk* ROV, covering approximately 1.0 km per dive. A continuous video/photo transect commenced at the maximum depth of ~150 m and continued upslope to the upper mesophotic reef zone or about 30 m. Speed over ground was approximately $\sim\frac{1}{4}$ knot (12.5 cm/s). Direction of transects were haphazard, but generally headed upslope and along the upper wall and deep fore-reef crest, but also depended on the ship's maneuverability with the wind and current. If a second dive was made at the same dive site, it was usually for sample collections and additional fish surveys.
2. Video was used for general habitat characterization and analysis of fish populations. The camera was typically angled down $\sim 30^\circ$ to view both near and far to the horizon for fish aggregations and habitat. The video was viewed in real time on the support vessel by scientists familiar with the mesophotic biota; audio annotations describing habitat, benthic biota, and fish were recorded onto the video. All fish will be identified and counted from the video transects. The total distance (km) of each dive will be used to calculate the linear density (# individuals/km) of each fish species, emphasizing commercially and recreationally important species and lionfish.
3. Quantitative horizontal and vertical photo transects used the digital still camera pointing perpendicular to the substrate (~ 1 m off bottom). During horizontal transects, 30 random (haphazard) images were taken while maintaining a constant depth. At most sites, this transect was made horizontally along a depth contour where *Agaricia* spp. and *Montastraea cavernosa* corals first became common (usually between 50 and 70 m depths), and was perpendicular to the face of the vertical rock wall or overhanging rock buttresses, so the camera was actually pointed straight forward toward the wall. Time and distance of the quantitative transects varied depending on currents and topography, but generally were about 15 minutes, and transited ~ 100 m. Vertical photo transects for habitat characterization and species identifications were also logged during the entire dive from 150 m to the reef crest, usually 30-40 m. These will be analyzed based on depth zones. Non-transect images, such as purposeful images to document a specific species, will not be included in the quantitative analyses. Poor and unusable images (blurred, too far off bottom), and overlapping images will also be removed from the quantitative analyses. Still images will be analyzed using CPCe[®] 4.1 software (Kohler and Gill 2006) to determine relative percent cover of benthic biota and habitat types, as well as coral colony diameter and density.

4. All data documentation (digital images, video, and dive annotations) were geo-referenced to ROV position after the cruise by matching the date and time to the ROV navigation files in our CIOERT At-Sea Access Database. Metadata and habitat dive notes were recorded during the dive into a Microsoft Access® database which links to the ROV navigation data. Teams of U.S. and Cuban scientists specializing in coral, sponge, algae, and fish taxonomy recorded data in separate Access® databases which were later combined with the benthic habitat database.

Selection of Dive Sites for ROV Surveys

Locations of proposed dive sites were compiled prior to the cruise based on data from various sources: 1) recommendations from CIM-UH, CNAP, and ICIMAR; 2) NOAA multibeam maps, and regional coastal bathymetric charts; and, 3) site data from HBOI's *Johnson-Sea-Link* manned submersible 1997 expedition (Discovery Channel "Forbidden Depths" documentary). Some sites were selected directly offshore of well-characterized shallow-water reef sites or within Marine Protected Areas (MPAs). Except for Banco de San Antonio, there are no high-resolution multibeam maps of the deep reef region; therefore, specific sites were selected from the relatively low-resolution bathymetric charts at depths of 30- 150 m. In order to circumnavigate the island in the time available, transit between sites at night was generally from 50- 150 km. Additional dive sites were selected within the Guanahacabibes National Park region.

Snorkel Dives

Snorkel dives were made when weather conditions and logistics made it possible. GoPro video was used on most dives to document habitat and collections of corals. Specimens of *Montastrea cavernosa* were collected for genetic analysis. Specimens of algae and sponges were also collected for taxonomy and genetics.

Specimen Collections

Benthic macrobiota were collected with the ROV and on snorkel dives. The main focus was to collect scleractinian corals, gorgonian octocorals, antipatharian black corals, sponges, and macroalgae for molecular analyses and taxonomy. In addition, other invertebrates of interest were collected. It was not possible to collect fish with the ROV. For the corals, we primarily focused on the scleractinian corals *Agaricia* spp. and *Montastraea cavernosa*. When possible, each specimen was divided in half which went to both countries. Specimens were also subsampled for taxonomic reference samples, genetic samples, and coral health studies. Scleractinian coral specimens will be used for population genetics, gene expression, and symbiont analyses. Corals were collected for genetic analysis in order to understand the genetic connectivity of Cuba's MCEs with mesophotic and shallow reefs upstream and cross-stream (including the Sister-Sanctuaries: Guanahacabibes and Banco de San Antonio in Cuba, and the Flower Gardens National Marine Sanctuary and Florida Keys National Marine Sanctuary in the U.S.).

Each specimen was given a unique sample number, and stored in glass jars which were bar coded with chemical resistant labels. Most specimens were preserved 95% ethanol or 10%

formalin as taxonomic reference samples. Coral and sponge specimens for genetics were preserved in TRIzol and stored at -20°C. Some macroalgae were dried with silica gel for molecular analyses. 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.

Permits and Agreement

An agreement (“Agreement”) between the National Center of Projected Areas (CNAP) of the Ministry of Science, Technology, and Environment (CITMA) and Florida Atlantic University was executed to address the conditions for HBOI-FAU access to and use of genetic and biochemical resources and associated knowledge resulting from the joint scientific expedition. The Agreement includes an overview of the collaboration, obligations of the parties, collection of samples, exchange of knowledge, and equitable distribution of benefits, and transfer of technology and information. A permit for U.S. operations in Cuban waters was granted by the Ministerio de Relaciones de Cuba (MINREX). Permits for collections and export of marine specimens and CITES permits were enabled by Carlos Diaz (Director of the National Center of Protected Areas, CNAP).

Deliverables and Data Sharing

A complete set of original data, which included: shipboard oceanographic data, ROV CTD data, ROV navigation data, ROV video data, ROV digital images, ROV dive annotations, Microsoft Access at-Sea Database (which documented ROV dive notes, habitat, benthic biota, and fish populations), and benthic specimens, was provided to the Centro de Investigaciones Marinas, Universidad de La Habana, as designated by the participating Cuban organizations and specified in the Agreement. A second set of complete data is archived at HBOI-FAU. When possible, benthic specimens were divided in half, with one specimen remaining in Cuba and one specimen provided to HBOI-FAU. If it was not possible to divide the specimen, then it remained with the host organizations. This cruise report will be made available to the NOAA Office of Ocean Exploration and Research (OER), NOAA Office of National Marine Sanctuaries, and all collaborating institutions in U.S. and Cuba. We intend to share information ranging from scientific research to education and outreach materials. The goal of the expedition’s education and outreach is to jointly promote ocean literacy, knowledge of deep coral ecosystems, and the challenges of exploring deep ocean frontiers for public and classroom audiences.

RESULTS

Dive Summary

Thirty-six mesophotic reef stations around the coast of Cuba were surveyed during 43 ROV dives (Fig. 2, Appendix 1). In addition, eight snorkel dives were conducted on shallow reef sites (1-6 m depths). Total ship transit around the island covered ~2,778 km (~1,500 nmi). ROV dives surveyed reefs from depths of 188 m to 18 m, covered 27 km, totaled 99 hours of bottom time, and resulted in 110 hours of high-definition video (Table 2). A total of 21,146 digital still images documented habitat and species, and transect images (7,248) will be used for future analyses of percent cover of benthic macrobiota (corals, sponges, and algae), and density of

corals. The high-definition video will be used to document species composition and density of fish.

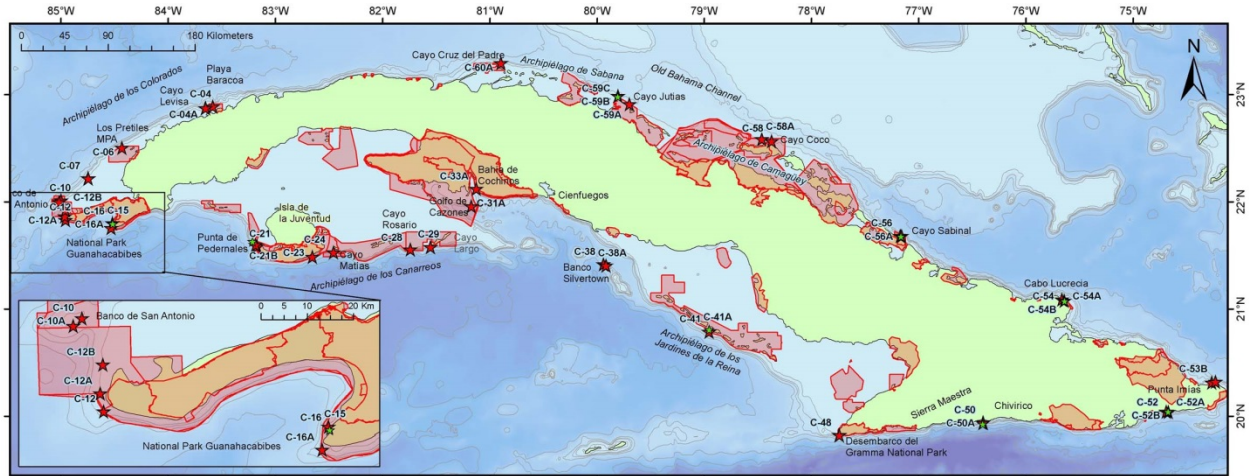


Figure 2. Map of Cuba showing ROV dive sites (red stars) on mesophotic reef sites (30-150 m depths), and snorkel (green dots) sites during the *F.G. Walton Smith* cruise, May 17 to June 10, 2017. Marine protected areas (pink polygons)- UNEP-WCMC (2017).

Table 2. Metadata from *F.G. Walton Smith* cruise, May 17 to June 10, 2017.

	ROV	Snorkel	CTD	ADCP	Total
Number of sites	43	8	22	6	79
Max Depth	188	6	450	2170	2170
Min Depth	18	1	0	15	0
Distance (km)	27.12				27.12
No. Specimens	345	258	94		697
No. Notes	5283	9	3	18	5313
Species diversity	713	93			806
Bottom Time (hrs)	98.9	12.7			111.7
DVD (video)	110				
Hard Drives (HD Video 4tb)	3				
Hard Drives (SD Video Xtb)	1				
Images					
Deck	1079	362			1441
General	1090	430			1520
Sample	654	64			718
Screengrab	11075	40			11115
Transect	7248				7248
Grand Total	21146	896			22042

Specimens Collected

Algae	138	160	298
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Chlorophyta	64	40		104
Cyanobacteria	4			4
Ochrophyta	35	33		68
Rhodophyta	35	87		122
Porifera	116	1		117
Cnidaria	63	97		160
Alcyonacea - Alcyoniina	1			1
Alcyonacea - gorgonian	21	3		24
Antipatharia	11			11
Hydrozoa	2			2
Scleractinia	28	94		122
Other	26			26
Annelida	1			1
Bryozoa	4			4
Chordata	7			7
Echinodermata	12			12
Mollusca	2			2
Non-Fauna	2			2
Rock	2			2
Water/Plankton			94	94
Grand Total	345	258	94	697
Subsamples				
DNA	49	94		143
Frozen -20 C	56	4		60
Taxonomy	680	235		915
Water			135	135
Sub Samples Total	785	333	135	1253

Oceanographic Data

A total of 22 shipboard CTD casts were made around Cuba (Appendix 2). During the first week six ADCP transects were conducted along the northwest coast from the dive sites out to 10 nmi offshore, although the ADCP ran continuously during the entire cruise. The surface currents along the western half of Cuba, between Havana and Cienfuegos, were likely part of the Cuban Countercurrent, which flows counterclockwise against the Caribbean and Florida Currents (Fig. 3). Along the southeastern coast from Archipiélagos de Jardines de la Reina and to the eastern end, which abuts the northern steep slope of Cayman Trench, currents were generally eastward. Surface currents were counterclockwise around the eastern end of Cuba. Surface currents along the northeastern Cuban coast, however, did not have a prevailing direction. Temperature and salinity recorded by the ROV showed surface temperatures ranging from 27.09 to 29.52°C for all dives (Table 2). In general, temperatures were greatest along the south coast (29.52°C). The coolest temperatures were found along the northeast coast (27.09°C). At mid-depth of the dives (50 m, in the deep mesophotic zone), temperatures ranged from 25.26- 28.62°C. Minimum temperatures at the deeper depths (162- 182 m) were 21.35- 25.93°C. A thermocline of 25-28°C

was common around 80-100 m depths. Surface salinities ranged from 35.11- 36.73 PSU and at 50 m depths were 35.14- 36.77 PSU. Surface fluorescence was low at surface but most stations except those along the northwest coast exhibited a deep chlorophyll maximum at depth 80-120 m. Significant fluorescence was recorded as deep as 150 m at most stations (Figure 4). Visibility was excellent at most sites (30- >50 m), except one site directly off a creek mouth. Surface currents at the dives sites varied from 10 to 51 cm s^{-1} (0.2- 1 kn), but occasionally were in excess of 100 cm s^{-1} during which the ROV could not be safely deployed.

The $p\text{CO}_2$ measurements showed a consistent pattern with depth at most stations with highest value, $\sim 460 \mu\text{atm}$ being found at the deepest areas and lowest value at mid-depth between 80 and 120 m, corresponding to the deep chlorophyll maximum. $p\text{CO}_2$ values typically showed a second peak $\sim 430\text{-}440 \mu\text{atm}$ at around 60-80 m, and then decreased to $\sim 410 \mu\text{atm}$ at the surface. pH value shows a range between 7.95-8.1. The lowest pH value was ~ 7.95 , typically found in the deepest surveyed areas. Other than that, there was no discernable pattern with depth. pH, however, changed rapidly horizontally even at the same depth ranges, particularly over the shelf-edge fringing reefs with a de-correlation scale of 30-50 m. Based on the CTD, pH and $p\text{CO}_2$ measurements, aragonite saturation state was calculated, which ranged from 3 to 5, indicating a generally healthy carbonate chemistry condition over these reefs.

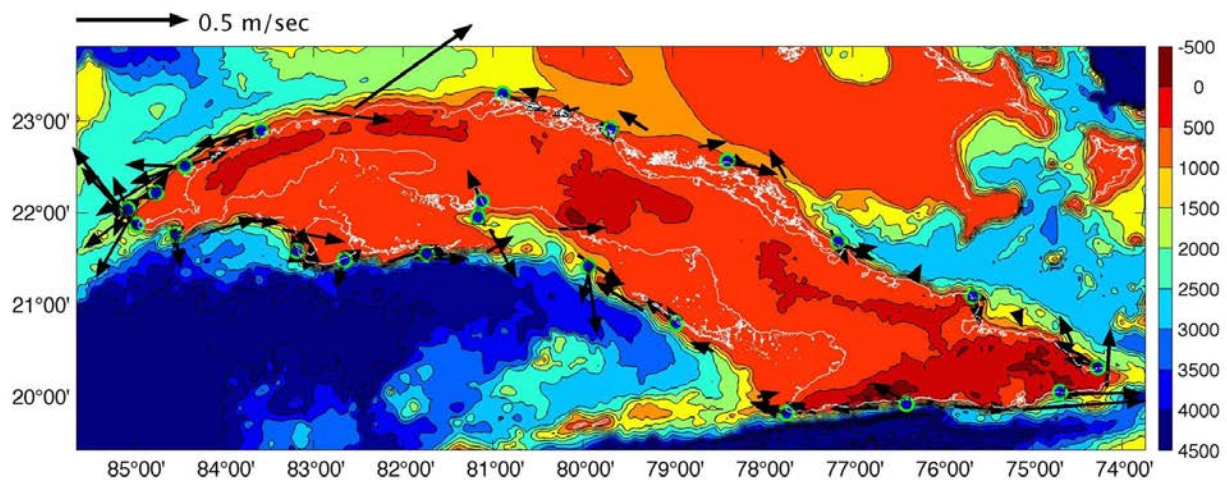


Figure 3. Shelf-edge currents around Cuba from 6-hourly mean surface currents (arrows) measured with shipboard ADCP during the *F.G. Walton Smith* cruise, May 17 to June 10, 2017. Green circles indicate the CTD stations.

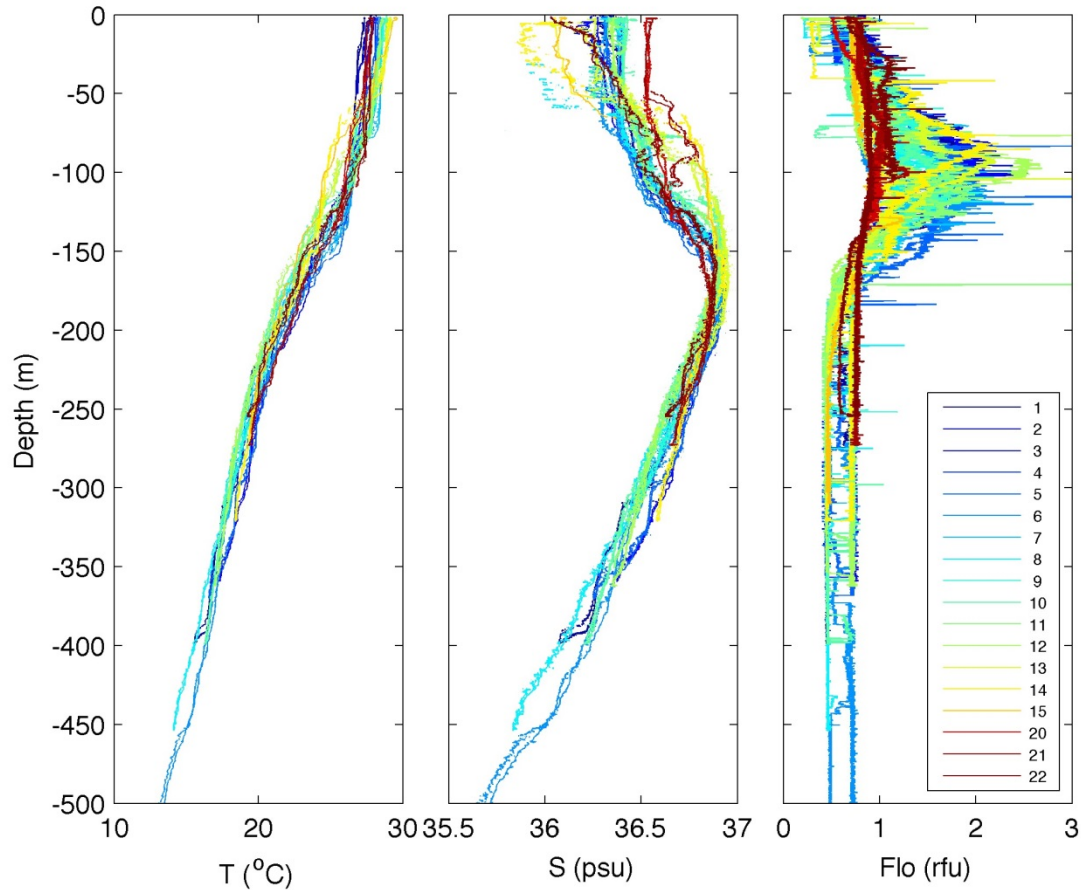


Figure 4. Water properties (temperature, salinity, and florescence) from 18 shipboard CTD casts around Cuba during the *F.G. Walton Smith* cruise, May 17 to June 10, 2017. The pump malfunctioned at stations 16 to 19 so no valid data were recorded.

Table 3. Summary of oceanographic data collected with a Seabird Fastcat 49 on the *Mohawk* ROV during the *F.G. Walton Smith* cruise, May 17 to June 10, 2017.

	Maximum Depth			Mid Depth (50 m)		Surface (1 m)	
	Depth (m)	Temperature (°C)	Salinity PPT	Temperature (°C)	Salinity PPT	Temperature (°C)	Salinity PPT
	Max	Range	Range	Range	Range	Range	Range
Northwest Coast	177.27	22.47-24.19	36.84-36.89	26.77-27.44	36.31-36.4	27.71-28.27	36.16-36.37
West Coast	182.13	22.53-25.93	36.65-36.9	27.5-28.25	36.29-36.37	28.17-28.58	36.28-36.31
Southwest Coast	162.29	22.69-24.15	35.59-36.89	27.68-28.46	35.14-36.41	28.53-29.52	35.11-36.41
Southeast Coast	162.06	22.53-24.41	36.8-36.93	25.99-28.62	36.11-36.67	28.42-29.48	36.04-36.35
Northeast Coast	162.01	21.35-25.56	36.72-37.41	25.26-27.88	36.39-36.77	27.09-28.54	35.64-36.73
Total	182.13	21.35-25.93	35.59-37.41	25.26-28.62	35.14-36.77	27.09-29.52	35.11-36.73

Collections

A total of 345 specimens of benthic macroinvertebrates and macroalgae were collected with the ROV on mesophotic reefs and 258 specimens from shallow snorkel dives (Table 2, Appendix 3). These included 298 macroalgae, 117 sponges, 122 scleractinians, 24 octocoral gorgonians, 11 anthipatharian black corals, and 26 other taxa. Preliminary analyses indicate that some specimens

are new species, and records of depth or distribution. The species lists presented herein are preliminary and considerable work remains on the taxonomy.

Geomorphology

These ROV dives documented for the first time the deep mesophotic habitat surrounding the Cuba. *A priori*, there were very little data confirming either the presence of deep mesophotic habitat or MCEs around Cuba. Many of the dive sites, especially on the eastern end of Cuba, had never been dived previously. All 43 dives confirmed the presence of MCE habitat on all coasts of Cuba. It appears from these dives that, just like the shallow reefs that fringe most of the Cuban coast, the deep reefs also parallel most of the shelf edge and along the various archipelagos for nearly 2800 km (1500 nmi). Topographically, the most conspicuous features of most of the dive sites were the deep island slope (125- >150 m), vertical wall (50-125 m), and deep fringing reef (30- 50 m). In addition, we dived on the slopes of two seamounts, Banco de San Antonio and Banco Silvertown which also had spectacular MCE habitat. The deep reef features are likely carbonate limestone, and none of the sites appeared to be granitic, even at the southeastern coast off the Sierra Maestra mountain range where we expected granitic rock slopes as the coastline drops from 1,974 m (top of peak) to the Cayman Trough (7,686 m).

The following is a general description of the deep shelf-edge region (Fig. 5):

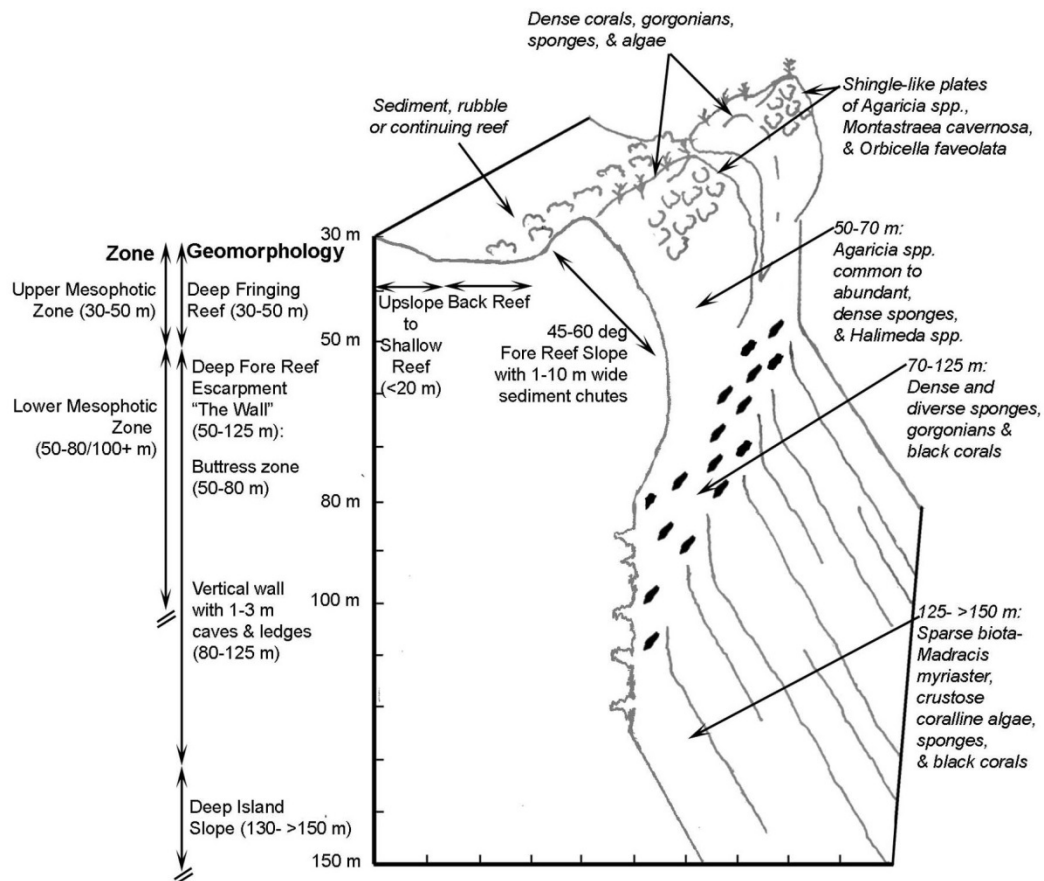


Figure 5. Schematic drawing of the general geomorphological features and biozonation of Cuba's mesophotic reefs.

Deep Island Slope (125- >150 m)- At many sites, this zone was a steep (70°), relatively smooth rock pavement slope intersected with low relief sediment chutes (1 m deep, 1-3 m wide), although some sites had slopes varying between 45° and 90° at 150 m. The surface rock usually showed horizontal layering and had scalloped erosional features (10-30 cm divots). This zone had the lowest diversity and density of biota. Fathometer profiles showed slopes of 10-45° extending to depths of 500 m.

Deep Fore-Reef Escarpment (the 'Wall', 50- 125 m)- This zone formed a near-vertical wall (80-90° slope) at most sites. The base of the wall was commonly between 100 m and 125 m depths although at many sites the wall continued to >150 m (>200 m at Station 29 off the NE coast). At some sites, the upper wall (45- 80 m) was formed of large rock buttresses which overhung the plane of the wall by 2-3 m. The buttresses were generally 10-20 m wide and were separated by sediment chutes which provide a conduit for the downslope transport of the shelf sediments (Hoskin et al. 1986). Less macrobiota occurred in the chutes that were silted with sediment. The lower wall was usually highly eroded, with karst-like topography forming caves (1-3 m diameter) and ledges (1-2 m) at depths between 60- 130 m.

Deep Fringing Reef (30- 50 m)- Seaward of the shallow reef zone (3- 25 m), a zone of deep fringing reefs generally occurred around depths of 25-30 m, that parallel the shelf edge and form a ridge or sill-like feature (3-5 m relief) at some sites. Generally, this ridge was not continuous but a series of coral encrusted mounds (5-10 m diameter, 3-5 m high) that were often intersected with sediment chutes (1-10 m wide) that cut through the reef. The fore-reef slope of this zone was typically steep (45-60°) with rocky escarpments, and spurs and grooves. The crest and deep fore-reef slope were generally covered with sponges, algae, gorgonians, and corals.

Biozonation

Mesophotic coral ecosystems (MCEs) are characterized by light-dependent corals and associated communities typically found at depths ranging from 30- 40 m and extending to >150 m in tropical and subtropical regions. Various researchers have divided the mesophotic zone into different subzones. For this paper, we use the depth of 30 m as the upper extent of the upper mesophotic zone and have used the depth of 50 m as the transition between the upper and lower mesophotic zones where we generally saw a fairly distinct change in geomorphological zonation and species. Therefore, the upper mesophotic zone is generally in the deep fringing reef region, and the lower mesophotic zone is basically on the wall and buttresses of the deep fore-reef escarpment. The definitive maximum depth of the mesophotic zone is problematic and varies from site to site based on light, sedimentation, and substrate, but was generally from 80-115 m at most sites.

Deep Island Slope (125- >150 m)- Although the deep island slope often had photosynthetic species such as crustose coralline red algae (CCA) and encrusting green algae, there were no zooxanthellate corals. Ahermatypic corals such as *Madracis myriaster* were common along with various gorgonian octocorals (*Ellisella elongata*, *Nicella goreau*, *Swiftia exserta*), black corals (*Antipathes* sp., *Tanacetipathes* sp., *Stichopathes* sp.), and Stylasterine corals (*Stylaster filigrana*). Sponges were common but not as diverse or dense as on the wall.

Deep Fore-Reef Escarpment (the 'Wall', 50- 125 m)- This is the most impressive and recurring feature of most sites along the Cuban shelf edge. This zone had the greatest diversity and density of macro-biota of the deep reefs. Starting at 100-125 m, nearly all vertical surfaces were covered with diverse sponges (e.g., *Agelas* spp., *Aplysina* spp., *Oceanapia* sp., *Xestospongia* spp.), algae (CCA, *Halimeda* spp.), gorgonian octocorals (*Nicella* spp., *Ellisella* spp., *Swiftia exserta*), and black corals (bushy *Antipatharia* to 1-2 m, and dense fields of *Stichopathes* sp.). In general, the dominant scleractinian coral on the wall were *Agaricia* (*A. fragilis*, *A. grahamae*, and *A. lamarcki*). These typically first occurred at maximum depths of 80-115 m (Table 4), and were often quite common to abundant between 50 and 70 m on the upper slope of the buttresses. The lower mesophotic zone therefore generally started around 80-115 m, but this was very variable by site. Corals were less common where there was less light, e.g., under the overhanging buttresses, on north facing walls, or where the deep fringing reef did not form a sill which would block the flow of sediments downslope. For example, one reef at Faro Roncali, Guanahacabibes National Park (Station 12A) had no ridge-like deep fringing reef to block sediment flow from the shelf, and as a result no scleractinian corals or crustose coralline algae were observed on the wall. But nearby, Station 12B had a distinct shelf-edge fringing reef with 5 m relief which blocked sediment flow and also had dense populations of plate coral on the wall and upper slope.

Deep Fringing Reef (30- 50 m)- This region forms the upper mesophotic zone where higher abundances and diversity of scleractinian species were found. *Agaricia* spp., *Montastraea cavernosa*, *Orbicella faveolata*, *Stephanocoenia intersepta* and *Porites astreoides* were dominant. Several sites, including Banco de San Antonio (Station 10A), Guanahacabibes (12B), Bahia de Cochinos (33A), and Cayo Sabinal (54B), had dense shingles of plate corals (*O. faveolata* or *Agaricia* spp.) on the fore reef slope and crest (estimated 60-80% cover at Station 33A).

Table 4. Deepest observations of macrobiota during ROV dives at all stations.

Taxa	Max. Depth (m)
Scleractinia	
<i>Stephanocoenia intersepta</i> *	133
<i>Agaricia</i> sp.	122.5
<i>Solenastrea bournoni</i> *	104.1
<i>Montastraea cavernosa</i>	100.9
<i>Helioseris cucullata</i>	79
<i>Agaricia grahamae</i>	74
<i>Orbicella faveolata</i>	72
Octocorallia	
<i>Swiftia exserta</i>	188.5
Porifera	
Verongiida Cu-01 (yellow crust)	183.3
<i>Xestospongia</i> sp. Cu-01	167.8
<i>Ceratoporella nicholsoni</i> (sclerosponge)	158.9
<i>Xestospongia muta</i>	133.8

<i>Leucetta</i> sp. (Calcarea)	123.8
<hr/>	
Chlorophyta	
<hr/>	
Chlorophyta (thin green crust)	184.6
<i>Halimeda</i> sp.	127
Rhodophyta	
Crustose coralline (CCA)	169.3
<i>Peyssonnelia</i> sp.	146.6
Ochrophyta	
<i>Lobophora</i> sp.	139.5
<i>Dictyota</i> sp.	100.5
Chordata	
<i>Pterois volitans</i> (Lionfish)	188.3
*- identifications tentative	

The maximum depth of zooxanthellate scleractinians in the world is considered to be 165 m in the Pacific, where the plate coral *Leptoseris hawaiiensis* occurs (Kahng and Maragos 2006); in the Atlantic, the maximum depth is 119 m for *A. grahamae* (Reed 1985). In the Atlantic Ocean and Caribbean Sea, nine genera and at least 18 species of hermatypic scleractinia occur to depths exceeding 70 m. Reed (1985) found ten new depth records, including *Agaricia grahamae*, *Helioseris* (syn. *Leptoseris*) *cucullata* (108 m), *Montastraea cavernosa* (113 m), and *Madracis* sp. (probably *M. decactis* or *M. pharensis* f. *luciphila*, 115 m), all on the deep fore-reef escarpments off San Salvador Island, Bahamas. The deepest records for the alga *Halimeda copiosa* (130 m) and crustose coralline algae (268 m) were also reported at San Salvador by Littler et al. (1985). In comparison, in Cuba we found *Agaricia* sp. to a maximum depth of 122.5 m, which is a new depth record in the Tropical Western Atlantic. In addition a depth record was found for *Stephanocoenia intersepta* (133 m, previously 100 m, Reed 1985).

Biodiversity

A total of 424 taxa of benthic macroinvertebrates, 124 macroalgae, and 180 fish taxa were identified from the surveys (ROV and snorkel) and from the collected specimens (Appendix 4 and 5). These species lists are preliminary and considerable work remains on the taxonomy. These data will be quantified in the future using CPCe point count for percent cover and for documenting densities of corals and fish. A SEADESC Level I Report (Southeastern United States Deep-Sea Corals) is presented in Appendix 6. This provides the following benchmark data for each dive site: cruise and ROV dive metadata, figures showing each ROV dive track and habitat zones overlaid on bathymetric 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. Table 1 of Appendix 6 lists the benthic macroinvertebrates and algae that were observed from the video and also includes specimens collected; Table 2 lists all the fish that were observed on each dive.

Corals- A total of 109 Cnidarian taxa (including, Scleractinia- 50, Alcyonacea-“gorgonians”- 32, Antipatharia- 15, Alcyonacea-Alcyoniina- 2) were identified from the surveys (ROV and snorkel). The deepest occurrences of zooxanthellate corals were *Stephanocoenia intersepta* (133

m), *Agaricia* sp. (122 m), and *M. cavernosa* (101 m) (Table 4). Of these taxa, *Agaricia* spp. were the most common corals, followed by *M. cavernosa* and *O. faveolata*. The most common octocorals were *Ellisella* sp., *Nicella* sp., Gorgoniidae, *Pseudopterogorgia* sp., Plexauridae, and *Swiftia exserta*. The most common black corals included *Stichopathes* sp., *Tanacetipathes tanacetum*, *Tanacetipathes* sp., and unidentified Antipathidae. In addition, 122 scleractinian corals were collected, some of which will be used for genetic analysis.

Sponges- Cuban MCEs proved to be a very favorable habitat for marine sponges in both species richness and abundance. We have identified 297 distinct taxa to date for all sites: 280 Demospongiae, 9 Homoscleromorpha, and 8 Calcarea, of which 115 (39%) were identified to species and 107 to genus (36%). The rest were only tentatively identified to families, orders, or classes, and are the subject of ongoing taxonomic research. The ten most frequently recorded species were the barrel sponge *Xestospongia muta* (shallow reef to 70 m), *Xestospongia* sp. Cu-1 (50-167 m), an encrusting unidentified bright yellow Verongiida (100-150 m), a large tubular *Aplysina archeri*, several species of *Agelas* (*A. sceptrum*, *A. dilatata*, and *A. citrina*), and *Mycale laxissima*. Sponges colonized all depths and substrates surveyed. The deepest records were a bright yellow Verongiida encrusting on rock (183 m), followed by abundant soft bottom associated sponge fauna (e.g., *Oceanapia* spp.), various massive genera (Tetractinellida), and crust, massive, or plate petrosiids. Peak diversity started at depths of 100-125 m where all forms of sponge morphology (crusts, plates, tubes, spherical, vases, and branches) and multicolor patterns abounded. There are at least 10 sponge species new to science within the genera of *Aiolochoxia*, *Aplysina*, and *Verongula* (Verongiida, Demospongiae), *Amphimedon*, *Callyspongia*, and *Xestospongia* (Haplosclerida, Demospongiae), *Clathria* (Poecilosclerida, Demospongiae), *Cinachyrella* (Tetractinellida, Demospongiae), *Aaptos* (Suberitidae, Demospongiae) and *Plakortis* (Homosclerophorida, Homoscleromorpha).

Algae- A total of 124 taxa of macroalgae (48 Chlorophyta, 52 Rhodophyta, 24 Ochrophyta, and 1 Cyanophyta) have been identified to date from all sites. The most frequent taxa were crustose coralline algae (CCA), *Halimeda copiosa*, *Lobophora* sp., and species of *Dictyota*. In general, the diversity and coverage of algae were very low on the deep island slope where only CCA and thin encrusting green algae occurred. Between 50- 100 m, the algae diversity and cover increased, with *H. copiosa* and CCA dominating. In the upper mesophotic zone (30-50 m), the species richness increased, with *Lobophora* sp. and other Dictyotales dominating. Some interesting records of maximum depth of algal occurrence include an unidentified green crust (185 m), crustose coralline algae (CCA, 169 m), *Peyssonnelia* sp. (146 m), *Lobophora* sp. (139 m), and *Halimeda* sp. (127 m). Cyanobacteria were observed at five sites and abundant at one described below. Detrital leaves of the marine angiosperm *Thalassia testudinum* were also observed on the deep island slope at some sites showing the vertical connectivity among coastal-marine ecosystems.

Fish- A total of 180 species of fish were observed throughout the survey. Between 60- 150 m depths, fish diversity and abundances were low at all sites, whereas between 30-60 m the diversity increased, as well as the frequency and abundance of fish species. The deep island slope zone (125- 150 m) was dominated by Blackcap Basslet (*Grama melacara*), Cave Basslet (*Liopropoma mowbrayi*), Sunshinefish (*Chromis insolata*), Blackfin Snapper (*Lutjanus buccanella*), Squirrelfish (*Holocentrus adscensionis*) and Longspine Squirrelfish (*H. rufus*). The

walls (lower mesophotic reef zone 60- 125 m) and upper fringing reef (30- 60 m) were inhabited by species common on Cuban shallow reefs, including numerous species from the families Acanthuridae, Balistidae, Carangidae, Chaetodontidae, Haemulidae, Holocentridae, Labridae, Lutjanidae, Pomacanthidae, Pomacentridae, and Serranidae. Groups of jack (*Caranx latus*, *C. ruber* and *C. lugubris*) were frequently observed. In the western area, sites that coincided with marine protected areas (Banco de San Antonio MPA, Guanahacabibes National Park, and Cayo Rosario MPA) showed a greater abundance of commercially important species: snapper (Lutjanidae), grouper (Serranidae), jack (Carangidae) and mackerel (Scombridae). The sites outside of marine protected areas had a lower abundance of these species, which could be an indicator of historical overfishing. Ten species of grouper (Serranidae) were identified throughout the sampling area including Coney (*Cephalopholis fulva*), Graysby (*Cephalopholis cruentata*), Nassau Grouper (*Epinephelus striatus*) and Red Hind (*E. guttatus*). Hundreds of Ocean Triggerfish (*Canthidermis sufflamen*) were observed at Banco de San Antonio MPA. Courtship and nest building behavior was observed, leading to the conclusion this is a spawning aggregation site. A spawning aggregation of Dog Snapper (*Lutjanus jocu*) was also observed at Cayo Coco (Station 58A) between 60 and 70 m depths. We suggest an analysis of the boundaries of the adjacent MPA, with the aim of including this spawning site to protect it from commercial fishing.

Impacts: Coral Disease, Bleaching, Fishing Gear, Lionfish, Pollution

Coral Disease/ Bleaching

Regarding coral health, only 12 colonies of Scleractinia (mainly *Agaricia* sp.) out of 2,415 colonies recorded and annotated during the ROV dives (0.50%) showed signs of bleaching; one *Agaricia* had black band disease, and one had an unidentified disease. In general, the Cuban mesophotic corals appeared quite healthy compared to some other Caribbean reef sites.

Fishing gear and human debris- Lost or discarded fishing gear were relatively uncommon; in total, fishing line or long line were found at eight sites and one lost net was observed. Most of these were found on the substrate on the upper mesophotic reefs but some were found at 100 m depths.

Lionfish (Pterois volitans)- Lionfish were observed at most sites; the greatest depth was 188.3 m at Cayo Levisa MPA (Station C-04). The abundance of lionfish was generally low, except for Cayo Coco (Station C-58) where they were relatively abundant. The presence of lionfish at greater depths makes it difficult to effectively control the species in shallow waters due to the contribution of larvae, juveniles and adults from deeper areas, where they are also difficult to catch. For this reason, there would be an intact reservoir of its populations in the mesophotic reefs which tentatively could populate reefs downstream in the U.S.

Pollution- In general, most dive sites appeared quite pristine with little signs of human impact. One site at Cayo Largo del Sur MPA (Station 29) showed evidence of nutrient pollution. At the crest of the deep fringing reef (35-40 m) there were dense areas of 1-m conical mounds, which appeared to be old dead coral, *M. cavernosa*. Landward of the fringing reef were extensive cyanobacterial mats on sediment. Alcolado (2001a) reported high nitrogen nutrients and dead

coral due to waste water near this site from a tourist resort on Cayo Largo where a sewage plant dumped partially treated waste water.

CONCLUSIONS

This Joint Cuba-U.S. Expedition provides for the first time, data on the extent and health of mesophotic coral reefs around the entire coast of Cuba, covering nearly 2,778 km (1,500 nmi). This research cruise is of special significance to understanding the distribution of the deep reefs and the basic oceanographic, biological and ecological processes that take place in MCEs around Cuba and at local and regional levels. This cruise report provides a preliminary overview of the oceanography, habitats, geomorphology, biozonation, biodiversity, and health of these reefs. Further analyses of the specimens, along with quantitative analyses of the video and photo data, will allow a more precise characterization of the diversity and relative abundance of the mesophotic communities of Cuba, as well as a better understanding of the connectivity of Cuban reefs with the Sister Sanctuaries in the U.S. and elsewhere in the Caribbean. Also these data may lead to expanding or adding new Marine Protected Areas. In addition, Appendix 6 provides a detailed characterization of each dive site which will provide benchmark data for comparisons with future studies and the effects of climate change.

LITERATURE CITED

- Aguilar C, González-Sansón G, Munkittrick KR, MacLatchy DL. 2004. Fish assemblages on fringe coral reefs of the northern coast of Cuba near Havana Harbor. *Ecotox Environ Safe* 58:126-138. [http://dx.doi.org/10.1016/s0147-6513\(03\)00104-0](http://dx.doi.org/10.1016/s0147-6513(03)00104-0)
- Alcolado PM. 2007. Reading the code of coral reef sponge community composition and structure for environmental biomonitoring: some experiences from Cuba. In: Custódio MR, editor. *Porifera Research: Biodiversity, Innovation and Sustainability*. Rio de Janeiro: Museu Nacional, p. 3-10.
- Alcolado P, Claro-Madruga R, Menéndez-Macías G, García-Parrado P, Martínez-Daranas B, Sosa M. 2003. The Cuban coral reefs. In: Cortés J, editor. *Latin American coral reefs*. Amsterdam: Elsevier Science, p. 53-75.
- Alcolado P, De la Guardia E, Pina-Amargós F, Cantelar K, González-Ferrer S, Caballero H, Ginsburg R, Lang J, Kramer P, Marks K. 2001a. Estado de salud de los arrecifes coralinos del Archipiélago Jardines de la Reina (SE de Cuba). Informe Preliminar de la Expedición CUBAGRRA II Instituto Oceanología 7:58.
- Alcolado PM, Claro-Madruga R, Martínez-Daranas B, Menéndez-Macía G, García-Parrado P, Cantelar K, Hernández M, del Valle R. 2001b. Evaluación ecológica de los arrecifes coralinos del oeste de Cayo Largo del Sur, Cuba: 1998-1999. *Bol Invest Mar Cost*. 30:109-132.
- Baker EK, Puglise KA, Harris PT. 2016. Mesophotic coral ecosystems – A life boat for coral reefs? The United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal.
- Caballero Aragón H, Alcolado PM, Rey-Villiers N, Perera Valderrama S, González Méndez J. 2016. Coral communities condition in varying wave exposure: the Gulf of Cazones, Cuba. *Rev Biol Trop*. 64:79-93. <http://dx.doi.org/10.15517/rbt.v64i1.18231>

- Fairbanks RG. 1989. A 17,000-year glacio-eustatic sea level record: influence of glacial melting rates on the Younger Dryas event and deep-ocean circulation. *Nature* 342:637-642.
- Ferrer Rodríguez VM, González-Díaz SP, Hernández Fernández L, Siciliano D, Bretos F, Appril A, Huges K, Santoro A. 2016. Salud de las comunidades de corales en arrecifes de Jardines de la Reina - Golfo de Ana María, región surcentral de Cuba. *Rev Invest Mar.* 36:34-53.
- González-Díaz P, González-Sansón G, Álvarez Fernández S, Perera Pérez O. 2010. High spatial variability of coral, sponges and gorgonian assemblages in a well preserved reef. *Rev Biol Trop.* 58:621-634.
- González-Díaz P, Perera-Pérez O, Pérez-García JA, Hernández-Fernández L. 2014. Biodiversidad de corales, gorgonias y esponjas en un sector del golfo de Ana María. *Rev Invest Mar.* 32:20-29.
- González-Díaz SP, Díaz Lopez C, Salinas Chávez E, González Sansón G, Gómez Luna L. 2015. Capítulo 6. Componentes y procesos de la zona costera. In: Contemporánea I, editor. Manejo integrado de Zonas Costeras en Cuba Coordinadora: Patricia González-Díaz. La Habana, p. 243.
- Hoskin CM, Reed JK, Mook DH. 1986. Production and off-bank transport of carbonate sediment, Black Rock, southwest Little Bahama Bank. *Mar. Geol.* 73:125-144.
- Kahng SE, Maragos JE. 2006. The deepest, zooxanthellate scleractinian corals in the world? *Coral Reefs* 25:254. <http://dx.doi.org/10.1007/s00338-006-0098-5>
- Kohler K, Gill S. 2006. Coral Point Count with Excel extensions (CPCe): a visual basic program for the determination of coral and substrate cover using random point count methodology. *Comput Geosci.* 32:1259-1269.
- Land LS, Moore C. 1977. Deep forereef and upper island slope, North Jamaica. In: Frost SH, Weiss MP, Saunders JB, editors. Reefs and related carbonates – Ecology and sedimentology. *Am. Ass. Petrol. Geol. Stud. Geol.* No. 4. p. 53-65.
- Littler MM, Littler DS, Blair SM, Norris JN. 1985. Deepest known plant life discovered on an uncharted seamount. *Science* 227:57-60.
- Pedro M, Alcolado PM, Caballero H, Guardia E, Cobián D. 2013. Condición de los arrecifes coralinos del Parque Nacional Guanahacabibes, Cuba. *REVMAR.* (5):41-62.
- Perez-Santos I, Schneider W, Fernandez-Vila L. 2015. Features and variability of the Cuban Countercurrent in the Yucatan Basin, Caribbean Sea. *Cienc Mar.* 41:65-83. <http://dx.doi.org/10.7773/cm.v41i1.2434>
- Reed JK. 1985. Deepest distribution of Atlantic hermatypic corals discovered in the Bahamas. In: Proceedings Fifth International Coral Reef Congress, Vol. 6, May 1985, Papeete, Tahiti. p. 249-254.
- Suárez AM, Martínez-Daranas B, Alfonso Y. 2015. Macroalgas marinas de Cuba, Editorial UH. La Habana, Cuba.
- UNEP-WCMC (2017). Protected Area Profile for Cuba from the World Database of Protected Areas, October 2017 (www.protectedplanet.net).

APPENDIX 1

ROV dive sites on Cuba's mesophotic reefs, and shallow snorkel dive sites during the *F.G. Walton Smith* cruise, May 17 to June 10, 2017.

Station	Dive No.	Date	Location	Latitude	Longitude	Depth Range (m)
C-04	1	05/18/2017	Cuba, NW coast, Cayo Levisa MPA, Station C-04	22°53.4830'N	83°34.9699'W	25-188
C-04A	2,3	05/18/2017	Cuba, NW coast, 2 nmi north of Cayo Arenas, Outside Cayo Levisa MPA, Station C-04A	22°52.6388'N	83°39.0630'W	49-172
C-06	4,5	05/19/2017	Cuba, NW coast, Los Pretiles MPA, Station C-06	22°30.4870'N	84°25.9078'W	43-170
C-07	6,7	05/20/2017	Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07	22°13.4054'N	84°44.8370'W	45-178
C-10	8	05/21/2017	Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10	22°00.9014'N	84°59.9478'W	25-183
C-10A	9	05/21/2017	Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A	22°00.0175'N	85°00.9774'W	30-150
C-12	10	05/22/2017	Cuba, W coast, Los Cayuelos, Guanahacabibes National Park, Station C-12	21°50.0051'N	84°57.4269'W	149
C-12A	11	05/22/2017	Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A	21°52.1115'N	84°57.8245'W	45-156
C-12B	12	05/22/2017	Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B	21°55.4775'N	84°57.4944'W	38-148
C-15	13	05/23/2017	Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15	21°48.2246'N	84°31.1370'W	25-145
C-16	Snorkel 01	05/23/2017	Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-16	21°47.8010'N	84°31.0000'W	3-4
C-16A	14	05/23/2017	Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park, Station C-16A	21°45.5120'N	84°31.8741'W	28-150
C-21	15	05/25/2017	Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21	21°35.2631'N	83°10.3254'W	25-158
C-21A	16	05/25/2017	Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A	21°36.0100'N	83°10.9436'W	28-150
C-21B	Snorkel 02	05/25/2017	Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Outside Punta Francés MPA, Station C-21B	21°37.8380'N	83°12.8520'W	4-5
C-23	17	05/26/2017	Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA, Station C-23	21°29.4195'N	82°39.2284'W	37-150
C-24	18	05/26/2017	Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA, Station C-24	21°31.9245'N	82°27.4803'W	40-150
C-28	19	05/27/2017	Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28	21°33.4690'N	81°44.4012'W	29-150
C-29	20	05/27/2017	Cuba, S coast, Archipiélago de Los Canarreos, Outside Cayo Largo del Sur MPA, Station C-29	21°34.8540'N	81°33.1300'W	26-157
C-31A	21	05/28/2017	Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A	21°57.6502'N	81°10.3554'W	18-150
C-33A	22	05/28/2017	Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A	22°07.4442'N	81°07.5186'W	30-150
C-38	23,24	05/31/2017	Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38	21°25.1806'N	79°56.3770'W	24-150
C-38A	25	05/31/2017	Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A	21°24.4700'N	79°54.9420'W	40-153
C-41	26	06/01/2017	Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41	20°47.4950'N	78°57.3230'W	30-150
C-41A	Snorkel 03	06/01/2017	Cuba, S coast, Cayo Anclitas, Pta. Practicas, Jardines de la Reina MPA, Station C-41A	20°48.6888'N	78°57.9648'W	5-5
C-48	27,28	06/02/2017	Cuba, S coast, Cabo Cruz, Outside Desembarco del Gramma National Park, Station C-48	19°49.6000'N	77°44.5510'W	40-154
C-50	29,30	06/03/2017	Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50	19°56.5515'N	76°23.9372'W	27-155
C-50A	Snorkel 04	06/03/2017	Cuba, S coast, Sierra Maestra, Los Galeones, off Hotel Brisas, Chivirico Proposed MPA, Station C-50A	19°57.7585'N	76°24.2605'W	4-5
C-52	31	06/04/2017	Cuba, S coast, Sierra Purial, Punta Imías, no MPA, Station C-52	20°02.6010'N	74°41.4980'W	60-161
C-52A	32	06/04/2017	Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A	20°02.5130'N	74°40.3450'W	43-156
C-52B	Snorkel 05	06/04/2017	Cuba, S coast, Sierra Purial, east tip of Punta Imías, no MPA, Station C-52B	20°02.5000'N	74°40.4870'W	5-6
C-53A	33	06/05/2017	Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A	20°19.0076'N	74°16.0018'W	54-155
C-53B	34	06/05/2017	Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B	20°19.4825'N	74°13.9406'W	50-142
C-54	35	06/06/2017	Cuba, NE coast, Outside Cabo Lucrecia MPA, Station C-54	21°05.5088'N	75°39.8211'W	45-151
C-54A	Snorkel 06	06/06/2017	Cuba, NE coast, Cabo Lucrecia MPA, Station C-54A	21°04.5000'N	75°38.3000'W	2-3
C-54B	36	06/06/2017	Cuba, NE coast, Cabo Lucrecia, proposed MPA, Station C-54B	21°04.8171'N	75°38.5301'W	65-156
C-56	37,38	06/07/2017	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56	21°41.0960'N	77°10.2410'W	24-150
C-56A	Snorkel 07	06/07/2017	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56A	21°40.7000'N	77°10.0000'W	1-4
C-58	39	06/08/2017	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58	22°34.1920'N	78°22.3610'W	42-140
C-58A	40	06/08/2017	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A	22°35.2620'N	78°27.7060'W	46-144
C-59A	41	06/09/2017	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A	22°54.8586'N	79°41.8540'W	22-143
C-59B	Snorkel 08	06/09/2017	Cuba, NE coast, Archipiélago Sabana-Camagüey, Outside Cayo Jutía MPA, Station C-59B	22°58.9580'N	79°48.3960'W	1-2
C-59C	42	06/09/2017	Cuba, NE coast, Archipiélago Sabana-Camagüey, Outside Cayo Jutía MPA, ¼ nmi N of snorkel Station, Station C-59C	22°59.4460'N	79°48.1880'W	30-147
C-60A	43	06/10/2017	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA, Station C-60A	23°17.7928'N	80°53.8093'W	40-161

APPENDIX 2

CTD/ADCP sites at Cuba during the *F.G. Walton Smith* cruise, May 17 to June 10, 2017.

Station	Dive No.	Date	Location	Latitude	Longitude	Depth Range (m)
C-02	ADCP 01	05/17/2017	Cuba, N coast, Norte de Playa Baracoa, Station C-02	23°03.9650'N	82°33.7293'W	15-1800
C-04	CTD 01	05/18/2017	Cuba, NW coast, Cayo Levisa MPA, Station C-04	22°53.9640'N	83°35.1060'W	2-397
C-04A	ADCP 02	05/18/2017	Cuba, NW coast, 2 nmi north of Cayo Arenas, Outside Cayo Levisa MPA, Station C-04A	22°52.4062'N	83°39.0526'W	58-1896.5
C-06	ADCP 03	05/19/2017	Cuba, NW coast, Norte de Los Pretilos MPA, Station C-06	22°30.5340'N	84°25.8382'W	115-2042
C-06	CTD 2	05/19/2017	Cuba, NW coast, Norte de Los Pretilos MPA, Station C-06	22°30.4940'N	84°25.7550'W	2-50
C-07	ADCP 04	05/20/2017	Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07	22°13.1071'N	86°64.8320'W	106-1935
C-07	CTD 3	05/20/2017	Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07	22°13.1779'N	84°44.9828'W	2-358
C-10	CTD 4	05/21/2017	Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10	22°02.3900'N	85°04.0550'W	2-31
C-10A	ADCP 05	05/21/2017	Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A	22°00.3990'N	85°01.2470'W	40-2170
C-12A	CTD 5	05/22/2017	Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A	21°52.1566'N	84°58.0803'W	2-369
C-12B	ADCP 06	05/22/2017	Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B	21°54.9500'N	84°57.5000'W	35-1371.6
C-21	CTD 6	05/25/2017	Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21	21°35.1490'N	83°10.4600'W	2-315
C-23	CTD 7	05/26/2017	Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA, Station C-23	21°29.2540'N	82°39.3100'W	2-450
C-28	CTD 8	05/27/2017	Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28	21°33.4260'N	81°44.4540'W	2-315
C-31A	CTD 9	05/28/2017	Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A	21°57.3030'N	81°10.1270'W	2-398
C-33A	CTD 10	05/28/2017	Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A	22°07.6440'N	81°07.7400'W	2-350
C-38	CTD 11	05/31/2017	Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38	21°15.1410'N	79°56.4680'W	2-362
C-38A	CTD 12	05/31/2017	Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A	21°25.1500'N	79°56.4500'W	2-350.7
C-41	CTD 13	06/01/2017	Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41	20°47.9000'N	78°57.8000'W	2-212
C-48	CTD 14	06/02/2017	Cuba, S coast, Cabo Cruz, Outside Desembarco del Gramma National Park, Station C-48	19°49.4000'N	77°44.0000'W	2-319
C-50	CTD 15	06/03/2017	Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50	19°56.4000'N	76°24.0000'W	2-301
C-52	CTD 16	06/04/2017	Cuba, S coast, Sierra Purial, Punta Imías, no MPA, Station C-52	20°02.4000'N	74°41.6000'W	2-273
C-53A	CTD 17	06/05/2017	Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A	20°19.1000'N	74°16.2999'W	2-280
C-54	CTD 18	06/06/2017	Cuba, NE coast, Outside Cabo Lucrecia MPA, Station C-54	21°05.5400'N	75°39.6500'W	2-253
C-56	CTD 19	06/07/2017	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56	21°41.3000'N	77°09.6000'W	2-253
C-58	CTD 20	06/08/2017	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58	22°34.0000'N	78°23.6000'W	2-135
C-59A	CTD 21	06/09/2017	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A	22°54.9000'N	79°41.6000'W	2-276
C-60A	CTD 22	06/10/2017	Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, outside MPA, Station C-60A	23°17.8700'N	80°53.6300'W	2-254

APPENDIX 3

Species list of benthic macroinvertebrates and macroalgae collected at mesophotic and shallow reef sites during the *F.G. Walton Smith* cruise, May 17 to June 10, 2017.

Species identifications are preliminary and are in progress.

Phylum	Class	Order	Family	Scientific Name	No. Specimen No.	No. Cuba Samples	No. HBOI-FAU Samples	CITES
Filum	Clase	Orden	Familia	Nombre Científico	Especímenes	No. Muestras Cuba	No. Muestras HBOI-FAU	CITES
Cyanobacteria	-	-	-	Cyanobacteria	4	4	2	
Chlorophyta	-	-	-	Chlorophyta	5	5	1	
Chlorophyta	-	-	-	Chlorophyta- Turf Algae	2	2	1	
Chlorophyta	Ulvophyceae	Bryopsidales	Caulerpaceae	<i>Caulerpa racemosa</i>	1	1	0	
Chlorophyta	Ulvophyceae	Bryopsidales	Caulerpaceae	<i>Caulerpa</i> sp.	1	1	1	
Chlorophyta	Ulvophyceae	Bryopsidales	Codiaceae	<i>Codium</i> sp.	1	1	1	
Chlorophyta	Ulvophyceae	Bryopsidales	Dichotomosiphonaceae	<i>Avrainvillea fulva</i>	1	1	1	
Chlorophyta	Ulvophyceae	Bryopsidales	Dichotomosiphonaceae	<i>Avrainvillea</i> sp.	3	3	3	
Chlorophyta	Ulvophyceae	Bryopsidales	Halimedaceae	<i>Halimeda copiosa</i>	5	7	4	
Chlorophyta	Ulvophyceae	Bryopsidales	Halimedaceae	<i>Halimeda discoidea</i>	3	3	2	
Chlorophyta	Ulvophyceae	Bryopsidales	Halimedaceae	<i>Halimeda goreau</i>	5	5	4	
Chlorophyta	Ulvophyceae	Bryopsidales	Halimedaceae	<i>Halimeda monile</i>	1	1	1	
Chlorophyta	Ulvophyceae	Bryopsidales	Halimedaceae	<i>Halimeda opuntia</i>	1	0	0	
Chlorophyta	Ulvophyceae	Bryopsidales	Halimedaceae	<i>Halimeda scabra</i>	1	0	0	
Chlorophyta	Ulvophyceae	Bryopsidales	Halimedaceae	<i>Halimeda</i> sp.	10	9	8	
Chlorophyta	Ulvophyceae	Bryopsidales	Halimedaceae	<i>Halimeda tuna</i>	10	10	7	
Chlorophyta	Ulvophyceae	Bryopsidales	Udoteaceae	<i>Penicillus dumetosus</i>	1	1	0	
Chlorophyta	Ulvophyceae	Bryopsidales	Udoteaceae	<i>Rhipocephalus phoenix</i>	3	2	0	
Chlorophyta	Ulvophyceae	Bryopsidales	Udoteaceae	<i>Udotea cyathiformis</i>	2	1	1	
Chlorophyta	Ulvophyceae	Bryopsidales	Udoteaceae	<i>Udotea dixonii</i>	5	2	1	
Chlorophyta	Ulvophyceae	Bryopsidales	Udoteaceae	<i>Udotea loensis</i>	2	0	0	
Chlorophyta	Ulvophyceae	Bryopsidales	Udoteaceae	<i>Udotea luna</i>	6	1	1	
Chlorophyta	Ulvophyceae	Bryopsidales	Udoteaceae	<i>Udotea</i> sp.	2	2	2	
Chlorophyta	Ulvophyceae	Cladophorales	Anadyomenaceae	<i>Anadyomene stellata</i>	4	4	2	
Chlorophyta	Ulvophyceae	Cladophorales	Anadyomenaceae	<i>Microdictyon marinum</i>	4	4	4	
Chlorophyta	Ulvophyceae	Cladophorales	Anadyomenaceae	<i>Microdictyon</i> sp.	1	1	1	
Chlorophyta	Ulvophyceae	Cladophorales	Anadyomenaceae	<i>Microdictyon umbilicatum</i>	5	4	3	
Chlorophyta	Ulvophyceae	Cladophorales	Boodleaceae	<i>Cladophoropsis macromeres</i>	1	0	0	
Chlorophyta	Ulvophyceae	Cladophorales	Cladophoraceae	<i>Cladophora fuliginosa</i>	9	6	6	
Chlorophyta	Ulvophyceae	Cladophorales	Cladophoraceae	<i>Cladophora</i> sp.	1	1	1	
Chlorophyta	Ulvophyceae	Cladophorales	Siphonocladaceae	<i>Dictyosphaeria cavernosa</i>	2	2	1	
Chlorophyta	Ulvophyceae	Cladophorales	Siphonocladaceae	<i>Dictyosphaeria verlyusii</i>	1	0	0	
Chlorophyta	Ulvophyceae	Cladophorales	Valoniaceae	<i>Valonia macrophysa</i>	2	2	1	
Chlorophyta	Ulvophyceae	Cladophorales	Valoniaceae	<i>Valonia ventricosa</i>	2	1	0	
Chlorophyta	Ulvophyceae	Dasycladales	Dasycladaceae	<i>Dasycladus vermicularis</i>	1	1	1	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Canistrocarpus cervicornis</i>	3	2	2	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Canistrocarpus criptatus</i>	1	1	1	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Dictyopteris delicatula</i>	1	0	0	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Dictyota caribaea</i>	2	2	1	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Dictyota ciliolata</i>	4	1	1	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Dictyota crenulata</i>	1	1	0	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Dictyota humifusa</i>	1	0	0	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Dictyota menstrualis</i>	1	1	0	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Dictyota mertensii</i>	2	1	1	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Dictyota pinnatifida</i>	1	1	1	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Dictyota pulchella</i>	3	2	1	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Dictyota</i> sp.	12	12	10	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Lobophora</i> sp.	21	20	15	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Lobophora variegata</i>	2	1	1	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Padina sanctae-crucis</i>	2	2	1	
Ochrophyta	Phaeophyceae	Dictyotales	Dictyotaceae	<i>Stypopodium zonale</i>	1	1	1	
Ochrophyta	Phaeophyceae	Fucales	Sargassaceae	<i>Sargassum hystris</i>	1	1	0	
Ochrophyta	Phaeophyceae	Fucales	Sargassaceae	<i>Sargassum polycerarium</i>	1	1	1	
Ochrophyta	Phaeophyceae	Fucales	Sargassaceae	<i>Sargassum</i> sp.	6	7	5	
Ochrophyta	Phaeophyceae	Fucales	Sargassaceae	<i>Turbinaria tricostata</i>	1	1	1	
Ochrophyta	Phaeophyceae	Fucales	Sargassaceae	<i>Turbinaria turbinata</i>	1	1	1	
Rhodophyta	-	-	-	Rhodophyta	4	4	1	
Rhodophyta	Floriidophyceae	-	-	Corallinophycidae	13	13	5	
Rhodophyta	Floriidophyceae	-	-	Crustose coralline (CCA)	1	1	0	
Rhodophyta	Floriidophyceae	Ceramiales	Ceramiaceae	<i>Antithamnion</i> sp.	1	0	0	
Rhodophyta	Floriidophyceae	Ceramiales	Ceramiaceae	<i>Cetroceras</i> sp.	7	0	0	
Rhodophyta	Floriidophyceae	Ceramiales	Ceramiaceae	<i>Ceramium cimbricum</i>	2	0	0	
Rhodophyta	Floriidophyceae	Ceramiales	Ceramiaceae	<i>Ceramium</i> sp.	1	0	0	
Rhodophyta	Floriidophyceae	Ceramiales	Dasyceae	<i>Dasya</i> sp.	2	2	2	
Rhodophyta	Floriidophyceae	Ceramiales	Delesseriaceae	<i>Hypoglossum involvens</i>	1	0	0	
Rhodophyta	Floriidophyceae	Ceramiales	Rhodomelaceae	<i>Acantophora spicifera</i>	1	0	0	
Rhodophyta	Floriidophyceae	Ceramiales	Rhodomelaceae	<i>Bryothamnion triquetrum</i>	1	1	1	
Rhodophyta	Floriidophyceae	Ceramiales	Rhodomelaceae	<i>Digenea simplex</i>	1	1	1	
Rhodophyta	Floriidophyceae	Ceramiales	Rhodomelaceae	<i>Laurencia</i> sp.	2	2	2	
Rhodophyta	Floriidophyceae	Ceramiales	Rhodomelaceae	<i>Melanothamnus pseudovillum</i>	1	0	0	
Rhodophyta	Floriidophyceae	Ceramiales	Rhodomelaceae	<i>Polysiphonia howei</i>	3	0	0	
Rhodophyta	Floriidophyceae	Ceramiales	Rhodomelaceae	<i>Polysiphonia</i> sp.	2	0	0	
Rhodophyta	Floriidophyceae	Ceramiales	Wrangeliaceae	<i>Wrangelia</i> sp.	2	1	1	
Rhodophyta	Floriidophyceae	Corallinales	Corallinaceae	<i>Amphiroa beauvoisii</i>	4	2	2	
Rhodophyta	Floriidophyceae	Corallinales	Corallinaceae	<i>Amphiroa fragilisima</i>	6	1	0	
Rhodophyta	Floriidophyceae	Corallinales	Corallinaceae	<i>Amphiroa rigida</i>	6	2	1	
Rhodophyta	Floriidophyceae	Corallinales	Corallinaceae	<i>Amphiroa</i> sp.	1	1	1	
Rhodophyta	Floriidophyceae	Corallinales	Corallinaceae	<i>Amphiroa tribulus</i>	3	3	3	
Rhodophyta	Floriidophyceae	Corallinales	Corallinaceae	<i>Jania adhaerens</i>	1	0	0	
Rhodophyta	Floriidophyceae	Corallinales	Corallinaceae	<i>Jania capillacea</i>	6	0	0	
Rhodophyta	Floriidophyceae	Corallinales	Corallinaceae	<i>Jania cubensis</i>	2	0	0	
Rhodophyta	Floriidophyceae	Corallinales	Corallinaceae	<i>Jania pumila</i>	6	1	0	
Rhodophyta	Floriidophyceae	Corallinales	Corallinaceae	<i>Jania rubens</i>	4	2	1	
Rhodophyta	Floriidophyceae	Corallinales	Corallinaceae	<i>Jania</i> sp.	2	3	2	
Rhodophyta	Floriidophyceae	Corallinales	Corallinaceae	<i>Neogonolithon spectabile</i>	1	1	1	
Rhodophyta	Floriidophyceae	Gelidiales	Gelidiellaceae	<i>Gelidiella acerosa</i>	4	2	1	
Rhodophyta	Floriidophyceae	Gigartinales	Cystocloniaceae	<i>Hypnea</i> sp.	1	0	0	
Rhodophyta	Floriidophyceae	Gigartinales	Cystocloniaceae	<i>Hypnea spinella</i>	5	0	0	
Rhodophyta	Floriidophyceae	Gigartinales	Solieriaceae	<i>Agardhiella subulata</i>	3	0	0	
Rhodophyta	Floriidophyceae	Gigartinales	Solieriaceae	<i>Flahaultia tegetiformans</i>	1	1	1	
Rhodophyta	Floriidophyceae	Halymeniales	Halymeniaceae	<i>Cryptonemia</i> sp.	1	1	1	
Rhodophyta	Floriidophyceae	Nemaliales	Galaxauraceae	<i>Dichotomaria marginata</i>	1	1	1	

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Filum	Clase	Orden	Familia	Nombre Científico	Especímenes	Cuba	HBOI-FAU	CITES
Rhodophyta	Floriellophyceae	Nemaliales	Galaxauraceae	<i>Dichotomaria obtusata</i>	4	2	1	
Rhodophyta	Floriellophyceae	Nemaliales	Galaxauraceae	<i>Galaxaura rugosa</i>	1	1	0	
Rhodophyta	Floriellophyceae	Nemaliales	Galaxauraceae	<i>Galaxaura</i> sp.	4	3	2	
Rhodophyta	Floriellophyceae	Nemaliales	Liagoraceae	<i>Liagora</i> sp.	2	2	2	
Rhodophyta	Floriellophyceae	Nemaliales	Liagoriaceae	<i>Titanophycus validus</i>	1	1	1	
Rhodophyta	Floriellophyceae	Nemaliales	Liagoropsidaceae	<i>Liagoropsis schrammii</i>	1	0	0	
Rhodophyta	Floriellophyceae	Nemaliales	Scinaiceae	<i>Scinia complanata</i>	1	1	1	
Rhodophyta	Floriellophyceae	Peyssonneliales	Peyssonneliaceae	<i>Peyssonnelia</i> sp.	1	1	0	
Rhodophyta	Floriellophyceae	Rhodymeniales	Rhodymeniaceae	<i>Botryocladia pyriformis</i>	1	1	1	
Rhodophyta	Floriellophyceae	Rhodymeniales	Rhodymeniaceae	<i>Botryocladia</i> sp.	1	1	1	
Rhodophyta	Floriellophyceae	Rhodymeniales	Rhodymeniaceae	<i>Chrysomenia enteromorpha</i>	1	1	1	
Rhodophyta	Floriellophyceae	Rhodymeniales	Rhodymeniaceae	<i>Chrysomenia</i> sp.	1	1	1	
Porifera	Calcarea	-	-	<i>Calcarea</i> unid. sp.	2	2	0	
Porifera	Demospongiae	-	-	Demospongiae unid. sp.	27	37	23	
Porifera	Demospongiae	Agelasida	Agelasidae	<i>Agelas confera</i>	1	4	2	
Porifera	Demospongiae	Agelasida	Agelasidae	<i>Agelas schmidti</i>	2	3	2	
Porifera	Demospongiae	Agelasida	Agelasidae	<i>Agelas</i> sp.	3	10	6	
Porifera	Demospongiae	Axinellida	Axinellidae	<i>Auletta</i> sp.	2	2	2	
Porifera	Demospongiae	Axinellida	Axinellidae	Axinellidae	1	1	1	
Porifera	Demospongiae	Axinellida	Axinellidae	<i>Dragmacidon</i> sp.	1	4	2	
Porifera	Demospongiae	Clonaida	Spirastrellidae	<i>Spirastrellidae</i> unid. sp.	1	1	0	
Porifera	Demospongiae	Dictyoceratida	-	<i>Dictyoceratida</i> unid. sp.	4	9	5	
Porifera	Demospongiae	Dictyoceratida	Dysideidae	<i>Dysidea</i> sp.	1	1	1	
Porifera	Demospongiae	Dictyoceratida	Irciniidae	<i>Ircinia felix</i>	1	1	1	
Porifera	Demospongiae	Dictyoceratida	Irciniidae	<i>Ircinia</i> sp.	2	5	4	
Porifera	Demospongiae	Dictyoceratida	Irciniidae	<i>Ircinia strobilina</i>	1	1	1	
Porifera	Demospongiae	Dictyoceratida	Thorectidae	<i>Smenospongia aurea</i>	1	3	2	
Porifera	Demospongiae	Dictyoceratida	Thorectidae	<i>Smenospongia</i> sp.	1	3	2	
Porifera	Demospongiae	Halichondrida	Heteroxyidae	<i>Myrmekioderma</i> sp.	2	2	1	
Porifera	Demospongiae	Haplosclerida	-	<i>Haplosclerida</i> unid. sp.	1	2	1	
Porifera	Demospongiae	Haplosclerida	Callyspongiidae	<i>Callyspongia plicifera</i>	1	2	1	
Porifera	Demospongiae	Haplosclerida	Callyspongiidae	<i>Callyspongia</i> sp.	3	5	4	
Porifera	Demospongiae	Haplosclerida	Niphatidae	<i>Amphimedon</i> sp.	2	4	3	
Porifera	Demospongiae	Haplosclerida	Niphatidae	<i>Cribrachalina</i> sp.	1	3	3	
Porifera	Demospongiae	Haplosclerida	Niphatidae	<i>Niphates</i> sp.	1	4	2	
Porifera	Demospongiae	Haplosclerida	Niphatidae	Niphatidae	1	1	1	
Porifera	Demospongiae	Haplosclerida	Petrosiidae	<i>Petrosia weinbergi</i>	1	1	1	
Porifera	Demospongiae	Haplosclerida	Petrosiidae	<i>Xestospongia muta</i>	1	4	2	
Porifera	Demospongiae	Haplosclerida	Petrosiidae	<i>Xestospongia</i> sp.	3	9	7	
Porifera	Demospongiae	Haplosclerida	Petrosiidae	<i>Xestospongia</i> sp. Cu-01	3	5	4	
Porifera	Demospongiae	Haplosclerida	Phloeodictyidae	<i>Aka</i> sp.	1	2	1	
Porifera	Demospongiae	Haplosclerida	Phloeodictyidae	<i>Oceanapia</i> "black"	1	3	2	
Porifera	Demospongiae	Haplosclerida	Phloeodictyidae	<i>Oceanapia</i> sp.	3	8	6	
Porifera	Demospongiae	Poecilosclerida	Clathriidae	Clathriidae	1	1	0	
Porifera	Demospongiae	Poecilosclerida	Lotrochotidae	<i>Lotrochota</i> sp.	1	2	1	
Porifera	Demospongiae	Poecilosclerida	Microcionidae	<i>Clathria</i> sp.	3	7	4	
Porifera	Demospongiae	Poecilosclerida	Tedaniidae	<i>Tedania ignis</i>	1	1	0	
Porifera	Demospongiae	Scopalina	Scopaliniidae	<i>Svenzea zeai</i>	1	1	1	
Porifera	Demospongiae	Spirophorida	Tetillidae	<i>Tetillidae</i> unid. sp.	1	1	1	
Porifera	Demospongiae	Suberitida	Suberitidae	<i>Terpios cf. belindae</i>	1	1	1	
Porifera	Demospongiae	Tethyida	Tethyidae	<i>Tethya</i> sp.	1	1	1	
Porifera	Demospongiae	Tetractinellida	-	Astrosporidida (syn. Tetractinellida)	2	4	2	
Porifera	Demospongiae	Tetractinellida	Geodiidae	<i>Erylus</i> new sp.	1	3	2	
Porifera	Demospongiae	Tetractinellida	Geodiidae	<i>Geodia</i> sp.	2	5	3	
Porifera	Demospongiae	Tetractinellida	Tetillidae	<i>Cinachyrella</i> sp.	1	4	3	
Porifera	Demospongiae	Tetractinellida	Theonellidae	<i>Discodermia</i> sp.	1	3	2	
Porifera	Demospongiae	Verongiida	-	Verongiida	10	22	18	
Porifera	Demospongiae	Verongiida	Aplysinidae	<i>Aiolochoira</i> sp.	1	4	2	
Porifera	Demospongiae	Verongiida	Aplysinidae	<i>Aplysina bathyphila</i>	1	5	2	
Porifera	Demospongiae	Verongiida	Aplysinidae	<i>Aplysina fistularis</i>	1	3	2	
Porifera	Demospongiae	Verongiida	Aplysinidae	<i>Aplysina sciophila</i>	2	4	3	
Porifera	Demospongiae	Verongiida	Aplysinidae	<i>Aplysina</i> sp.	4	9	6	
Porifera	Demospongiae	Verongiida	Aplysinidae	<i>Verongula gigantea</i>	1	3	2	
Porifera	Homoscleromorpha	Homosclerophorida	Plakinidae	<i>Plakinidae</i> unid. sp.	1	1	1	
Porifera	Homoscleromorpha	Homosclerophorida	Plakinidae	<i>Plakartis</i> sp.	3	4	1	
Cnidaria	Anthozoa	Alcyonacea	-	Alcyonacea- gorgonian	4	4	4	
Cnidaria	Anthozoa	Alcyonacea	Anthothelidae	<i>Ilcigorgia schrammi</i>	3	3	2	
Cnidaria	Anthozoa	Alcyonacea	Briareidae	<i>Briareum</i> sp.	1	1	0	
Cnidaria	Anthozoa	Alcyonacea	Ellisellidae	<i>Ellisella barbadensis</i> syn. <i>Elongata</i>	2	2	3	
Cnidaria	Anthozoa	Alcyonacea	Ellisellidae	<i>Ellisella elongata</i>	1	2	1	
Cnidaria	Anthozoa	Alcyonacea	Ellisellidae	<i>Nicella goreau</i>	1	1	1	
Cnidaria	Anthozoa	Alcyonacea	Gorgoniidae	Gorgoniidae	1	1	1	
Cnidaria	Anthozoa	Alcyonacea	Gorgoniidae	<i>Pseudopterogorgia acerosa</i>	1	2	0	
Cnidaria	Anthozoa	Alcyonacea	Gorgoniidae	<i>Pseudopterogorgia citrina</i>	1	1	1	
Cnidaria	Anthozoa	Alcyonacea	Gorgoniidae	<i>Pseudopterogorgia</i> sp.	1	2	1	
Cnidaria	Anthozoa	Alcyonacea	Keroeidae	<i>Lignella richardi</i>	1	1	2	
Cnidaria	Anthozoa	Alcyonacea	Nidaliidae	<i>Chironophthya caribaea</i>	1	2	2	
Cnidaria	Anthozoa	Alcyonacea	Paramuriceidae	Paramuriceidae	1	1	3	
Cnidaria	Anthozoa	Alcyonacea	Plexauridae	<i>Eunicea</i> sp.	1	1	0	
Cnidaria	Anthozoa	Alcyonacea	Plexauridae	<i>Hypnogorgia</i> sp.	1	1	1	
Cnidaria	Anthozoa	Alcyonacea	Plexauridae	<i>Paramuricea</i> sp.	1	2	1	
Cnidaria	Anthozoa	Alcyonacea	Plexauridae	Plexauridae	1	1	1	
Cnidaria	Anthozoa	Alcyonacea	Plexauridae	<i>Swiftia exserta</i>	2	3	2	
Cnidaria	Anthozoa	Antipatharia	-	Antipatharia unid. sp.	2	2	4	YES
Cnidaria	Anthozoa	Antipatharia	Antipathidae	<i>Antipathes</i> sp.	1	1	2	YES
Cnidaria	Anthozoa	Antipatharia	Antipathidae	Antipathidae	1	1	2	YES
Cnidaria	Anthozoa	Antipatharia	Antipathidae	<i>Stichopathes lutkeni</i>	2	2	1	YES
Cnidaria	Anthozoa	Antipatharia	Antipathidae	<i>Stichopathes</i> sp.	3	3	2	YES
Cnidaria	Anthozoa	Antipatharia	Myriopathidae	<i>Plumapathes</i> sp.	1	1	2	YES
Cnidaria	Anthozoa	Antipatharia	Myriopathidae	<i>Tanacetipathes tanacetum</i>	1	1	0	YES
Cnidaria	Anthozoa	Scleractinia	-	Scleractinia- unid cup	1	1	0	YES
Cnidaria	Anthozoa	Scleractinia	Agariciidae	<i>Agaricia agaricites</i>	2	2	2	YES

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Filum	Clase	Orden	Familia	Nombre Científico	Especímenes	No. Muestras Cuba	No. Muestras HBOI-FAU	CITES
Cnidaria	Anthozoa	Scleractinia	Agariciidae	<i>Agaricia lamarcki</i>	1	1	2	YES
Cnidaria	Anthozoa	Scleractinia	Agariciidae	<i>Agaricia sp.</i>	16	19	27	YES
Cnidaria	Anthozoa	Scleractinia	Astrocoeniidae	<i>Madracis asperula</i>	1	2	2	YES
Cnidaria	Anthozoa	Scleractinia	Astrocoeniidae	<i>Madracis sp.</i>	1	1	2	YES
Cnidaria	Anthozoa	Scleractinia	Meandrinidae	<i>Meandrina meandrites</i>	1	1	2	YES
Cnidaria	Anthozoa	Scleractinia	Merulinidae	<i>Orbicella faveolata</i>	1	1	1	YES
Cnidaria	Anthozoa	Scleractinia	Montastraeidae	<i>Montastraea cavernosa</i>	96	77	115	YES
Cnidaria	Anthozoa	Scleractinia	Poritidae	<i>Porites sp.</i>	2	2	1	YES
Cnidaria	Hydrozoa	-	-	Hydrozoa	2	2	1	
Annelida	Polychaeta	-	-	Polychaeta	1	1	0	
Mollusca	Gastropoda	-	-	Gastropoda	1	1	0	
Mollusca	Gastropoda	-	Pleurotomariidae	<i>Entemnotrochus adansonianus</i>	1	1	0	
Bryozoa	-	-	-	Bryozoa	4	4	1	
Echinodermata	Asteroidea	-	-	Asteroidea	1	1	0	
Echinodermata	Crinoidea	-	-	Crinoidea	1	1	1	
Echinodermata	Crinoidea	Comatulida	-	Comatulida	3	3	5	
Echinodermata	Crinoidea	Comatulida	Comatulidae	<i>Davidaster sp.</i>	1	1	2	
Echinodermata	Ophiuroidea	-	-	Ophiuroidea	6	6	1	
Chordata	-	-	-	Tunicata	2	4	0	
Chordata	Ascidiacea	-	-	Ascidiacea	3	3	0	
Chordata	Actinopterygii	-	-	Actinopterygii	1	1	0	
Chordata	Actinopterygii	Perciformes	Grammatidae	<i>Gramma melacara</i>	1	1	0	
Rock	-	-	-	Carbonate Rock	1	1	0	
Rock	-	-	-	Granitic Rock	1	0	0	
Total Water Samples; No. Muestras Agua en Total						43 (500 ml each)	94 (500 ml each)	
Total No. Specimen/Samples; No. Especímenes/No. Muestras en Total					603	619	499	
No. CITES Samples; No. Muestras de CITES en Total								167

APPENDIX 4

Benthic macroinvertebrates and macroalgae observed and/or collected at mesophotic and shallow reef sites during the *F.G. Walton Smith* cruise, May 17 to June 10, 2017.
Species identifications are preliminary and are in progress. X= species observed but not quantified.

Phylum/Class/Scientific Name	Northwest Coast			West Coast			Southwest Coast						Southeast Coast						Northeast Coast																														
	C-04	C-04A	C-06	C-07	C-10	C-10A	C-12A	C-12B	C-15	C-16	C-16A	C-21	C-21A	C-21B	C-23	C-24	C-28	C-29	C-31A	C-33A	C-38	C-38A	C-41	C-41A	C-48	C-50	C-50A	C-52	C-52A	C-52B	C-53A	C-53B	C-54	C-54A	C-54B	C-56	C-56A	C-58	C-58A	C-59A	C-59B	C-59C	C-60A						
Black Band Disease	X																																																
Bleaching		X	X	X	X	X		X															X																										
Dead Coral																			X																														
Disease- unid.																																																	

APPENDIX 5

Fish observed during ROV dives on mesophotic reef sites during the *F.G. Walton Smith* cruise, May 17 to June 10, 2017.

Species identifications are preliminary and are in progress. X= species observed but not quantified.
Counts are given for commercially important grouper/snapper species, lionfish, and turtles.

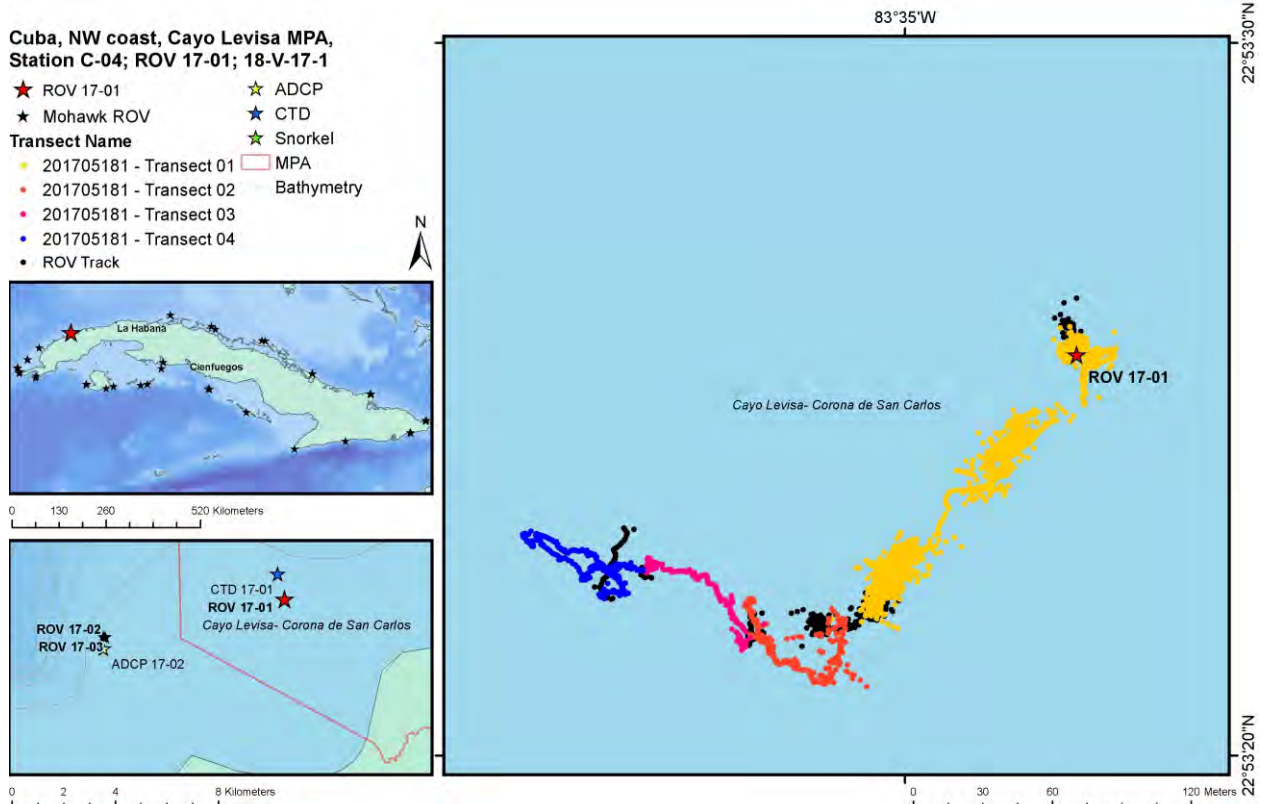
Phylum/Class/Order/Scientific Name	Common Name	Northwest Coast			West Coast			Southwest Coast						Southeast Coast						Northeast Coast																			
		C-04	C-04A	C-06	C-07	C-10	C-10A	C-12A	C-12B	C-15	C-16A	C-21	C-21A	C-23	C-24	C-28	C-29	C-31A	C-33A	C-38	C-38A	C-41	C-48	C-50	C-52	C-52A	C-53A	C-53B	C-54	C-54B	C-56	C-56A	C-58	C-58A	C-59A	C-59C	C-60A		
<i>Pragnathodes oculatus</i> (Poe, 1860)	Longsnout Butterflyfish			X	X				X	X		X			X				X	X	X		X	X		X	X	X	X	X		X	X	X	X	X	X		
<i>Pragnathodes aya</i> (Jordan, 1886)	Bank Butterflyfish							X				X					X									X	X	X	X	X									
<i>Pragnathodes guyanensis</i> (Durand, 1960)	French Butterflyfish													X																									
<i>Pronotogrammus martinicensis</i> (Guichenot, 1868)	Roughtongue Bass										X				X																								
<i>Pseudupeneus maculatus</i> (Bloch, 1793)	Spotted Goatfish	X			X			X		X	X	X	X										X					X	X										
<i>Ptereleotris callura</i> (Jordan & Gilbert, 1882)	Blue Dartfish																		X																				
<i>Ptereleotris helenae</i> (Randall, 1968)	Hovering Dartfish																																						
<i>Rypticus maculatus</i> Holbrook, 1855	Whitespotted Soapfish																		X																				
<i>Rypticus saponaceus</i> (Bloch & Schneider, 1801)	Greater Soapfish																		X																				
Scaridae	Parrotfish	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X		X			X	X								X		X	
<i>Scarus coelestinus</i> Valenciennes, 1840	Midnight Parrotfish															X																							
<i>Scarus iseri</i> (Bloch, 1789)	Striped Parrotfish	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X				X	X	X	X	X	X
<i>Scarus taeniopterus</i> Lesson, 1829	Princess Parrotfish	X	X	X						X																													
<i>Scarus vetula</i> Bloch & Schneider, 1801	Queen Parrotfish																			X																			
<i>Scomberomorus regalis</i> (Bloch, 1793)	Cero	X		X				X	X		X									X																			
<i>Scomberomorus</i> sp.	Mackerel																					X																	
<i>Seriola</i> sp.	Amberjack			X																																			
<i>Serranus annularis</i> (Günther, 1880)	Orangeback Bass					X						X										X					X											X	
<i>Serranus natospilus</i> Longley, 1935	Saddle Bass																				X																		
<i>Serranus phoebe</i> Poey, 1851	Tattler							X															X	X														X	
<i>Serranus</i> sp.	Sea Bass																						X	X															
<i>Serranus tabacarius</i> (Cuvier, 1829)	Tobaccofish							X																		X	X	X											
<i>Serranus tigrinus</i> (Bloch, 1790)	Harlequin Bass					X		X												X	X																		
<i>Serranus tortugarum</i> Longley, 1935	Chalk Bass	X	X																				X																
<i>Sparisoma atomarum</i> (Poe, 1861)	Greenblotch Parrotfish																																						
<i>Sparisoma aurofrenatum</i> (Valenciennes, 1840)	Redband Parrotfish						X	X					X	X					X	X	X	X	X	X	X	X	X	X	X									X	
<i>Sparisoma rubripinne</i> (Valenciennes, 1840)	Yellowtail Parrotfish	X																																					
<i>Sparisoma viride</i> (Bonnaterre, 1788)	Stoplight Parrotfish			X	X	X	X		X	X	X		X															X	X								X	X	
<i>Sphyræna barracuda</i> (Edwards, 1771)	Great Barracuda	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X									
<i>Stegastes adustus</i> (Troschel, 1865)	Dusky Damselfish	X	X																																				
<i>Stegastes diencaeus</i> (Jordan & Rutter, 1897)	Longfin Damselfish																																						
<i>Stegastes leucostictus</i> (Müller & Troschel, 1848)	Beaugregory										X								X	X	X	X					X												
<i>Stegastes partitus</i> (Poe, 1868)	Bicolor Damselfish	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X									
<i>Stegastes planifrons</i> (Cuvier, 1830)	Threespot Damselfish																																						
<i>Thalassoma bifasciatum</i> (Bloch, 1791)	Bluehead Wrasse	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X										
<i>Trachinotus blochii</i> (Lacepède, 1801)	Permit										X	X																											
<i>Trachinotus goodei</i> Jordan & Evermann, 1896	Palometa														X																								
Syngnathiformes																																							
<i>Aulostomus maculatus</i> Valenciennes, 1841	Atlantic Trumpetfish																																						
Tetraodontiformes																																							
<i>Acanthostracion polygonius</i> Poe, 1876	Honeycomb Cowfish	X																																					
<i>Aluterus scriptus</i> (Osbeck, 1765)	Scrawled Filefish																					X																	
<i>Balistes vetula</i> Linnaeus, 1758	Queen Triggerfish				X	X		X	X													X		X															
Balistidae	Triggerfish					X	X								X																								
<i>Cantherhines macrocerus</i> (Hollard, 1853)	Whitespotted Filefish					X																																	
<i>Canthidermis sufflamen</i> (Mitchill, 1815)	Ocean Triggerfish						X	X		X	X			X		X						X	X				X	X	X								X	X	
<i>Canthigaster rostrata</i> (Bloch, 1786)	Sharpnose Puffer			X	X	X	X	X	X	X	X	X											X	X	X	X	X	X	X										
<i>Lactophrys triquetra</i> (Linnaeus, 1758)	Smooth Trunkfish					X																																	
<i>Melichthys niger</i> (Bloch, 1786)	Black Durgon					X	X	X		X	X																												
<i>Sphoeroides spengleri</i> (Bloch, 1785)	Bandtail Puffer			X																																			
<i>Xanthichthys ringens</i> (Linnaeus, 1758)	Sargassum Triggerfish	X	X	X	X			X	X	X	X				X																								

APPENDIX 6

SEADESC Level I Report (Southeastern United States Deep-Sea Corals). 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 bathymetric maps, dive track data (start and end latitude, longitude, depth), CTD plots, objectives, dive events, general description of the habitat and biota, and images of the biota and habitat that characterize the dive site. Table 1 of this appendix lists the benthic macroinvertebrates and macroalgae that were observed from the ROV video and also includes specimens collected; Table 2 lists all the fish that were observed on each ROV dive.

Dive Site: Cuba, NW coast, Cayo Levisa MPA, Station C-04; ROV 17-01; 18-V-17-1

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: None

Data Management: Access Database

Date of Dive: 5/18/2017

Specimens: 8

Digital Photos: 412

No. DVD: 3

Hard Drive No.: 1

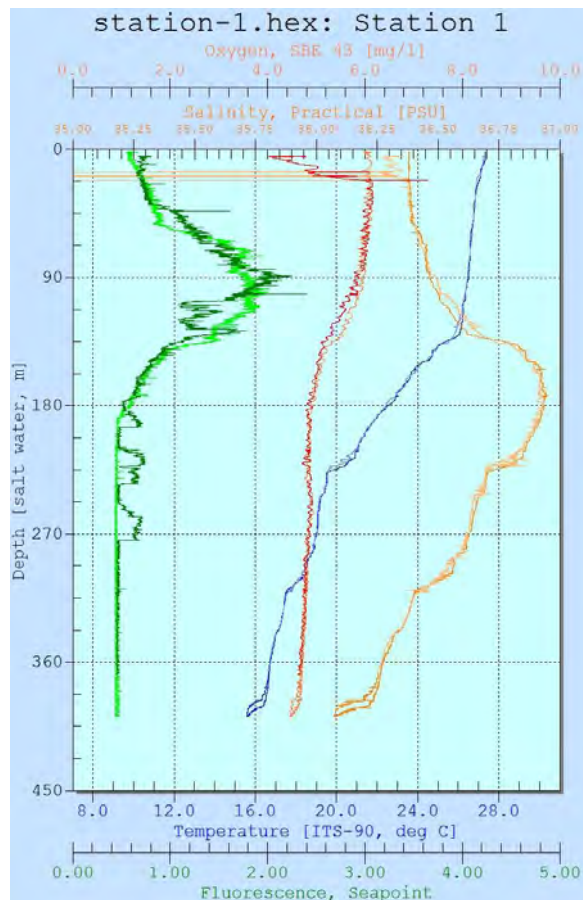
Dive Site: Cuba, NW coast, Cayo Levisa MPA, Station C-04; ROV 17-01; 18-V-17-1

Dive Data:

Minimum Bottom Depth (m): 25	Total Transect Length (km): 0.742
Maximum Bottom Depth (m): 188	Surface Current (kn): 1.0
On Bottom (Time- GMT): 8:44	On Bottom (Lat/Long): 22.8904°N; -83.5827°W
Off Bottom (Time- GMT): 11:36	Off Bottom (Lat/Long): 29.8898°N; -83.5845°W
Physical (bottom); Temp (°C): N/A	Salinity: N/A Visibility 5 Current (kn): 0.1

Physical Environment:

Distance from Dive Site(km): 0.92



Shipboard CTD casts were made with the Sea-Bird 19. The ranges of the water column data recorded during CTD 17-01 are as follows: Depth Maximum: 398.4 m, Temperature: 15.6-27.3 °C, Salinity: 36.1-37 PSU, Oxygen Saturation: 4-6.2 ml/l, and Fluorescence: 0.4-2.4 RFU.

Dive Imagery:

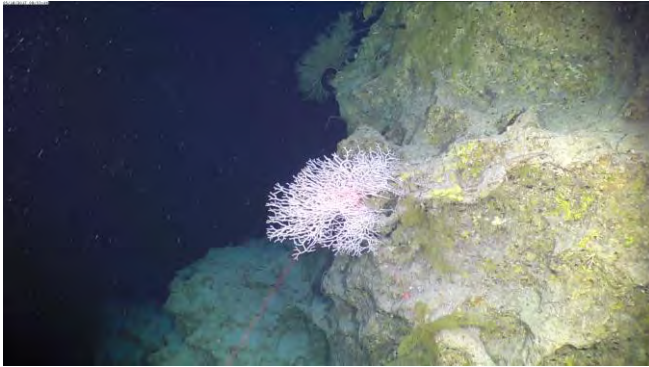


Figure 1: 22°53.4289'N;83°34.9577'W: -174.1 m
Azooxanthellate *Madracis myriaster* on rugged deep island slope



Figure 2: 22°53.408'N;83°34.9744'W: -146.4 m
Wire coral- *Stichopathes* sp. and black coral- *Antipathes pedata*



Figure 3: 22°53.3746'N;83°35.0027'W: -127.8 m
Sturdy barrel sponge- *Xestospongia* sp. Cu-01 on deep island slope



Figure 4: 22°53.3702'N;83°35.0074'W: -123.9 m
Finger sponge- *Erylus* sp., and sturdy barrel sponge- *Xestospongia* sp.



Figure 5: 22°53.3714'N;83°35.0704'W: -24.6 m
Plexauridae octocorals and *Montastraea cavernosa* coral



Figure 6: 22°53.3707'N;83°35.0711'W: -24.5 m
Fore reef slope of deep fringing reef

Dive Site: Cuba, NW coast, Cayo Levisa MPA, Station C-04; ROV 17-01; 18-V-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 18-V-17-1; ROV 17-01, UNCW Dive 407; Cuba, NW coast, Cayo Levisa MPA, Station C-04.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

All data (ROV navigation, video, photos, dive notes) were recorded in Eastern Standard Daylight Savings Time (+4 hr. GMT). Metadata and habitat dive notes were recorded by Farrington/Reed (HBOI) during the dive into an Access database which links to the ROV navigation data. Science teams specializing in coral, sponge, algae, and fish taxonomy recorded data in separate Access databases which were compiled with the benthic habitat database. ROV sensors included: Seabird Fastcat 49, CO₂ and pH.

Dive time was generally 3-4 hours at each dive site. A continuous video/photo transect commenced at the maximum depth of ~150 m and continued upslope to the upper mesophotic reef zone or about 30 m. If a second dive was made at the same dive site, it was usually for sample collections and fish video transects. Video was recorded throughout each dive with an Insite Pacific Mini Zeus high-definition CMOS color zoom camera. Digital still images were taken with a Kongsberg OE14-408. Both cameras had 10-cm parallel lasers for scale (green- still; red- video). Digital camera setup was P-Mode, Auto ISO, white balance- fluorescent light bulb or fish symbol modes. First several days the setup varied and had troubles with blurring. Quantitative photo transects used the digital still camera pointing perpendicular to the substrate (<1 m off bottom). Thirty random (haphazard) images were taken during each quantitative transect while maintaining a constant depth. Typically, this transect was made horizontally along a depth contour where *Agaricia* spp. and *Montastraea cavernosa* corals first became common (usually between 60 and 70 m depths), and was horizontal to the face of the vertical rock wall or overhanging rock buttresses, so the camera was actually pointed straight forward toward the wall. Time and distance of the quantitative transects varied depending on currents and topography, but generally were about 15 minutes, and transited ~100 m. Non-quantitative photo transects for habitat characterization and species identifications were logged during the entire vertical transect from 150 m to the deep reef crest, usually 30-40 m. Screen grabs of habitat and biota were also taken from the video with time/date stamp as filenames. For quantifying fish populations, fish transects of at least 30 minutes were made at each site, using the video camera pointed forward and down ~20° to view from the horizon to close up. Direction of transects were haphazard, but generally headed along the upper wall and deep reef crest, but also depended on the ship's maneuverability with the wind and current.

Dive Events- CTD, CO₂ and pH sensors not working. Digital camera image problems with blurring and color balance.

Site Description/Habitat:

Depth range: 188-25 m.

Transect upslope was on heading of 200°.

8:14- Launch; wind 14 kn from NNE, current 1 kn to 230°, water temperature- 27.4 °C, salinity- 36.3.

8:44- On bottom; 188 m, 5 m visibility, 0.1 kn current.

11:42- End dive.

Dive Site: Cuba, NW coast, Cayo Levisa MPA, Station C-04; ROV 17-01; 18-V-17-1

188-145 m, deep island slope zone: steep, eroded carbonate rock wall (70-90° slope); 1-2 m relief ledges. Common biota: generally low density of demosponges and corals; black corals- *Stichopathes*, *Tanacetipathes*, *Antipathes furcata*, *Antipathes* spp.; scleractinians- cup corals; gorgonians- *Nicella* (Ellisellidae) fans, *Nicella goreau*; sponges- thin encrusting yellow Verongiida, *Corallistes*.

Vertical photo transect upslope, 188- 123 m , 08:45- 10:39; deep island slope zone.

144 m: smooth rock pavement, 30° slope.

135- 120 m: diverse sponges; first sclerosponges, *Oceanapia*, *Aplysina*, *Xestospongia*.

120 m, lower mesophotic zone: 80° eroded rock wall with dense sponges.

Quantitative vertical photo transect, upslope from 110 to 50 m, 10:55- 11:09 (36 photos); lower mesophotic zone.

70- 52 m: *Agaricia* coral plates common. *Agaricia* with black band disease, 50 m.

48 m- upper mesophotic zone: top of vertical wall; series of spur and groove buttresses. Biota: nearly 100% cover of dense and diverse biota; sponges- *Oceanapia*, *Agelas*; corals- first *M. cavernosa*, *Mycetophyllia*; dense *Pseudopterogorgia*.

Quantitative vertical photo transect, upslope from 47 to 30 m, 11:11- 11:20 (31 Photos); upper mesophotic zone, top of wall, deep fringing reef.

30-25 m, deep reef crest: series of spur and groove buttresses, intersected by sand chutes; shallow gorgonians- *Pseudopterogorgia*, *Eunicea*; coral- 10-20 cm diameter *Agaricia*.

Quantitative horizontal photo transect, 31- 25 m; 11:22- 11:34 (33 photos); top of wall, deep reef crest.

Maximum Depth Occurrences:

Lionfish- 177 m

Sclerosponges- 133 m

Agaricia- 70 m

Montastraea cavernosa- 48 m

Number of Sample: 8

Disease and Human Impacts: One *Agaricia* with possible black band disease- 50 m

Dive Site: Cuba, NW coast, Cayo Levisa MPA, Station C-04; ROV 17-01; 18-V-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-01. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Notes	Samples
Northwest Coast ROV 17-01 C-04		
Algae		
Chlorophyta		
Chlorophyta	X	
Chlorophyta- Filamentous	X	
<i>Halimeda copiosa</i>	X	
<i>Halimeda</i> sp.	X	
Ochrophyta		
<i>Dictyota</i> sp.	X	
<i>Lobophora</i> sp.	X	
Phaeophyceae	X	
Rhodophyta		
Crustose coralline (CCA)	X	
<i>Martensia pavonia</i>	X	
<i>Peyssonnelia</i> sp.	X	
Porifera		5
Porifera	X	
Demospongiae		
<i>Agelas cerebrum</i>	X	
<i>Agelas cervicornis</i>	X	
<i>Agelas clathrodes</i>	X	
<i>Agelas dilatata</i>	X	
<i>Agelas</i> sp. Cu-08	X	
<i>Agelas tubulata</i>	X	
<i>Aiolochoiria crassa</i>	X	
<i>Aiolochoiria</i> sp. Cu-02	X	
<i>Amphimedon compressa</i>	X	
<i>Amphimedon</i> sp. Cu-01	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina fulva</i>	X	
<i>Aplysina</i> sp. Cu-03	X	
<i>Aplysina</i> sp. Cu-06	X	
<i>Ceratoporella nicholsoni</i>	X	

Dive Site: Cuba, NW coast, Cayo Levisa MPA, Station C-04; ROV 17-01; 18-V-17-1

<i>Clathria echinata</i>	X	
<i>Clathria venosa</i>	X	
<i>Cliona delitrix</i>	X	
<i>Corallistes</i> sp.	X	
Demospongiae unid. sp.	X	1
<i>Desmapsamma</i> sp.	X	
<i>Discodermia</i> sp.		1
<i>Erylus</i> new sp.		1
<i>Geodia</i> sp. Cu-03	X	
<i>Ircinia campana</i>	X	
<i>Ircinia felix</i>	X	
<i>Ircinia strobilina</i>	X	
<i>Mycale laevis</i>	X	
<i>Mycale laxissima</i>	X	
<i>Niphates arenata</i>	X	
<i>Oceanapia</i> "black"		1
<i>Oceanapia</i> sp. Cu-03	X	
Petrosiidae Cu-01	X	
<i>Ptilocaulis walpersi</i>	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Spirastrella</i> sp. Cu-01	X	
Spirastrellidae unid. sp.	X	
<i>Svenzea zeai</i>	X	
Tetractinellida Cu-01	X	
Verongiida Cu-01	X	
<i>Xestospongia muta</i>	X	
Xestospongia sp. Cu-01		1
Homoscleromorpha		
<i>Homosclerophorida</i> unid. sp.	X	
Oscarellidae unid. sp.	X	
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		
Hydrozoa		
Hydroidolina	X	
<i>Millepora alcicornis</i>	X	
Stylasteridae	X	
Anthozoa- non coral		
Actiniaria	X	
Alcyonacea - gorgonian		
<i>Callogorgia gracilis</i>	X	
<i>Ellisella barbadensis</i> (syn. <i>elongata</i>)		1
<i>Ellisella</i> sp.	X	

Dive Site: Cuba, NW coast, Cayo Levisa MPA, Station C-04; ROV 17-01; 18-V-17-1

Gorgoniidae	X	
<i>Nicella</i> sp.	X	
<i>Placogorgia</i> sp.	X	
Plexauridae	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		1
<i>Antipathes furcata</i>	X	
<i>Antipathes</i> sp.	X	
<i>Elatopathes abietina</i>	X	
<i>Stichopathes lutkeni</i>		1
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		
<i>Agaricia</i> sp.	X	
<i>Colpophyllia natans</i>	X	
<i>Dichocoenia stokesii</i>	X	
<i>Helioseris cucullata</i>	X	
<i>Isophyllia rigida</i>	X	
<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Orbicella faveolata</i>	X	
<i>Oxysmilia rotundifolia</i>	X	
<i>Porites astreoides</i>	X	
<i>Stephanocoenia intersepta</i>	X	
Other		1
Arthropoda		
Majidae	X	
Echinodermata		1
Comatulida	X	
Ophiuroidea	X	1
Chordata - Invertebrate		
Ascidiacea	X	
Non-Fauna		
Human debris		
Human debris- fishing line	X	
Human debris- long line	X	
Disease		
Black Band Disease	X	

Dive Site: Cuba, NW coast, Cayo Levisa MPA, Station C-04; ROV 17-01; 18-V-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-01. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Northwest Coast ROV 17-01 C-04 Notes
Target	18
Actinopterygii	18
Perciformes	14
<i>Lutjanus buccanella</i> - Blackfin Snapper	11
<i>Lutjanus mahogoni</i> - Mahogany Snapper	2
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	1
Scorpaeniformes	4
<i>Pterois volitans</i> - Lionfish	4
Other	
Actinopterygii	
Perciformes	
<i>Acanthurus chirurgus</i> - Doctorfish	X
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Bodianus pulchellus</i> - Spotfin Hogfish	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon sedentarius</i> - Reef Butterflyfish	X
Chaetodontidae - Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis enchrysurus</i> - Yellowtail Reeffish	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Chromis scotti</i> - Purple Reeffish	X
<i>Grama melacara</i> - Blackcap Basslet	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon sciurus</i> - Bluestriped Grunt	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus nigricans</i> - Black Hamlet	X
Labridae - Wrasse	X
<i>Liopropoma rubre</i> - Peppermint Bass	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacentrus</i> sp. - Damselfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
Scaridae - Parrotfish	X

Dive Site: Cuba, NW coast, Cayo Levisa MPA, Station C-04; ROV 17-01; 18-V-17-1

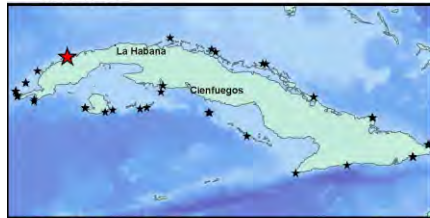
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X

Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-02; 18-V-17-3

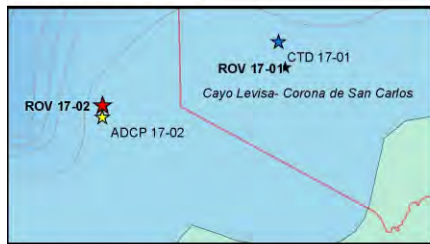
General Location and Dive Track:

Cuba, NW coast, 2 nmi north of Cayo Arenas,
Cayo Levisa MPA, Station C-04A;
ROV 17-02; 18-V-17-3

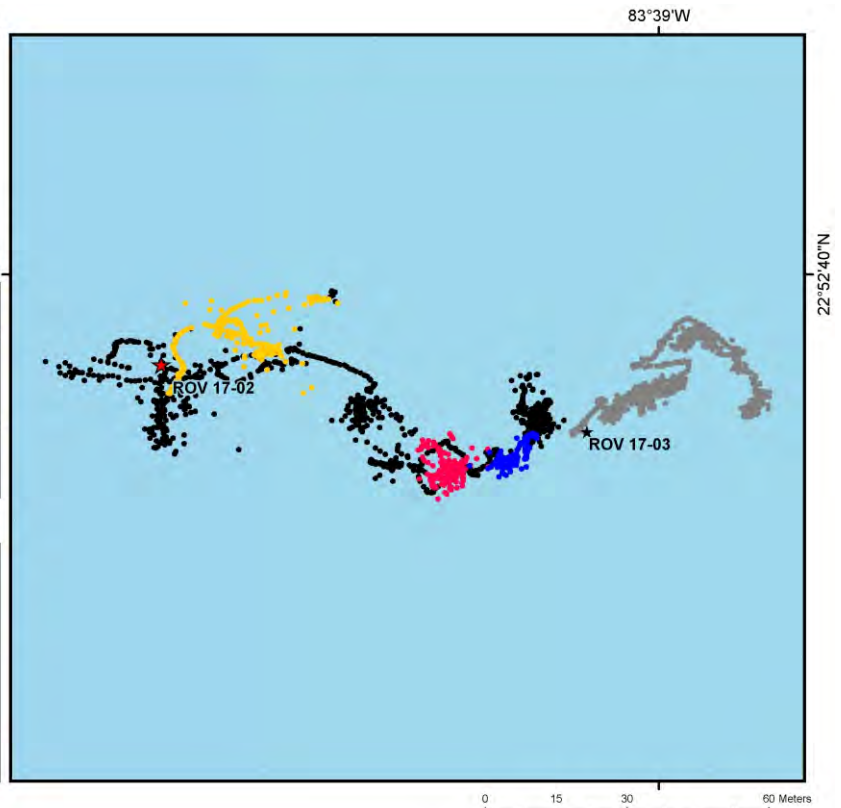
- ★ ROV 17-02
- ★ Mohawk ROV
- Transect Name
- 201705183 - Transect 01
- 201705183 - Transect 02
- 201705183 - Transect 03
- ROV 17-02
- ROV 17-03
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



0 130 260 520 Kilometers



0 2 4 8 Kilometers



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophoitic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: None

Data Management: Access Database

Date of Dive: 5/18/2017

Specimens: 1

Digital Photos: 214

No. DVD: 2

Hard Drive No.: 1

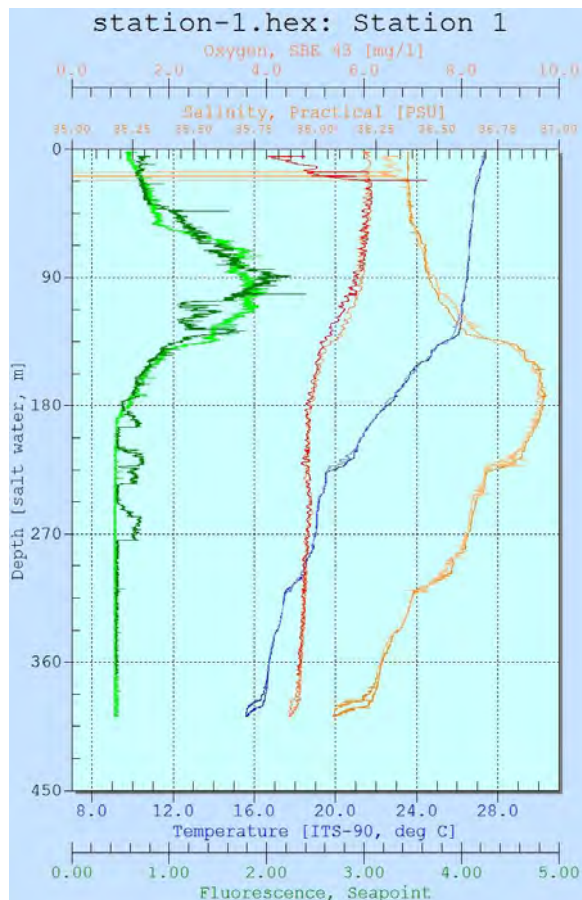
Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-02; 18-V-17-3

Dive Data:

Minimum Bottom Depth (m): 68	Total Transect Length (km): 0.283
Maximum Bottom Depth (m): 172	Surface Current (kn): 0
On Bottom (Time- GMT): 15:27	On Bottom (Lat/Long): 22.8776°N; -83.6509°W
Off Bottom (Time- GMT): 16:30	Off Bottom (Lat/Long): 22.8776°N; -83.6502°W
Physical (bottom); Temp (°C): N/A	Salinity: N/A Visibility 10 Current (kn): 0.1

Physical Environment:

Distance from Dive Site(km): 7.26



Shipboard CTD casts were made with the Sea-Bird 19. The ranges of the water column data recorded during CTD 17-01 are as follows: Depth Maximum: 398.4 m, Temperature: 15.6-27.3 °C, Salinity: 36.1-37 PSU, Oxygen Saturation: 4-6.2 ml/l, and Fluorescence: 0.4-2.4 RFU.

Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-02; 18-V-17-3

Dive Imagery:



Figure 1: 22°52.6466'N;83°39.025'W: -110.8 m
Rugged 'Wall'; black coral- *Tanacetipathes* sp., barrel sponge- *Xestospongia* sp., rope sponge- *Aplysina* sp., black sponge (right)- *Oceanapia* sp.



Figure 2: 22°52.6484'N;83°39.0141'W: -68.8 m
ROV manipulator collections of *Agaricia* coral



Figure 3: 22°52.6447'N;83°39.0227'W: -96.3 m
Ledge on deep wall; fan sponge- *Agelas* cf. *citrina*, encrusting yellow and orange sponges

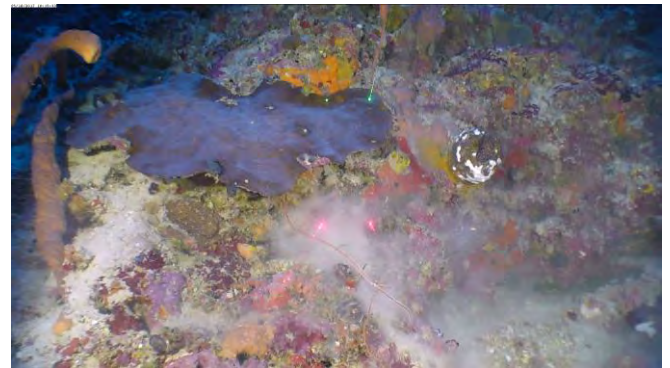


Figure 4: 22°52.6478'N;83°39.0151'W: -72.7 m
Plate coral- *Agaricia* sp. on ledge of wall (lasers- 10 cm)



Figure 5: 22°52.6461'N;83°39.0151'W: -71 m
Rock pavement covered with crustose coralline algae, corals and sponges



Figure 6: 22°52.6487'N;83°39.0132'W: -69.1 m
Agaricia sp. coral, with dense sponges and algae

Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-02; 18-V-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 18-V-17-3; ROV 17-02, UNCW Dive 408; Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Dive Events- CTD, CO₂ and pH sensors not working. Digital camera image problems with blurring and color balance. Manipulator broke during collection; dive ended early.

Site Description/Habitat:

Depth range: 172-68 m.

Transect upslope was on heading of E.

15:09- Launch; wind 17 kn from 050°, current 0 kn, water temperature- 27.6 °C, salinity- 36.3.

15:27- On bottom; 172 m.

16:28- End dive; manipulator broke.

172- 135 m, deep island slope zone: 100% hard bottom, smooth rock pavement, 10° slope. Biota sparse. Dominant biota: demosponges, plexaurid gorgonians. Fish net, 160 m

Quantitative vertical photo transect, upslope from 166 to 135 m, 15:32- 15:40 (25 photos); deep island slope zone.

125 m, lower mesophotic zone: base of rugged, eroded, near vertical rock slope. Dense and diverse sponges, *Nicella goreau*.

Quantitative vertical photo transect, upslope from 125 to 95 m, 15:59- 16:06 (25 photos); lower mesophotic zone.

102 m: first crustose coralline algae (CCA), 50 cm bushy black coral.

90- 70 m: eroded, vertical wall; 80% cover biota; *Agaricia*, *Antipathes atlantica*.

Quantitative vertical photo transect, upslope from 90 to 70 m, 16:10- 16:16 (25 photos); continue lower mesophotic zone.

Maximum Depth Occurrences:

Crustose coralline algae (CCA)- 102 m

Agaricia- 74 m

Number of Samples: 1

Disease and Human Impacts:

Fishing net- 162 m

Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-02; 18-V-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-02. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Northwest Coast ROV 17-02 C-04A		
Phylum/Class/Scientific Name	Notes	Samples
Algae		
Chlorophyta		
<i>Halimeda discoidea</i>	X	
<i>Halimeda incrassata</i>	X	
<i>Halimeda</i> sp.	X	
<i>Halimeda tuna</i>	X	
Rhodophyta		
Crustose coralline (CCA)	X	
<i>Peyssonnelia</i> sp.	X	
Porifera		
Demospongiae		
<i>Agelas citrina</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas dilatata</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas</i> sp. Cu-08	X	
<i>Agelas tubulata</i>	X	
<i>Aplysina</i> aff. <i>lacunosa</i>	X	
<i>Aplysina archeri</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina fulva</i>	X	
<i>Aplysina lacunosa</i>	X	
<i>Aplysina</i> sp. Cu-03	X	
<i>Callyspongia plicifera</i>	X	
Demospongiae unid. sp.	X	
<i>Discodermia</i> sp. Cu-01	X	
<i>Geodia</i> sp. Cu-03	X	
Haplosclerida unid. sp.	X	
<i>Ircinia</i> sp. Cu-03	X	
<i>Ircinia</i> sp. Cu-04	X	
<i>Leiodermatium</i> sp.	X	

Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-02; 18-V-17-3

<i>Oceanapia bartschi</i>	X	
<i>Oceanapia</i> sp. Cu-01	X	
Petrosiidae Cu-13	X	
<i>Polymastia</i> sp. Cu-01	X	
Spirastrellidae unid. sp.	X	
Verongiida Cu-01	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
<i>Xestospongia</i> sp. Cu-02	X	
Cnidaria		
Anthozoa- non coral		
Actinaria	X	
Alcyonacea - gorgonian		
<i>Bebryce</i> sp.	X	
<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Nicella</i> sp.	X	
Antipatharia		
<i>Antipathes</i> sp.	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		
<i>Agaricia</i> sp.	X	
Scleractinia- unid cup	X	
Other		
Annelida		
<i>Filograna</i> sp.	X	
Arthropoda		
Penaeidae	X	
Echinodermata		
Comatulida	X	
Non-Fauna		1
Human debris		
Human debris- net	X	
Rock		1
Carbonate Rock		1

Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-02; 18-V-17-3

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-02. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

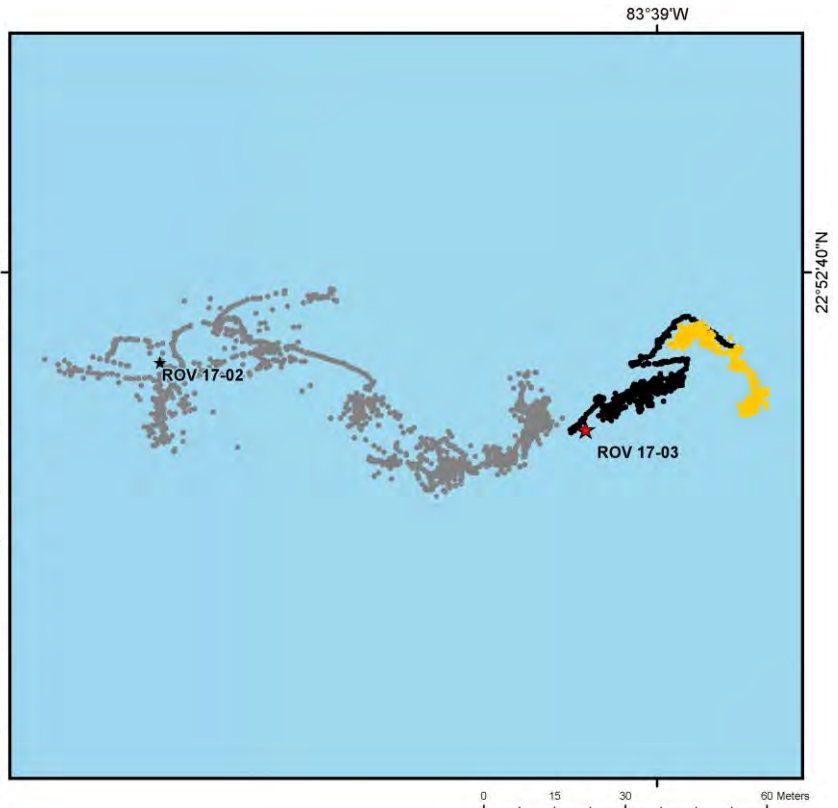
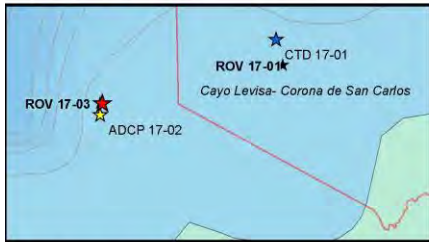
Northwest Coast ROV 17-02 C-04A	
Phylum/Class/Order/Scientific Name - Common Name	Notes
Target	1
Actinopterygii	1
Perciformes	1
<i>Cephalopholis cruentata</i> - Graysby	1
Other	
Actinopterygii	
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Caranx lugubris</i> - Black Jack	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Hypoplectrus nigricans</i> - Black Hamlet	X
Tetraodontiformes	X
<i>Acanthostracion polygonius</i> - Honeycomb Cowfish	X

Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-03; 18-V-17-4

General Location and Dive Track:

Cuba, NW coast, 2 nmi north of Cayo Arenas,
Cayo Levisa MPA, Station C-04A;
ROV 17-03; 18-V-17-4

- ★ ROV 17-03
- ★ Mohawk ROV
- Transect Name
- 201705184 - Transect 01
- ROV 17-03
- ROV 17-02
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: None

Data Management: Access Database

Date of Dive: 5/18/2017

Specimens: 7

Digital Photos: 109

No. DVD: 1

Hard Drive No.: 1

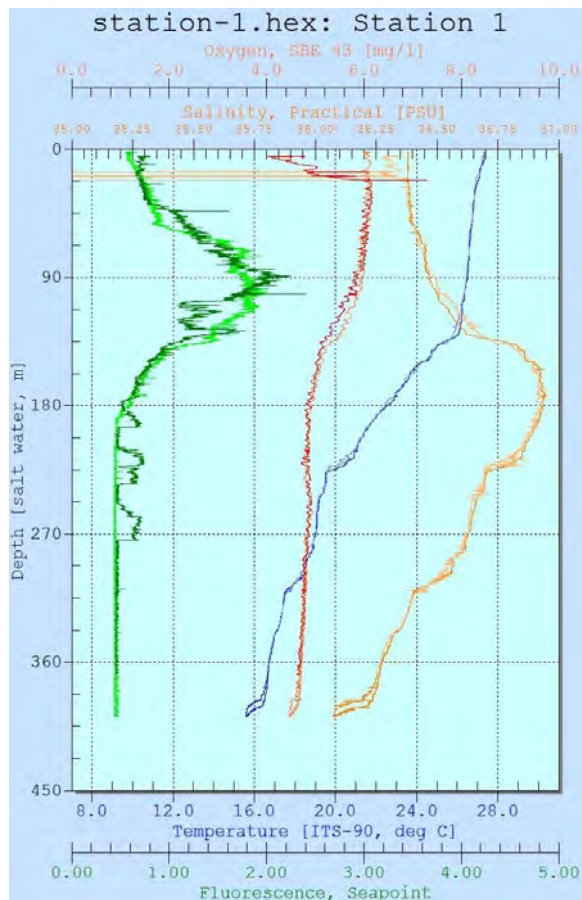
Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-03; 18-V-17-4

Dive Data:

Minimum Bottom Depth (m): 49	Total Transect Length (km): 0.145
Maximum Bottom Depth (m): 65	Surface Current (kn): 0
On Bottom (Time- GMT): 17:26	On Bottom (Lat/Long): 22.8775°N; -83.6501°W
Off Bottom (Time- GMT): 18:22	Off Bottom (Lat/Long): 22.8776°N; -83.65°W
Physical (bottom); Temp (°C): N/A	Salinity: N/A Visibility 20 Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 7.20



Shipboard CTD casts were made with the Sea-Bird 19. The ranges of the water column data recorded during CTD 17-01 are as follows: Depth Maximum: 398.4 m, Temperature: 15.6-27.3 °C, Salinity: 36.1-37 PSU, Oxygen Saturation: 4-6.2 ml/l, and Fluorescence: 0.4-2.4 RFU.

Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-03; 18-V-17-4

Dive Imagery:



Figure 1: 22°52.6544'N;83°38.9983'W: -52.8 m
Deep fore reef slope; *Montastraea cavernosa* coral, Sargassum Triggerfish- *Xanthichthys ringens*



Figure 2: 22°52.6603'N;83°38.9967'W: -48.9 m
Deep fore reef slope with dense sponges and octocorals



Figure 3: 22°52.6535'N;83°39.0004'W: -55.1 m
Demosponges, red vase- *Mycale laxissima*, green branching- *Iotrochota birotulata*; and encrusting coralline algae



Figure 4: 22°52.6547'N;83°38.9982'W: -52.6 m
Encrusting sponge- *Spirastrella* sp., and vase sponge- *Mycale laxissima*



Figure 5: 22°52.6579'N;83°38.9906'W: -49.2 m
Deep fore reef slope with few cup, bushy, and crust sponges and whip corals

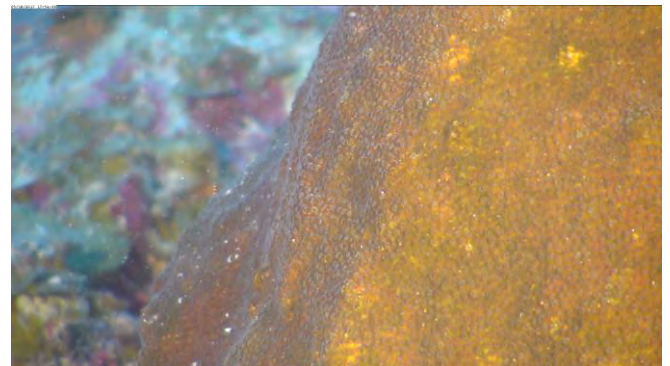


Figure 6: 22°52.6592'N;83°38.9994'W: -51.8 m
Orbicella faveolata on deep fore reef slope

Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-03; 18-V-17-4

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 18-V-17-4; ROV 17-03, UNCW Dive 409; Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Dive Events- CTD, CO₂ and pH sensors not working. Digital camera image problems with blurring and color balance. Continuation of previous dive, starting at 65 m depth.

Site Description/Habitat:

Depth range: 65- 49 m.

Transect upslope was on heading of E.

17:18- Launch; wind 15 kn from NE.

17:28- On bottom; 65 m, visibility- 20 m.

18:22- End dive.

65 m: steep rock slope. Biota: algae- *Halimeda discoidea*, *H. tuna*; black coral- *Stichopathes*; gorgonians- *Ellisella barbadensis*; sponges- dense and diverse.

63 m: first *M. cavernosa*.

49 m, upper mesophotic zone: deep reef crest, flat rock, 100% hard bottom. Biota: dense and diverse; gorgonians- *Iciligorgia schrammi*, common; sponges- diverse, dense; algae- *Lobophora*; reef fish dense.

Vertical photo transect upslope, 49 m, 5:55- 6:23; upper mesophotic zone.

Maximum Depth Occurrences:

Montastraea cavernosa- 63 m

Number of Samples- 7

Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-03; 18-V-17-4

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-03. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

		Northwest Coast ROV 17-03 C-04A	
Phylum/Class/Scientific Name	Notes		Samples
Algae			2
Chlorophyta			1
<i>Halimeda copiosa</i>	X		
<i>Halimeda discoidea</i>	X		1
<i>Halimeda</i> sp.	X		
<i>Halimeda tuna</i>	X		
Ochrophyta			1
<i>Lobophora</i> sp.	X		1
Rhodophyta			
Crustose coralline (CCA)	X		
<i>Peyssonnelia</i> sp.	X		
Porifera			2
Demospongiae			2
<i>Agelas sceptrum</i>	X		
<i>Agelas tubulata</i>	X		
<i>Aiolochoira crassa</i>	X		
<i>Amphimedon compressa</i>	X		
<i>Aplysina archeri</i>	X		
<i>Auletta cf. tuberosa</i>	X		
<i>Clathria</i> sp. Cu-01	X		
<i>Cliona caribbaea</i>	X		
<i>Cliona delitrix</i>	X		
Demospongiae unid. sp.	X		1
<i>Dragmacidon cf. alvarezae</i>	X		
<i>Iotrochota birotulata</i>	X		
<i>Mycale laxissima</i>	X		
<i>Niphates alba</i>	X		
<i>Niphates digitalis</i>	X		
<i>Niphates erecta</i>	X		
<i>Oceanapia</i> sp. Cu-01	X		
<i>Petrosia weinbergi</i>	X		

Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-03; 18-V-17-4

<i>Ptilocaulis walpersi</i>	X	
<i>Siphonodictyon</i> sp. Cu-01	X	
<i>Spirastrella hartmani</i>	X	
<i>Spirastrella</i> sp. Cu-01	X	
Spirastrellidae unid. sp.		1
Verongiida Cu-01	X	
<i>Verongula gigantea</i>	X	
Homoscleromorpha		
Homosclerophorida unid. sp.	X	
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		2
Alcyonacea - gorgonian		
<i>Bebryce</i> sp.	X	
<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Placogorgia</i> sp.	X	
Plexauridae	X	
Antipatharia		
<i>Antipathes atlantica</i>	X	
<i>Antipathes</i> sp.	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		2
<i>Agaricia lamarcki</i>	X	
<i>Agaricia</i> sp.	X	2
<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Mycetophyllia</i> sp.	X	
<i>Orbicella faveolata</i>	X	
<i>Stephanocoenia intersepta</i>	X	
Other		1
Chordata - Invertebrate		
Ascidiacea		1

Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-03; 18-V-17-4

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-03. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Northwest Coast ROV 17-03 C-04A	
Phylum/Class/Order/Scientific Name - Common Name	Notes
Target	9
Actinopterygii	9
Perciformes	4
<i>Apsilus dentatus</i> - black snapper	2
<i>Lutjanus buccanella</i> - Blackfin Snapper	2
Scorpaeniformes	5
<i>Pterois volitans</i> - Lionfish	5
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Aulopiformes	
<i>Synodus synodus</i> - Red Lizardfish	X
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
Perciformes	
<i>Apogon</i> sp. - Cardinalfish	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Centropyge argi</i> - Cherubfish	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
Chaetodontidae - Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Chromis scotti</i> - Purple Reefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
Labridae - Wrasse	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Scomberomorus regalis</i> - Cero	X
<i>Serranus tortugarum</i> - Chalk Bass	X
<i>Sparisoma rubripinne</i> - yellowtail parrotfish	X

Dive Site: Cuba, NW coast, 2 nmi north of Cayo Arenas, Cayo Levisa MPA, Station C-04A; ROV 17-03; 18-V-17-4

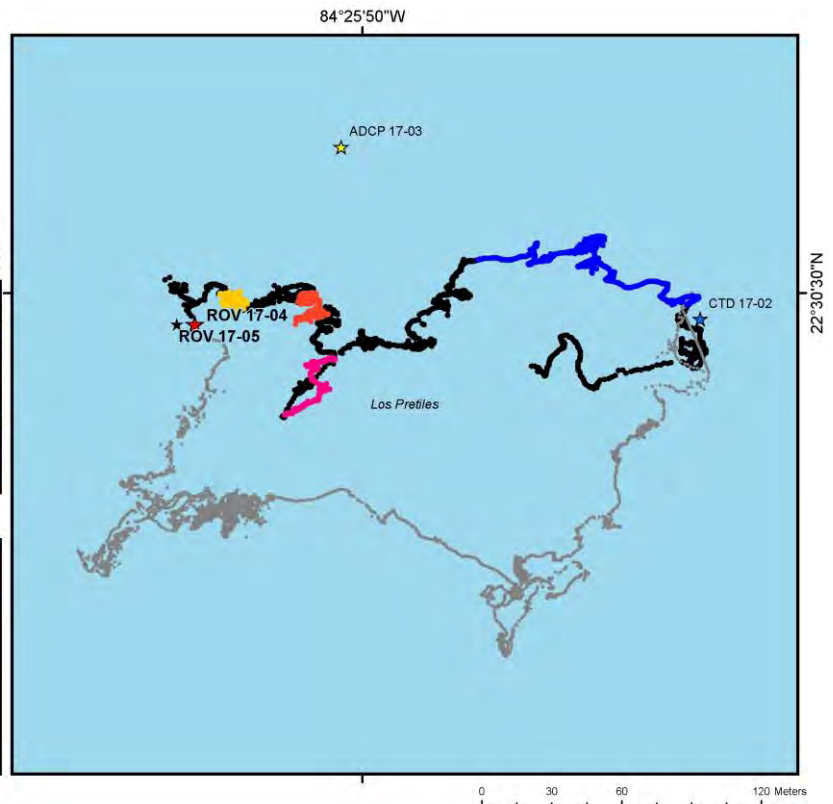
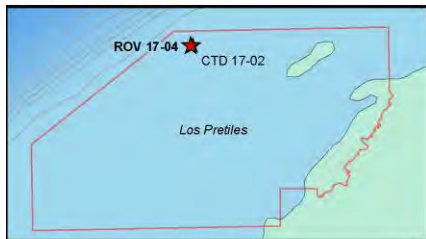
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes adustus</i> - dusky damselfish	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
Tetraodontiformes	
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, NW coast, Los Pretiles MPA, Station C-06; ROV 17-04; 19-V-17-1

General Location and Dive Track:

Cuba, NW coast, Los Pretiles MPA, Station C-06; ROV 17-04; 19-V-17-1

- ★ ROV 17-04
- ★ Mohawk ROV
- Transect Name
- 201705191 - Transect 01
- 201705191 - Transect 02
- 201705191 - Transect 03
- 201705191 - Transect 04
- ROV 17-04
- ROV 17-05
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/19/2017

Specimens: 6

Digital Photos: 436

No. DVD: 3

Hard Drive No.: 1

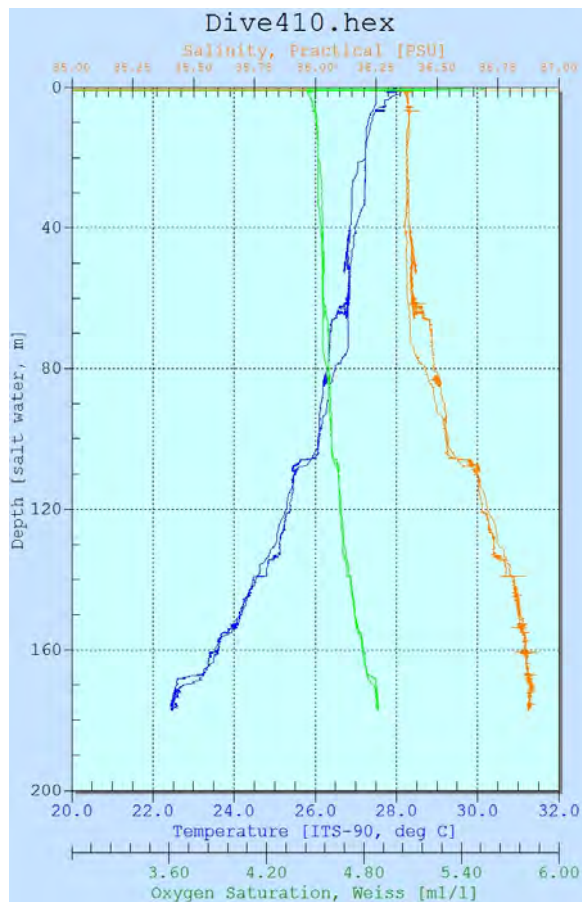
Dive Site: Cuba, NW coast, Los Pretiles MPA, Station C-06; ROV 17-04; 19-V-17-1

Dive Data:

Minimum Bottom Depth (m): 49	Total Transect Length (km): 0.613
Maximum Bottom Depth (m): 170	Surface Current (kn):
On Bottom (Time- GMT): 8:40	On Bottom (Lat/Long): 22.5082°N; -84.4312°W
Off Bottom (Time- GMT): 11:33	Off Bottom (Lat/Long): 22.5081°N; -84.4299°W
Physical (bottom); Temp (°C): 22.5	Salinity: 36.88 Visibility 15 Current (kn): 0.1

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-04 are as follows: Depth Maximum: 177.3 m, Temperature: 22.4-28.2 °C, Salinity: 36.3-36.9 PSU, and Oxygen Saturation: 4.4-4.9 ml/l.

Dive Imagery:



Figure 1: 22°30.4976'N;84°25.8575'W: -126.9 m
Sturdy barrel sponge- *Xestospongia* sp. Cu-01 ('bebe'),
and yellow and orange sponge crusts on deep island
slope

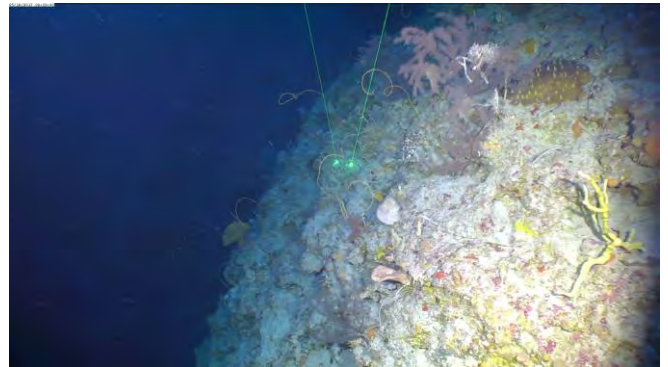


Figure 2: 22°30.4994'N;84°25.8488'W: -110 m
Deep fore reef escarpment with sponges and black
corals (10 cm lasers)



Figure 3: 22°30.4982'N;84°25.8476'W: -96.1 m
Rugged lower 'Wall'; demosponges, pedunculate
globe- *Aplysina bathyphila*, ramose- *Aplysina* sp., thick
massive petrosiids, *Geodia* sp.; and encrusting algae



Figure 4: 22°30.4977'N;84°25.8454'W: -95.2 m
Rope sponges- *Aplysina* sp. and cups- *Agelas dilatata*
on vertical 'Wall'

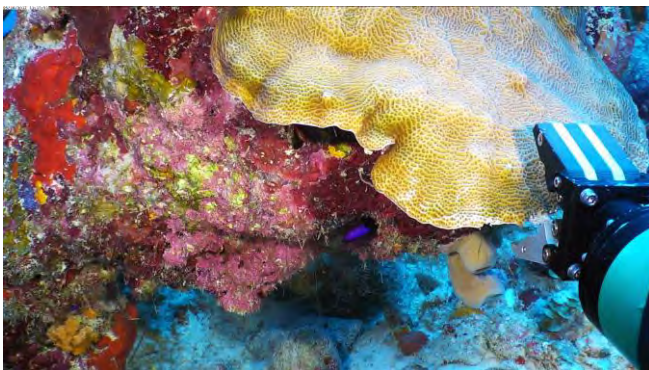


Figure 5: 22°30.4933'N;84°25.7594'W: -49.1 m
Collection of *Agaricia agaricites* on deep fore reef
slope



Figure 6: 22°30.512'N;84°25.7807'W: -52.3 m
Green alga- *Halimeda goreauii* and brown *Lobophora*
sp.

Dive Site: Cuba, NW coast, Los Pretiles MPA, Station C-06; ROV 17-04; 19-V-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 19-V-17-1; ROV 17-04, UNCW Dive 410; Cuba, NW coast, Los Pretiles MPA, Station C-06.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Dive Events- CTD, CO2 and pH sensors are working. Digital camera image problems with blurring and color balance.

Site Description/Habitat:

Depth range: 170- 49 m.

Transect upslope was on heading of 090°.

08:25- Launch.

08:21- On bottom; 170 m, visibility- 15 m.

11:33- End dive.

170- 132 m, deep island slope: steep, rugged carbonate rock slope (70-90°); fairly barren of biota.

Quantitative vertical photo transect, upslope from 150 to 132 m, 08:43- 08:54 (25 photos).

126 m, begin lower mesophotic zone: vertical rock wall, ledges, overhangs; dense sponges, *Xestospongia*, *Agelas clathrodes*.

110 m: 30% cover sponges, black coral, few gorgonians. Some fishing line.

Quantitative vertical photo transect, upslope from 100 to 84 m, 09:05- 09:15 (30 photos); lower mesophotic zone.

74 m: base of series of rock buttresses with vertical sand chutes in between. Biota: 50% cover of macrobiota; sponges, dense and diverse; black corals- large bushy *Antipatharia*; sparse gorgonians; no algae; no *Scleractinia*.

70 m: first *Agaricia* (50 cm diameter); 10-30 cm *Agaricia* common, on brow of buttresses.

Quantitative horizontal photo transect along 65 m contour, 09:23- 09:34 (30 photos); along upper brow of buttresses and sand chutes.

58 m, upper mesophotic zone: top of wall; 10° slope, 1 m boulders and sand; 70% hard bottom. *Lobophora*, 1 m *Agaricia* (probably mostly *A. grahamae*); first *M. cavernosa*.

58- 49 m: Biota: sponges; algae- *Halimeda*, *Lobophora*; corals- *Agaricia*, *Agaricia agaricites*, *Orbicella faveolata*.

Vertical photo transect upslope, 58- 49 m, 10:05- 11:18; upper mesophotic zone.

Maximum Depth Occurrences:

Agaricia sp. (probably *A. grahamae*)- 70 m

Lobophora- 57 m

Montastraea cavernosa- 57 m

Orbicella faveolata- 57 m

Dive Site: Cuba, NW coast, Los Pretiles MPA, Station C-06; ROV 17-04; 19-V-17-1

Number of Samples: 6

Disease and Human Impacts:

Fishing line- 110 m

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-04. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Notes	Samples
Northwest Coast ROV 17-04 C-06		
Algae		2
Chlorophyta		1
Chlorophyta	X	
<i>Cladophoropsis</i> sp.	X	
<i>Dictyosphaeria cavernosa</i>	X	
<i>Halimeda copiosa</i>	X	
<i>Halimeda discoidea</i>		1
<i>Halimeda goreau</i>	X	
<i>Halimeda</i> sp.	X	
<i>Halimeda tuna</i>	X	
<i>Penicillus</i> sp.	X	
<i>Udotea</i> sp.	X	
Ochrophyta		1
<i>Dictyota</i> sp.	X	
<i>Lobophora</i> sp.	X	1
Phaeophyceae	X	
Rhodophyta		
Crustose coralline (CCA)	X	
<i>Peyssonnelia</i> sp.	X	
Rose Petal CCA	X	
Porifera		
Demospongiae		
<i>Agelas cerebrum</i>	X	
<i>Agelas cervicornis</i>	X	
<i>Agelas citrina</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas dilatata</i>	X	
<i>Agelas dispar</i>	X	
<i>Agelas flabelliformis</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas</i> sp. Cu-08	X	
<i>Agelas sventres</i>	X	
<i>Agelas tubulata</i>	X	

Dive Site: Cuba, NW coast, Norte de Los Pretiles MPA, Station C-06; ROV 17-04; 19-V-17-1

<i>Aiolochoiria crassa</i>	X
<i>Aiolochoiria</i> sp. Cu-02	X
<i>Amphimedon compressa</i>	X
<i>Aplysina bathyphila</i>	X
<i>Aplysina fulva</i>	X
<i>Aplysina</i> sp. Cu-03	X
<i>Aplysina</i> sp. Cu-04	X
<i>Ceratoporella nicholsoni</i>	X
<i>Cinachyrella</i> sp. Cu-04	X
<i>Clathria echinata</i>	X
<i>Cliona delitrix</i>	X
<i>Cribrochalina vasculum</i>	X
Demospongiae unid. sp.	X
<i>Dragmacidon</i> sp. Cu-01	X
<i>Geodia neptuni</i>	X
<i>Geodia</i> sp. Cu-03	X
<i>Iotrochota birotulata</i>	X
<i>Mycale laevis</i>	X
<i>Mycale laxissima</i>	X
<i>Niphates arenata</i>	X
<i>Niphates</i> sp. Cu-01	X
<i>Niphates</i> sp. Cu-02	X
<i>Oceanapia</i> sp. Cu-01	X
<i>Oceanapia</i> sp. Cu-03	X
Petrosiidae Cu-01	X
<i>Polymastia</i> sp. Cu-01	X
Siphonodictyon sp. Cu-01	X
<i>Spirastrella hartmani</i>	X
<i>Spirastrella</i> sp. Cu-01	X
Spirastrellidae unid. sp.	X
<i>Svenzea zeai</i>	X
Tetractinellida Cu-01	X
Verongiida Cu-01	X
<i>Verongula gigantea</i>	X
<i>Xestospongia deweerdtae</i>	X
<i>Xestospongia muta</i>	X
<i>Xestospongia</i> sp. Cu-01	X
Homoscleromorpha	
<i>Plakortis</i> sp. Cu-01	X
Cnidaria 3	
Hydrozoa	
Hydroidolina	X

Dive Site: Cuba, NW coast, Norte de Los Pretiles MPA, Station C-06; ROV 17-04; 19-V-17-1

Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		
<i>Bebryce</i> sp.	X	
<i>Callogorgia gracilis</i>	X	
<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Nicella</i> sp.	X	
<i>Pseudopterogorgia</i> sp.	X	
Antipatharia		1
<i>Antipathes atlantica</i>	X	
<i>Antipathes furcata</i>	X	
<i>Antipathes</i> sp.	X	
<i>Stichopathes</i> sp.	X	1
<i>Tanacetipathes</i> sp.	X	
Scleractinia		2
<i>Agaricia agaricites</i>		1
<i>Agaricia</i> sp.	X	1
<i>Madracis auretenra</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Mussa angulosa</i>	X	
<i>Orbicella faveolata</i>	X	
<i>Porites astreoides</i>	X	
Scleractinia- unid colonial	X	
<i>Scolymia cubensis</i>	X	
<i>Stephanocoenia intersepta</i>	X	
Other		1
Mollusca		1
Gastropoda		1

Dive Site: Cuba, NW coast, Norte de Los Pretiles MPA, Station C-06; ROV 17-04; 19-V-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-04. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Northwest Coast ROV 17-04 C-06 Notes
Target	7
Actinopterygii	7
Perciformes	2
<i>Cephalopholis cruentata</i> - Graysby	1
<i>Epinephelus striatus</i> - Nassau Grouper	1
Scorpaeniformes	5
<i>Pterois volitans</i> - Lionfish	5
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
<i>Holocentrus</i> sp. - Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus chirurgus</i> - Doctorfish	X
<i>Apogon</i> sp. - Cardinalfish	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon sedentarius</i> - Reef Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis enchrysur</i> - Yellowtail Reefish	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Coryphopterus personatus</i> - Masked/Glass Goby	X
<i>Elacatinus</i> sp. - Goby	X
Gobiidae - Goby	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon vittatum</i> - Boga	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X

Dive Site: Cuba, NW coast, Norte de Los Pretiles MPA, Station C-06; ROV 17-04; 19-V-17-1

<i>Holacanthus</i> sp. - Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus nigricans</i> - Black Hamlet	X
Labridae - Wrasse	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Pomacentrus</i> sp. - Damselfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Seriola</i> sp. - Amberjack	X
<i>Serranus tortugarum</i> - Chalk Bass	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Stegastes adustus</i> - dusky damselfish	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Sphoeroides spengleri</i> - Bandtail Puffer	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, NW coast, Los Pretiles MPA, Station C-06; ROV 17-05; 19-V-17-3

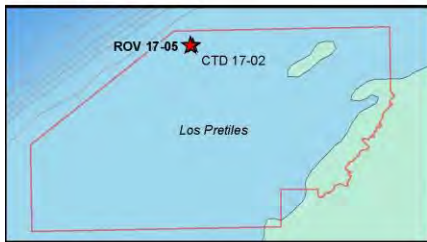
General Location and Dive Track:

Cuba, NW coast, Los Pretiles MPA, Station C-06; ROV 17-05; 19-V-17-3

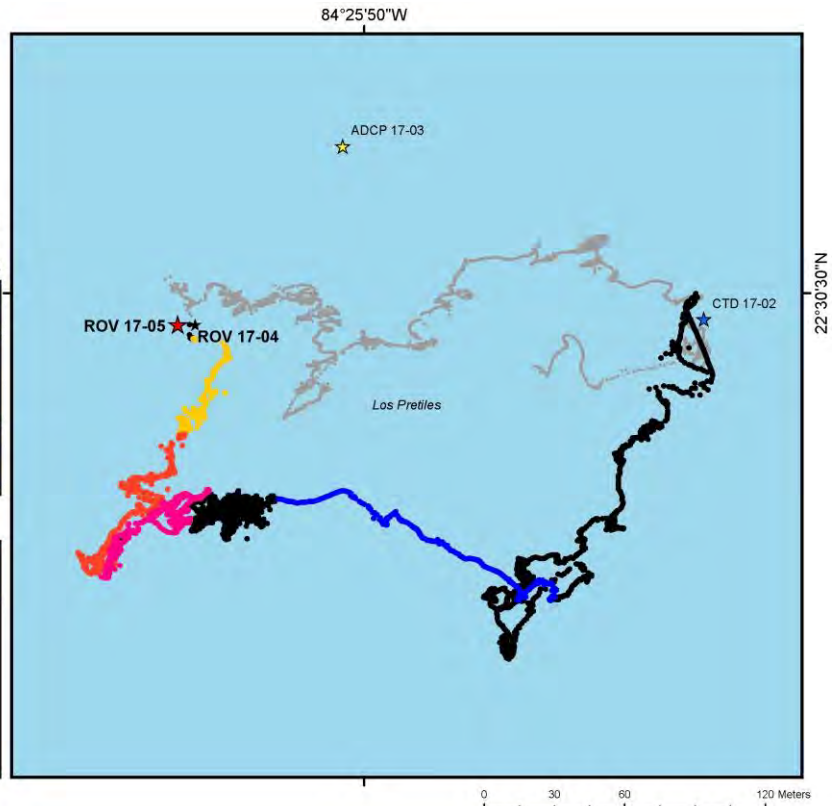
- ★ ROV 17-05
- ★ Mohawk ROV
- Transect Name
 - 201705193 - Transect 01
 - 201705193 - Transect 02
 - 201705193 - Transect 03
 - 201705193 - Transect 04
 - ROV 17-05
 - ROV 17-04
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



0 130 260 520 Kilometers



0 4.5 9 18 Kilometers



Site Overview:

Project: CUBA 2017

Principal Investigator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/19/2017

Specimens: 16

Digital Photos: 422

No. DVD: 4

Hard Drive No.: 1

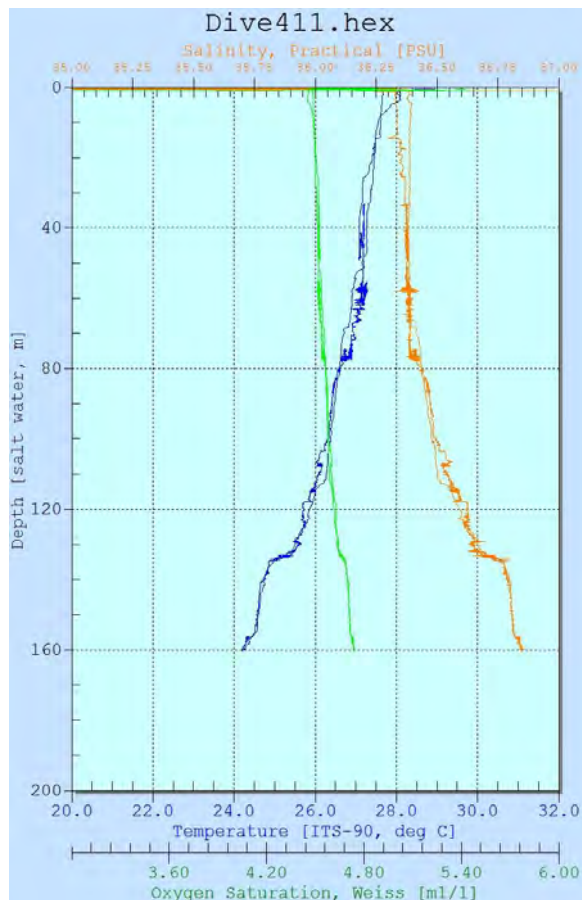
Dive Site: Cuba, NW coast, Los Pretiles MPA, Station C-06; ROV 17-05; 19-V-17-3

Dive Data:

Minimum Bottom Depth (m): 43	Total Transect Length (km): 0.862
Maximum Bottom Depth (m): 150	Surface Current (kn):
On Bottom (Time- GMT): 14:00	On Bottom (Lat/Long): 22.5082°N; -84.4313°W
Off Bottom (Time- GMT): 17:23	Off Bottom (Lat/Long): 22.508°N; -84.4292°W
Physical (bottom); Temp (°C): 24.6	Salinity: 36.81 Visibility 40 Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-05 are as follows: Depth Maximum: 160.6 m, Temperature: 24.2-28.1 °C, Salinity: 36.3-36.9 PSU, and Oxygen Saturation: 4.5-4.7 ml/l.

Dive Site: Cuba, NW coast, Los Pretiles MPA, Station C-06; ROV 17-05; 19-V-17-3

Dive Imagery:



Figure 1: 22°30.4374'N;84°25.8933'W: -82.6 m
Large (80 cm diam.) vase sponge- *Verongula* sp. on rugged 'Wall'

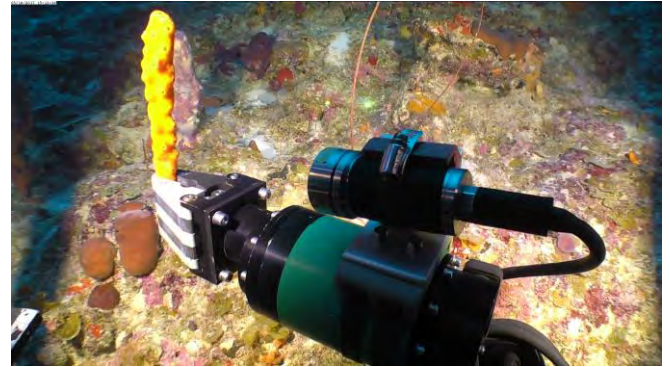


Figure 2: 22°30.4481'N;84°25.8635'W: -58.9 m
Collection of finger sponge- *Dragmacidon* sp.

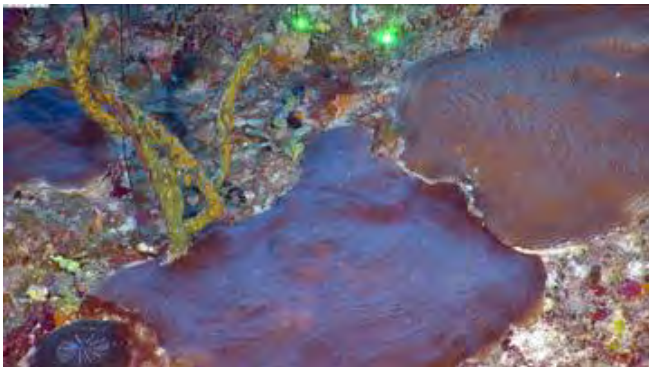


Figure 3: 22°30.4505'N;84°25.8604'W: -58.3 m
Zone of dense *Agaricia* plate corals on 'Wall' (10 cm lasers)



Figure 4: 22°30.4204'N;84°25.8013'W: -43.2 m
Collection of *Porites porites* finger coral



Figure 5: 22°30.4178'N;84°25.8009'W: -43.2 m
Collection of brown leaf algae- *Lobophora* sp.



Figure 6: 22°30.4608'N;84°25.7745'W: -48.9 m
Octocoral on deep fore reef slope

Dive Site: Cuba, NW coast, Los Pretiles MPA, Station C-06; ROV 17-05; 19-V-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 19-V-17-3; ROV 17-05, UNCW Dive 411; Cuba, NW coast, Los Pretiles MPA, Station C-06.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Dive Events- CTD, CO₂ and pH sensors are working. Digital camera image problems with blurring and color balance.

Site Description/Habitat:

Depth range: 150- 43 m.

Transect upslope was on heading of 090°.

13:46- Launch. Wind- 4 kn from 246°, seas- calm, water temperature- 28.2 °C, salinity- 36.3.

14:02- On bottom.

17:23- End dive.

150- 125 m, deep island slope zone: steep, carbonate rock slope (70°). Biota fairly sparse; few demosponges, thin encrusting, yellow Verongiida common.

Vertical photo transect upslope, 148- 125 m, 14:06- 14:10; deep island slope zone.

140 m: first lionfish.

125 m, lower mesophotic zone: more diverse sponges, few gorgonians, lionfish.

Vertical photo transect upslope, 118- 77 m, 14:10- 14:27; lower mesophotic zone.

100 m: dense CCA.

85 m: 1-2 m wide ledges common on wall.

75 m: upper brow of buttresses wall; first *Agaricia* (10 cm diam.).

Quantitative horizontal photo transect, 75- 77 m, 14:28- 14:45 (25 photos).

62 m: more ledges on wall.

58 m, upper mesophotic zone: top of vertical wall. Biota: sponges dense and diverse- *Agelas*, Axinellidae, *Agelas clathrodes*, *Niphates*; Scleractinia- *Agaricia* (15 cm); algae- *Lobophora*, *Halimeda tuna*.

58- 35 m, upper mesophotic zone: upper deep reef, 45° slope.

Quantitative vertical photo transect, upslope from 58 to 35 m, 15:53- 16:04 (30 photos); upper mesophotic zone. Biota: dense *Agaricia*, *Porites divaricata*, CCA, *Ellisella elongata*.

35 m: flat, 50% sediment, 1 m rock outcrops.

Maximum Depth Occurrences:

Lionfish- 140 m

Crustose coralline algae (CCA)- 100 m.

Agaricia- 75 m

Montastraea cavernosa- 46 m

Dive Site: Cuba, NW coast, Los Pretilos MPA, Station C-06; ROV 17-05; 19-V-17-3

Number of Samples- 16

Disease and Human Impacts:

None

Dive Site: Cuba, NW coast, Norte de Los Pretiles MPA, Station C-06; ROV 17-05; 19-V-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-05. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

		Northwest Coast ROV 17-05 C-06	
Phylum/Class/Scientific Name	Notes	Samples	
Algae		4	
Chlorophyta		1	
Chlorophyta- Filamentous		X	
<i>Halimeda</i> sp.		X	
<i>Halimeda tuna</i>		X	1
Ochrophyta		2	
<i>Dictyota pulchella</i>			1
<i>Dictyota</i> sp.		X	
<i>Lobophora</i> sp.		X	1
Rhodophyta		1	
<i>Amphiroa fragilissima</i>		X	
Crustose coralline (CCA)		X	1
<i>Jania capillacea</i>		X	
<i>Peyssonnelia</i> sp.		X	
Porifera		5	
Demospongiae		5	
<i>Agelas citrina</i>		X	
<i>Agelas conifera</i>		X	1
<i>Agelas dilatata</i>		X	
<i>Agelas dispar</i>		X	
<i>Agelas sceptrum</i>		X	
<i>Agelas</i> sp.			1
<i>Agelas</i> sp. Cu-08		X	
<i>Aiolochoiria crassa</i>		X	
<i>Aiolochoiria crassa</i> var. gray		X	
<i>Aiolochoiria crassa</i> var. purple		X	
<i>Aiolochoiria</i> sp. Cu-02		X	
<i>Aplysina archeri</i>		X	
<i>Aplysina bathyphila</i>		X	
<i>Aplysina cauliformis</i>		X	
<i>Aplysina</i> sp. Cu-03		X	
<i>Auletta cf. tuberosa</i>		X	
<i>Ceratoporella nicholsoni</i>		X	

Dive Site: Cuba, NW coast, Norte de Los Pretiles MPA, Station C-06; ROV 17-05; 19-V-17-3

<i>Cribrochalina vasculum</i>	X	
Demospongiae unid. sp.	X	1
<i>Desmapsamma anchorata</i>	X	
<i>Dragmacidon</i> sp.		1
<i>Dragmacidon</i> sp. Cu-01	X	
<i>Geodia neptuni</i>	X	
<i>Geodia</i> sp. Cu-03	X	
<i>Hymeniacidon caerulea</i>	X	
<i>Iotrochota birotulata</i>	X	
<i>Ircinia strobilina</i>	X	
<i>Mycale laxissima</i>	X	
<i>Niphates arenata</i>	X	
<i>Niphates digitalis</i>	X	
<i>Niphates</i> sp.		1
<i>Niphates</i> sp. Cu-02	X	
<i>Oceanapia</i> sp. Cu-01	X	
<i>Oceanapia</i> sp. Cu-03	X	
Petrosiidae Cu-01	X	
<i>Scopalina ruetzleri</i>	X	
<i>Siphonodictyon</i> sp. Cu-01	X	
<i>Spirastrella</i> sp. Cu-01	X	
Spirastrellidae unid. sp.	X	
<i>Svenzea zeai</i>	X	
Verongiida Cu-01	X	
Verongiida Cu-05	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
<i>Plakortis dariae</i>	X	
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		4
Hydrozoa		
Stylasteridae	X	
Alcyonacea - gorgonian		1
<i>Ellisella elongata</i>		1
<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Nicella</i> sp.	X	
<i>Plexaurella</i> sp.	X	
Plexauridae	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Villogorgia</i> sp.	X	

Dive Site: Cuba, NW coast, Norte de Los Pretiles MPA, Station C-06; ROV 17-05; 19-V-17-3

Antipatharia		
<i>Antipathes atlantica</i>	X	
<i>Antipathes</i> sp.	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		3
<i>Agaricia</i> sp.	X	2
<i>Isophyllia sinuosa</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Orbicella faveolata</i>	X	
<i>Porites astreoides</i>	X	
<i>Porites furcata</i>	X	
<i>Porites</i> sp.		1
<i>Scolymia cubensis</i>	X	
<i>Scolymia</i> sp.	X	
<i>Stephanocoenia intersepta</i>	X	
Other		1
Arthropoda		
<i>Panulirus argus</i>	X	
Echinodermata		1
Ophiuroidea		1
Non-Fauna		
Disease		
Bleaching	X	

Dive Site: Cuba, NW coast, Norte de Los Pretiles MPA, Station C-06; ROV 17-05; 19-V-17-3

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-05. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Northwest Coast ROV 17-05 C-06 Notes
Commercially Important Species	20
Actinopterygii	17
Perciformes	6
<i>Cephalopholis cruentata</i> - Graysby	1
<i>Epinephelus guttatus</i> - Red Hind	1
<i>Epinephelus morio</i> - Red Grouper	1
<i>Lutjanus buccanella</i> - Blackfin Snapper	2
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	1
Scorpaeniformes	11
<i>Pterois volitans</i> - Lionfish	11
Elasmobranchii	3
Myliobatiformes	2
<i>Dasyatis americana</i> - Southern Stingray	2
Orectolobiformes	1
<i>Ginglymostoma cirratum</i> - Nurse Shark	1
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Holocentrus</i> sp. - Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
<i>Sargocentron vexillarium</i> - Dusky Squirrelfish	X
Perciformes	
<i>Apogon pseudomaculatus</i> - Twospot Cardinalfish	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis enchrysurus</i> - Yellowtail Reeffish	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Coryphopterus personatus</i> - Masked/Glass Goby	X

Dive Site: Cuba, NW coast, Norte de Los Pretiles MPA, Station C-06; ROV 17-05; 19-V-17-3

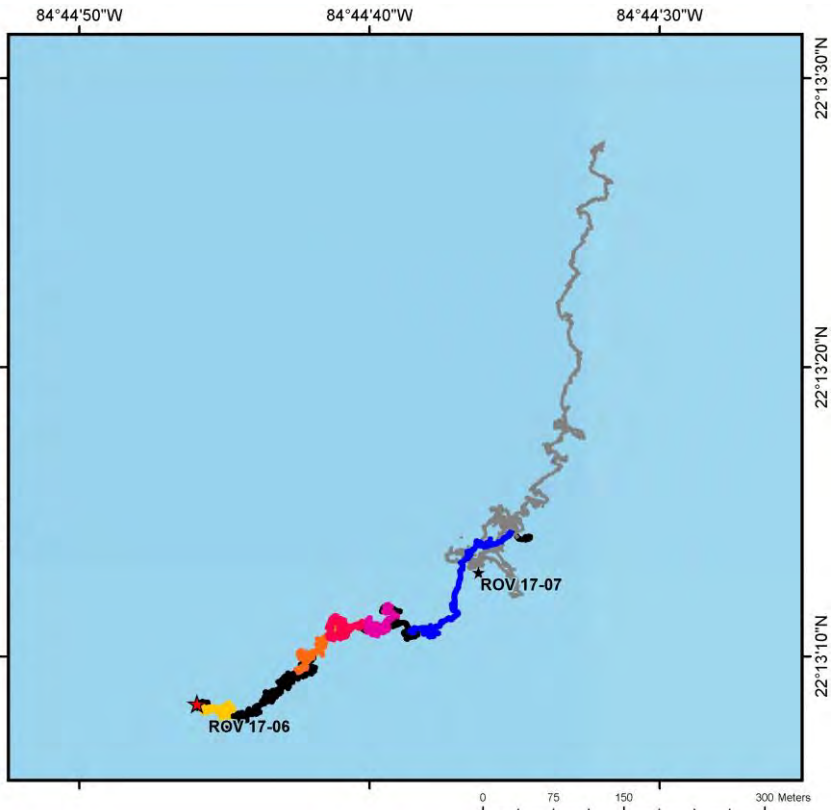
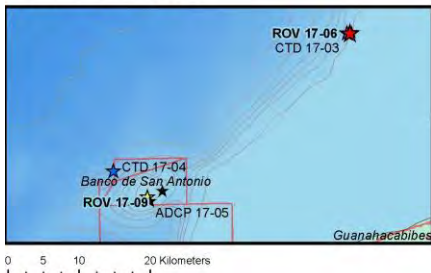
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon carbonarium</i> - Caesar Grunt	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus nigricans</i> - Black Hamlet	X
Labridae - Wrasse	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Pomacentrus</i> sp. - Damselfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
Tetraodontiformes	
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-06; 20-V-17-1

General Location and Dive Track:

Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-06; 20-V-17-1

- ★ ROV 17-06
- ★ Mohawk ROV
- Transect Name
 - 201705201 - Transect 01
 - 201705201 - Transect 02
 - 201705201 - Transect 03
 - 201705201 - Transect 04
 - 201705201 - Transect 05
- ROV 17-06
- ROV 17-07
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/20/2017

Specimens: 3

Digital Photos: 591

No. DVD: 3

Hard Drive No.: 1

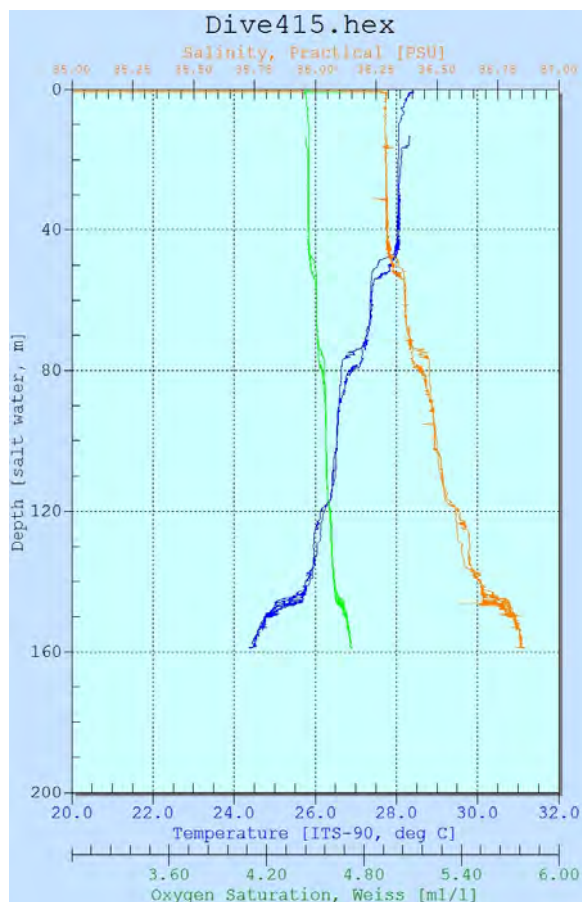
Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-06; 20-V-17-1

Dive Data:

Minimum Bottom Depth (m): 45	Total Transect Length (km): 0.951
Maximum Bottom Depth (m): 178	Surface Current (kn): 0.8
On Bottom (Time- GMT): 8:26	On Bottom (Lat/Long): 22.219°N; -84.7461°W
Off Bottom (Time- GMT): 11:55	Off Bottom (Lat/Long): 22.2197°N; -84.7438°W
Physical (bottom); Temp (°C): 23.2	Salinity: 36.87 Visibility 10 Current (kn): 0.5

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-06 are as follows: Depth Maximum: 176.7 m, Temperature: 23-28 °C, Salinity: 36.2-37.1 PSU, and Oxygen Saturation: 4.5-4.8 ml/l.

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-06; 20-V-17-1

Dive Imagery:



Figure 1: 22°13.1758'N;84°44.6924'W: -90.2 m
Orange octocoral- *Swiftia exserta* on the 'Wall'



Figure 2: 22°13.1858'N;84°44.6815'W: -77.3 m
Plate sponge- *Agelas dilatata*, and Longspine Squirrelfish- *Holocentrus rufus*

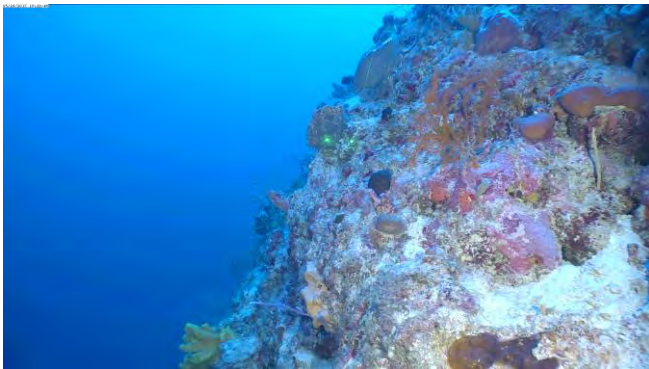


Figure 3: 22°13.178'N;84°44.6836'W: -65.7 m
Sponges, encrusting algae and octocorals on the



Figure 4: 22°13.1801'N;84°44.6429'W: -49.3 m
Collecting *Eunica* sp. octocoral on deep fore reef slope



Figure 5: 22°13.1518'N;84°44.7174'W: -120.6 m
Shortnose Batfish- *Ogcocephalus nasutus*, and yellow demosponge crust on deep island slope



Figure 6: 22°13.1926'N;84°44.6574'W: -54.6 m
Rope sponge- *Iotrochota birotulata*, plate- *Petrosia weinbergi*, spherical- *Geodia* sp.; and plate coral- *Agarcia* sp.

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-06; 20-V-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 20-V-17-1; ROV 17-06, UNCW Dive 412; Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Dive Events- Digital camera image problems with blurring and color balance; trying different settings.

Site Description/Habitat:

Depth range: 178- 45 m.

Transect upslope was on heading of 098°.

08:11- Launch. Wind- 12 kn from 108°, current- 0.8 kn to 280°, seas- 0.3 m from E, water temperature- 27.9 °C, salinity- 36.1.

08:27- On bottom; 172 m, visibility- 10 m, current- 0.5 kn from SE.

11:53- End dive.

178- 130 m, deep island slope zone: steep smooth rock slope (70°). Sparse biota: sponges- thin encrusting Verongiida, Tetractinellida; Gorgonacea- 20 cm fans, Paramuriceidae fans; black corals- Antipatharia fans, *Stichopathes*; corals- Stylasteridae.

178 m: school of red snapper.

Quantitative vertical photo transect, up slope from 170 to 130 m, 08:33- 08:45 (30 images); deep island slope zone.

130 m: more diversity; dense sponges- yellow encrusting, *Ircinia*, *Xestospongia*, *Polymastia*; Gorgonacea- *Nicella goreau*.

120 m, lower mesophotic zone: 70° rock slope, 2 m ledges, with caves. Biota: sponges- dense sclerosponges up to 50% cover, *Dercitus*, *Aplysina*, *Xestospongia*; Gorgonacea- *Ellisella* whips

115 m: vertical rock wall, eroded facies; first lionfish.

Quantitative vertical photo transect, up slope from 115 to 85 m, 09:44- 10:05 (30 photos); lower mesophotic zone.

110 m: rock buttresses, very eroded. Biota: dense diverse sponges- *Aplysina archeri*, *Aplysina fulva*, dense sclerosponges, *Oceanapia*; Stylaster; lionfish.

102 m: gorgonian zone; dense *Nicella*; sponges- *Polymastia*, *Xestospongia*; *Stylaster filigranus*.

95 m: first CCA.

90 m: first *Swiftia exserta*.

Vertical photo transect upslope, 80- 58, 10:05- 10:32; continue lower mesophotic zone.

70 m: upper rock buttresses, 60° slope; dense sponges, gorgonians.

69 m: first coral, *Stephanocoenia intersepta* (5 cm diam.).

68 m: first *Agaricia* (15 cm).

64 m: first *Halimeda*.

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-06; 20-V-17-1

55 m, upper mesophotic zone: upper brow of buttresses, 45° slope, low relief, low rugosity. Quantitative horizontal photo transect along 55-51 m, start-10:36, end 11:02 (30 photos); upper mesophotic zone. Biota: algae- *Lobophora*, dense CCA, *Dictyota*; sponges- dense; gorgonians- *Plexaurella*; sponges- large *Aplysina* up to 1 m.

50- 45 m: fringing, low relief deep reef along top edge, 1-2 m relief; intersected with sediment chutes. On top, flat with sediment and small boulders.

Quantitative horizontal photo transect, 50- 45 m, 11:30- 11:53 (25 photos); upper mesophotic zone. Biota: dense plexaurid gorgonians, *Eunicea*; dense *Agaricia* (10-30 cm); sponges; 5 m diameter patches of cyanobacteria on sediment.

Maximum Depth Occurrences:

Lionfish- 115 m

CCA- 95 m

Swiftia exserta- 90 m

Stephanocoenia intersepta- 69 m

Agaricia- 68 m

Halimeda- 68 m

Lobophora- 55 m

Number of Samples- 3

Disease and Human Impacts:

None

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-06; 20-V-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-06. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Northwest Coast ROV 17-06 C-07		
Phylum/Class/Scientific Name	Notes	Samples
Algae		
Cyanobacteria		
Chlorophyta		
Chlorophyta	X	
<i>Halimeda copiosa</i>	X	
<i>Halimeda</i> sp.	X	
<i>Halimeda tuna</i>	X	
<i>Udotea cyathiformis</i>	X	
Ochrophyta	X	
<i>Dictyota</i> sp.	X	
<i>Lobophora</i> sp.	X	
Rhodophyta	X	
Crustose coralline (CCA)	X	
<i>Peyssonnelia</i> sp.	X	
Porifera		1
Demospongiae		1
<i>Agelas cervicornis</i>	X	
<i>Agelas citrina</i>	X	
<i>Agelas clathrodes</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas dilatata</i>	X	
<i>Agelas dispar</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas</i> sp. Cu-08	X	
<i>Aiolochoxia crassa</i>	X	
<i>Aiolochoxia crassa</i> var. gray	X	
<i>Aiolochoxia crassa</i> var. purple-blue	X	
<i>Aiolochoxia</i> sp. Cu-02	X	
<i>Amphimedon compressa</i>	X	
<i>Aplysina archeri</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina fistularis</i>	X	

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-06; 20-V-17-1

<i>Aplysina fulva</i>	X	
<i>Aplysina sciophila</i>	X	1
<i>Aplysina</i> sp. Cu-03	X	
<i>Callyspongia armigera</i>	X	
<i>Callyspongia</i> sp. Cu-03	X	
<i>Ceratoporella nicholsoni</i>	X	
<i>Cinachyrella</i> sp. Cu-04	X	
<i>Cliona delitrix</i>	X	
<i>Corallistes</i> sp.	X	
<i>Cribrochalina vasculum</i>	X	
Demospongiae unid. sp.	X	
<i>Discodermia</i> sp. Cu-01	X	
<i>Dragmacidon cf. alvarezae</i>	X	
<i>Geodia neptuni</i>	X	
<i>Geodia</i> sp. Cu-03	X	
<i>Igernella</i> sp.	X	
<i>Iotrochota birotulata</i>	X	
<i>Ircinia strobilina</i>	X	
<i>Leiodermatium</i> sp.	X	
<i>Mycale laxissima</i>	X	
<i>Niphates alba</i>	X	
<i>Niphates arenata</i>	X	
<i>Niphates</i> sp. Cu-01	X	
Niphatidae Cu-01	X	
<i>Oceanapia</i> sp. Cu-01	X	
<i>Oceanapia</i> sp. Cu-02	X	
Petrosiidae Cu-15	X	
Petrosiidae unid. sp.	X	
<i>Polymastia</i> sp. Cu-04	X	
<i>Scopalina ruetzleri</i>	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Spirastrella coccinea</i>	X	
<i>Spirastrella hartmani</i>	X	
<i>Svenzea zeai</i>	X	
Verongiida Cu-01	X	
Verongiida Cu-06	X	
Verongiida Cu-08	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		2
Hydrozoa		

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-06; 20-V-17-1

Hydroidolina	X	
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		1
<i>Bebryce</i> sp.	X	
<i>Ellisella</i> sp.	X	
<i>Eunicea</i> sp.		1
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Nicella</i> sp.	X	
<i>Paramuricea</i> sp.	X	
Plexauridae	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		
<i>Antipathes atlantica</i>	X	
Antipathidae	X	
<i>Plumapathes pennacea</i>	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		1
<i>Agaricia</i> sp.	X	1
<i>Montastraea cavernosa</i>	X	
<i>Orbicella faveolata</i>	X	
<i>Orbicella franksi</i>	X	
<i>Scolymia cubensis</i>	X	
<i>Siderastrea siderea</i>	X	
<i>Stephanocoenia intersepta</i>	X	
Other		
Arthropoda		
<i>Panulirus argus</i>	X	
Non-Fauna		
Disease		
Bleaching	X	

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-06; 20-V-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-06. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

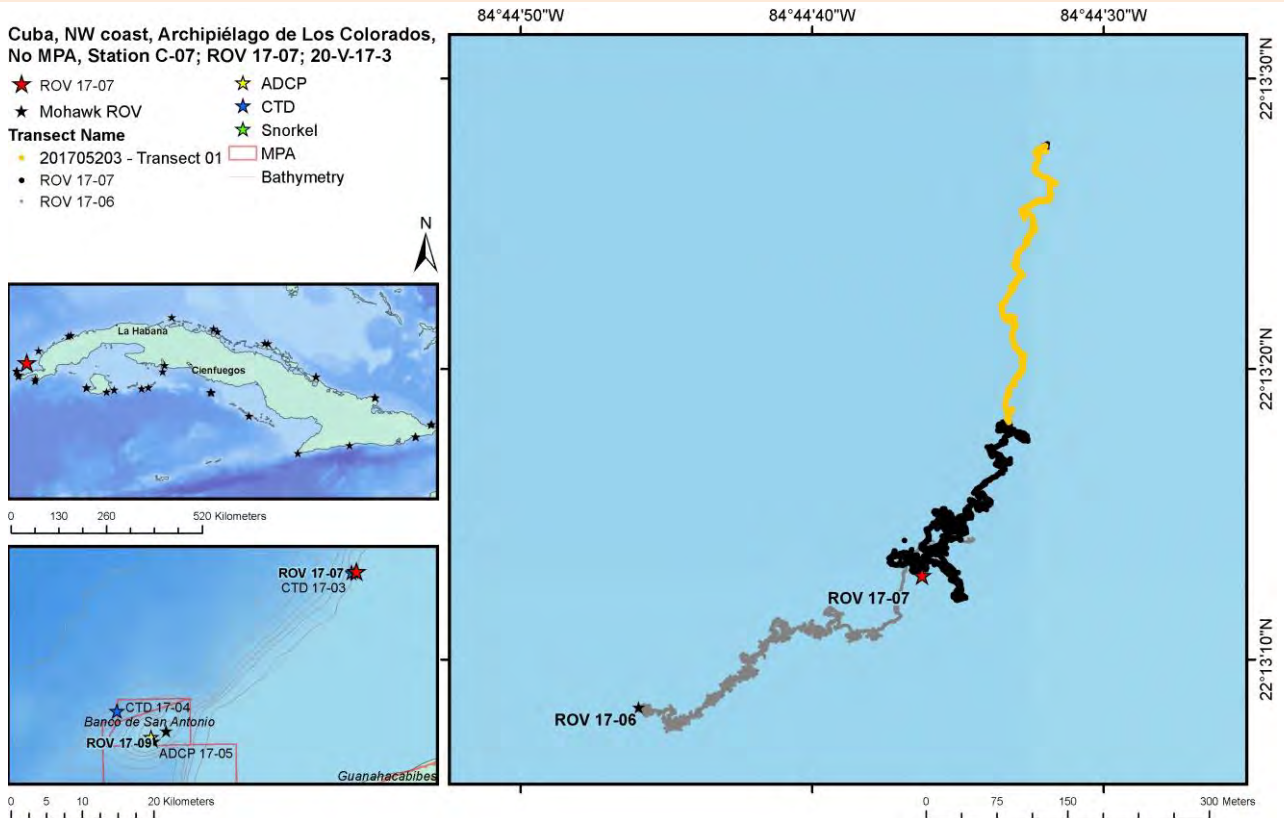
Northwest Coast ROV 17-06 C-07	
Phylum/Class/Order/Scientific Name - Common Name	Notes
Commercially Important Species	24
Actinopterygii	24
Perciformes	9
<i>Cephalopholis cruentata</i> - Graysby	3
<i>Lutjanus analis</i> - Mutton Snapper	1
<i>Lutjanus apodus</i> - Schoolmaster	1
<i>Lutjanus buccanella</i> - Blackfin Snapper	1
<i>Lutjanus jocu</i> - Dog Snapper	2
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	1
Scorpaeniformes	15
<i>Pterois volitans</i> - Lionfish	15
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
<i>Holocentrus</i> sp. - Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Lophiiformes	
<i>Ogcocephalus nasutus</i> - Shortnose Batfish	X
Perciformes	
<i>Acanthurus chirurgus</i> - Doctorfish	X
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Calamus</i> sp. - Porgy	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
Chaetodontidae - Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis enchrysurus</i> - Yellowtail Reeffish	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Elacatinus horsti</i> - Yellowline Goby	X

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-06; 20-V-17-1

<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus</i> sp. - Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus nigricans</i> - Black Hamlet	X
<i>Lachnolaimus maximus</i> - Hogfish	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Scomberomorus regalis</i> - Cero	X
<i>Sphyaena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Balistes vetula</i> - Queen Triggerfish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-07; 20-V-17-3

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2, Light and Temperature Sensor- HOBOS

Data Management: Access Database

Date of Dive: 5/20/2017

Specimens: 14

Digital Photos: 442

No. DVD: 3

Hard Drive No.: 1

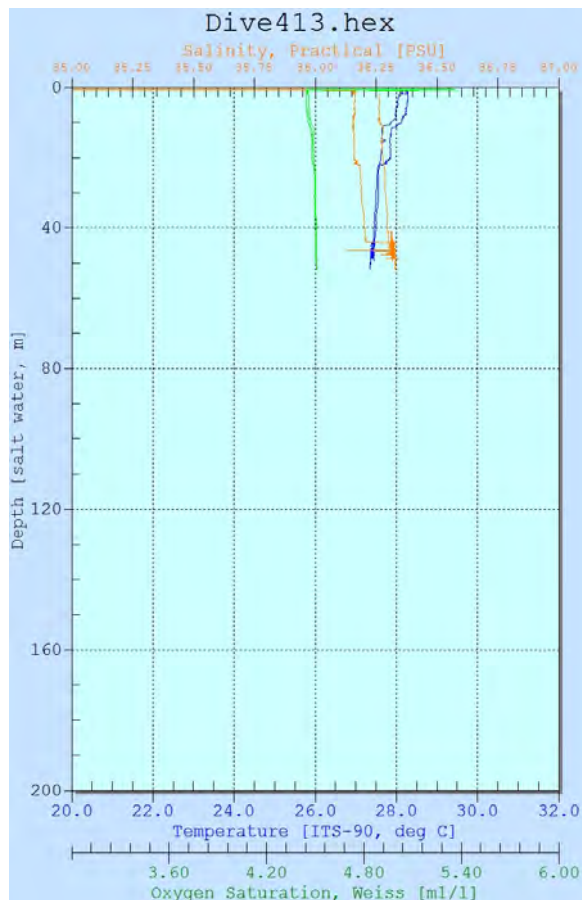
Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-07; 20-V-17-3

Dive Data:

Minimum Bottom Depth (m): 47	Total Transect Length (km): 1.251
Maximum Bottom Depth (m): 50	Surface Current (kn): 0.2
On Bottom (Time- GMT): 13:47	On Bottom (Lat/Long): 22.2202°N; -84.7434°W
Off Bottom (Time- GMT): 17:03	Off Bottom (Lat/Long): 22.2218°N; -84.7426°W
Physical (bottom); Temp (°C): 27.6	Salinity: 36.28 Visibility 100 Current (kn): 0

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-07 are as follows: Depth Maximum: 51.7 m, Temperature: 27.3-28.3 °C, Salinity: 36.2-36.3 PSU, and Oxygen Saturation: 4.4-4.5 ml/l.

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-07; 20-V-17-3

Dive Imagery:



Figure 1: 22°13.2259'N;84°44.6134'W: -47.3 m
Collecting *Orbicella* sp. on deep fore reef slope

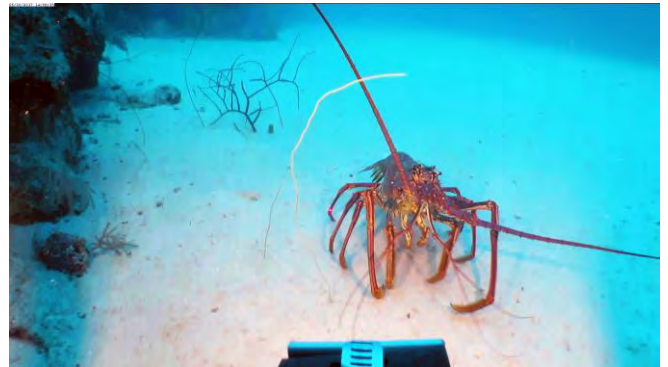


Figure 2: 22°13.2018'N;84°44.5813'W: -49.3 m
Lobster- *Panularis argus* checking out the ROV



Figure 3: 22°13.2481'N;84°44.5786'W: -48.3 m
Dense sheets of *Agaricia* coral; ROV manipulator and suction hose



Figure 4: 22°13.262'N;84°44.5701'W: -47.7 m
Red Grouper- *Epinephelus morio* on crest of deep fringing reef



Figure 5: 22°13.4131'N;84°44.5394'W: -45.4 m
School of Horse-eye Jack- *Caranx latus* on deep fringing reef

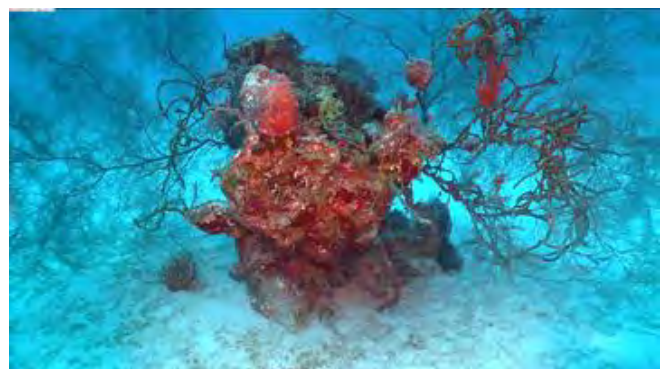


Figure 6: 22°13.4399'N;84°44.5283'W: -47.2 m
Boulder with octocorals and sponges on deep fringing reef

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-07; 20-V-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 20-V-17-3; ROV 17-07, UNCW Dive 413; Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Added HOBO light/temperature sensor to ROV.

Dive Events- Dive on top of reef for samples and fish video survey. No additional habitat surveys.

Site Description/Habitat:

Depth range: 50- 47 m.

13:41- Launch. Wind- 16 kn from 107°, current- 0.2 kn from 216°, seas- 0.3- 1 m from SE, water temperature- 28.0 °C, salinity- 36.2.

13:48- On bottom; 50 m.

17:02- End dive.

50- 48 m, upper mesophotic zone: spur and groove deep reef edge, and flat sediment/boulders on top.

Fish video survey, 48 m, 16:29- 17:02, along fringing reef and reef flat; schools of snapper; dense fish, nurse shark, hog snapper, school master, pork fish.

Number of Samples- 14

Disease and Human Impacts:

None

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-07; 20-V-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-07. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

		Northwest Coast ROV 17-07 C-07	
Phylum/Class/Scientific Name		Notes	Samples
Algae			4
Chlorophyta			3
<i>Avrainvillea</i> sp.		X	
Chlorophyta		X	
Chlorophyta- Filamentous Green		X	
<i>Cladophora</i> sp.			1
<i>Halimeda copiosa</i>		X	1
<i>Halimeda goreau</i>		X	
<i>Halimeda</i> sp.		X	
<i>Halimeda tuna</i>		X	
<i>Udotea</i> sp.			1
Ochrophyta			
<i>Dictyota</i> sp.		X	
<i>Lobophora</i> sp.		X	
Rhodophyta			1
Crustose coralline (CCA)		X	
<i>Peyssonnelia</i> sp.		X	1
Porifera			3
Demospongiae			2
<i>Agelas clathrodes</i>		X	
<i>Agelas conifera</i>		X	
<i>Agelas dilatata</i>		X	
<i>Agelas dispar</i>		X	
<i>Agelas sceptrum</i>		X	
<i>Agelas</i> sp. Cu-08		X	
<i>Aiolochoia crassa</i>		X	
<i>Aiolochoia crassa</i> var. dark blue		X	
<i>Aplysina archeri</i>		X	
<i>Aplysina cauliformis</i>		X	
<i>Aplysina fistularis</i>		X	
<i>Callyspongia plicifera</i>		X	
<i>Callyspongia</i> sp. Cu-02		X	

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-07; 20-V-17-3

<i>Callyspongia</i> sp. Cu-03	X	
<i>Cliona delitrix</i>	X	
<i>Cliona</i> sp.	X	
<i>Cribrochalina vasculum</i>	X	
Demospongiae unid. sp.	X	2
<i>Dragmacidon alvarezae</i>	X	
<i>Dragmacidon cf. alvarezae</i>	X	
<i>Geodia neptuni</i>	X	
<i>Iotrochota birotulata</i>	X	
<i>Ircinia campana</i>	X	
<i>Ircinia felix</i>	X	
<i>Ircinia strobilina</i>	X	
<i>Mycale laxissima</i>	X	
<i>Niphates alba</i>	X	
<i>Niphates</i> sp. Cu-01	X	
<i>Oceanapia peltata</i>	X	
<i>Oceanapia</i> sp. Cu-02	X	
Petrosiidae unid. sp.	X	
<i>Phorbas</i> sp.	X	
<i>Ptilocaulis walpersi</i>	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Smenospongia aurea</i>	X	
<i>Spirastrella coccinea</i>	X	
<i>Spirastrella hartmani</i>	X	
<i>Spirastrella</i> sp. Cu-01	X	
<i>Svenzea zeai</i>	X	
<i>Theonella atlantica</i>	X	
<i>Verongula gigantea</i>	X	
<i>Xestospongia deweerdtae</i>	X	
<i>Xestospongia muta</i>	X	
Homoscleromorpha		1
<i>Plakortis</i> sp.		1
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		7
Hydrozoa		
Hydroidolina	X	
<i>Millepora alcicornis</i>	X	
Alcyonacea - gorgonian		1
<i>Ellisella</i> sp.	X	
<i>Eunicea</i> sp.	X	
Gorgoniidae	X	
Plexauridae	X	

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-07; 20-V-17-3

Pseudopterogorgia sp.	X	1
Antipatharia		1
Antipatharia unid. sp.		1
Antipathidae	X	
<i>Leiopathes</i> sp.	X	
<i>Stichopathes</i> sp.	X	
Scleractinia		5
<i>Agaricia agaricites</i>	X	
<i>Agaricia</i> sp.	X	3
<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Orbicella faveolata</i>	X	1
<i>Porites</i> sp.	X	1
<i>Scolymia cubensis</i>	X	
<i>Scolymia</i> sp.	X	
<i>Siderastrea siderea</i>	X	
<i>Stephanocoenia intersepta</i>	X	
Non-Fauna		
Disease		
Bleaching	X	

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-07; 20-V-17-3

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-07. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

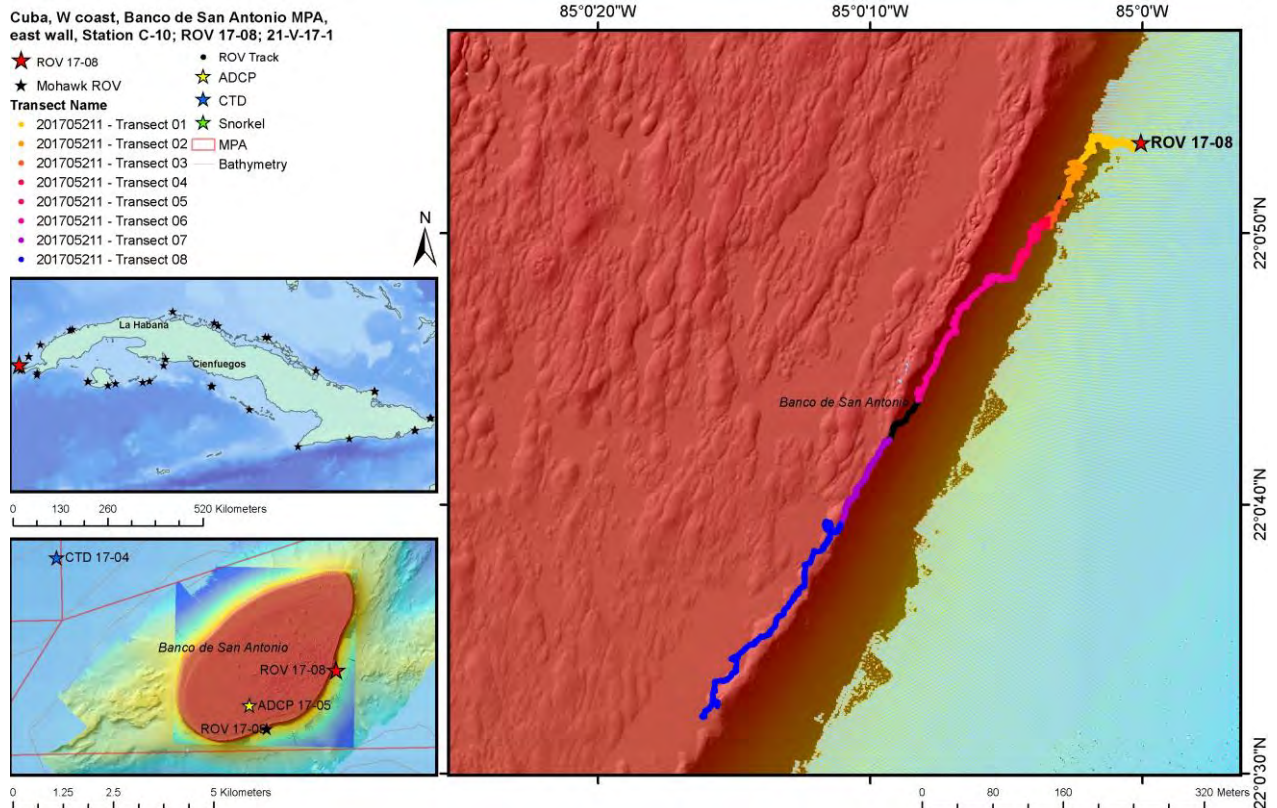
Phylum/Class/Order/Scientific Name - Common Name	Northwest Coast ROV 17-07 C-07 Notes
Commercially Important Species	32
Actinopterygii	31
Perciformes	28
<i>Cephalopholis cruentata</i> - Graysby	2
<i>Epinephelus guttatus</i> - Red Hind	2
<i>Epinephelus morio</i> - Red Grouper	1
<i>Lutjanus analis</i> - Mutton Snapper	1
<i>Lutjanus apodus</i> - Schoolmaster	1
<i>Lutjanus buccanella</i> - Blackfin Snapper	4
<i>Lutjanus mahogoni</i> - Mahogany Snapper	1
<i>Mycteroperca bonaci</i> - Black Grouper	1
<i>Mycteroperca phenax</i> - Scamp	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	14
Scorpaeniformes	3
<i>Pterois volitans</i> - Lionfish	3
Elasmobranchii	1
Orectolobiformes	1
<i>Ginglymostoma cirratum</i> - Nurse Shark	1
Other	
Actinopterygii	
Beryciformes	
<i>Holocentrus</i> sp. - Squirrelfish	X
<i>Myripristis jacobus</i> - Blackbar Soldierfish	X
Perciformes	
<i>Acanthurus chirurgus</i> - Doctorfish	X
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Anisotremus virginicus</i> - Porkfish	X
<i>Bodianus rufus</i> - Spanish Hogfish	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon striatus</i> - Banded Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X

Dive Site: Cuba, NW coast, Archipiélago de Los Colorados, No MPA, Station C-07; ROV 17-07; 20-V-17-3

<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Coryphopterus personatus</i> - Masked/Glass Goby	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon aurolineatum</i> - Tomtate	X
<i>Haemulon melanurum</i> - Cottonwick	X
<i>Haemulon parra</i> - Sailors Choice	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus nigricans</i> - Black Hamlet	X
Labridae - Wrasse	X
<i>Lachnolaimus maximus</i> - Hogfish	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Mulloidichthys martinicus</i> - Yellow goatfish	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Pomacentrus</i> sp. - Damsel fish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damsel fish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Balistes vetula</i> - Queen Triggerfish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10; ROV 17-08; 21-V-17-1

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investigator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: NF1602_Cuba_SanAntonioBank_1m

Purpose: Mesophoitic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/21/2017

Specimens: 17

Digital Photos: 664

No. DVD: 3

Hard Drive No.: 1

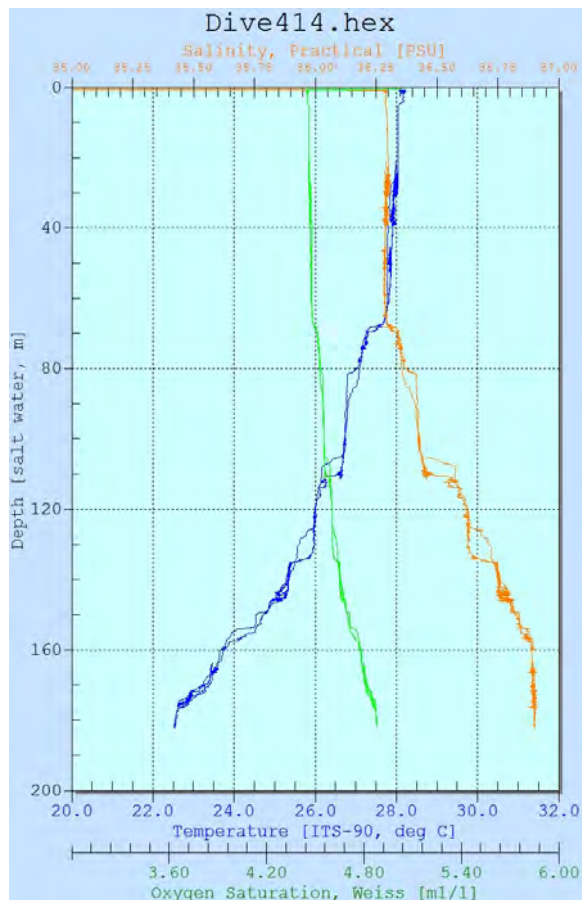
Dive Site: Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10; ROV 17-08; 21-V-17-1

Dive Data:

Minimum Bottom Depth (m): 25	Total Transect Length (km): 1.143
Maximum Bottom Depth (m): 183	Surface Current (kn): 0.7
On Bottom (Time- GMT): 8:40	On Bottom (Lat/Long): 22.0148°N; -85°W
Off Bottom (Time- GMT): 11:45	Off Bottom (Lat/Long): 22.0088°N; -85.0045°W
Physical (bottom); Temp (°C): 22.6	Salinity: 36.9 Visibility 20 Current (kn): 0.1

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-08 are as follows: Depth Maximum: 182.1 m, Temperature: 22.5-28.2 °C, Salinity: 36.3-36.9 PSU, and Oxygen Saturation: 4.4-4.9 ml/l.

Dive Site: Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10; ROV 17-08; 21-V-17-1

Dive Imagery:

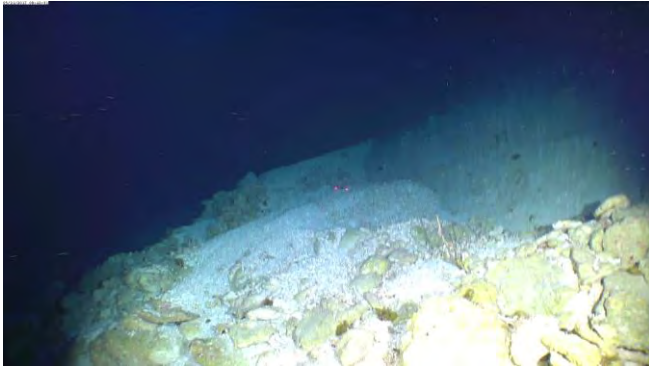


Figure 1: 22°0.8894'N;85°0.0185'W: -167.6 m
Coral debris pile up on ledges of deep island slope



Figure 2: 22°0.8875'N;85°0.0204'W: -167.7 m
Collection of rock sample on deep island slope

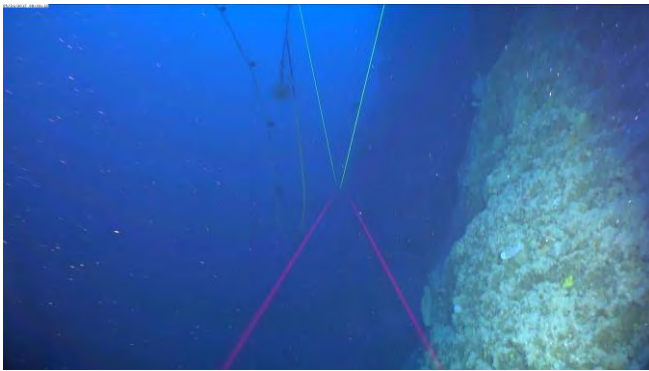


Figure 3: 22°0.8864'N;85°0.0339'W: -137.3 m
ROV weight and cable drift along the deep fore reef escarpment, the 'Wall'

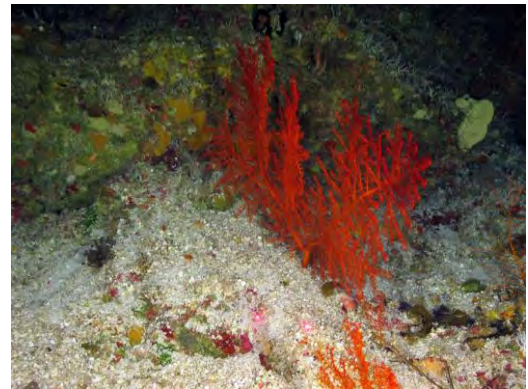


Figure 4: 22°0.8409'N;85°0.0582'W: -127.4 m
Octocoral- *Swiftia exserta* on deep island slope

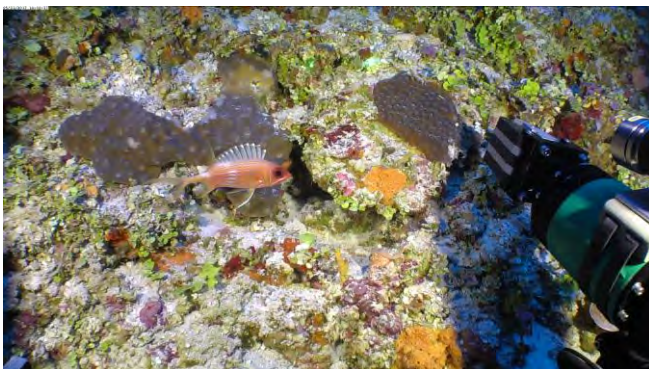


Figure 5: 22°0.805'N;85°0.0944'W: -74.9 m
Collection of *Montastraea cavernosa* as Longspine Squirrelfish- *Holocentrus rufus* looks on

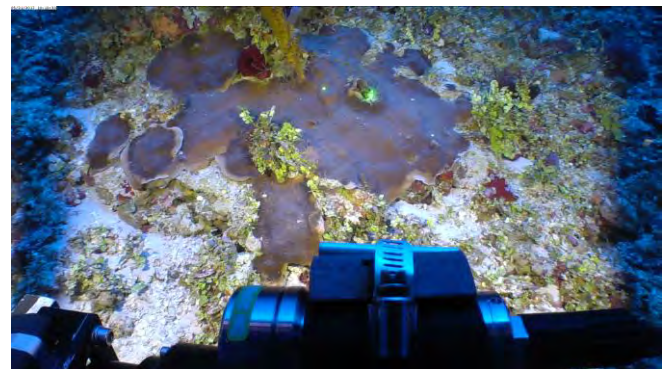


Figure 6: 22°0.803'N;85°0.0941'W: -73.8 m
Large sheets of *Agaricia grahamae* coral, and *Halimeda* sp. green algae

Dive Site: Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10; ROV 17-08; 21-V-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 21-V-17-1; ROV 17-08, UNCW Dive 414; Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Dive Events- still problems with blurring; change setup.

Site Description/Habitat:

Depth range: 183- 25 m.

Transect upslope was on heading of 270°.

08:21- Launch. Wind- 12 kn from 110°, current- 0.7 kn from NNE, seas- 1 m swell, water temperature- 28.35 ° C.

08:35- On bottom; 183 m, visibility- 20 m, current- 0.1 kn from N.

11:45- End dive.

155 m: shark in mid-water.

183 m, deep island slope zone: on bottom, 45°. rock slope, 80% hard bottom, coral rubble, 25-50 cm boulders. School of snapper.

Vertical photo transect upslope, 183- 145 m, 8:42- 9:06; deep island slope zone.

167 m: dark green Chlorophyta, CCA.

150 m: 70° rock slope; sponges more dense- *Xestospongia*, yellow encrusting Verongiida; Stylaster.

140 m: 80-90° rock slope.

Quantitative horizontal photo transect, upslope from 145 to 140 m, start- 09:06 to 09:17 (30 photos); deep island slope zone.

Fish video transect, 140- 120 m, 09:18- 09:27, along wall.

130 m, base of lower mesophotic zone: rock wall, 2 m wide ledges. Biota: 90% cover; sponges more dense and diverse- *Aplysina* rope sponges; first *Swiftia exserta*, gorgonians common; Stylaster.

Vertical photo transect upslope, 122- 100 m, 9:28- 9:36; lower mesophotic zone.

102 m- first *Agaricia* (10 cm).

100 m: 80- 90° smooth rock wall, eroded, but not rugged.

Quantitative horizontal photo transect along wall, 100 m, 09:36- 09:52 (30 photos).

100 m: first *Halimeda*.

Vertical photo transect upslope, 79- 50 m, 9:52- 10:37; continued lower mesophotic zone.

75 m: first *M. cavernosa*; first *Helioseris cucullata*; dense sponges; 1 m diameter *Agaricia* (goreau).

55- 50 m: 80° wall, some ledges, undercut; large *Agelas clathrodes* plates common, *Xestospongia*; 50 cm *Agaricia* common; first *Caulerpa racemosa*, first *Lobophora*; lionfish; 50 cm Antipatharia; spiny lobster (*Panularis argus*).

40 m, upper mesophotic zone: upper brow of wall, 45- 60° rock slope, not rugged. *M. cavernosa* (10 cm);

Dive Site: Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10; ROV 17-08; 21-V-17-1

filamentous red algae.

Quantitative horizontal photo transect, 37- 40 m, 10 :54- 11 :13 (30 photos); upper mesophotic zone. 1 m *Xestospongia muta* common.

Fish video transect, 40-25 m, 11:13- 11:45, along upper brow of wall and reef crest.

30- 25 m: top of wall, low relief rock, flat pavement, few 1-2 m ledges, low rugosity, 100% hard bottom. Biota: dense gorgonians (shallow reef species- *Pseudopterogorgia*, *Eunicea*, *Plexaurella*); corals- *Pseudodiploria*, *Siderastrea*; algae; sponges.

Maximum Depth Occurrences:

Chlorophyta- 167 m

Crustose coralline algae (CCA)- 167 m

Swiftia exserta- 130 m

Agaricia- 102 m

Halimeda- 100 m

Montastraea cavernosa- 75 m

Helioseris cucullata- 75 m

Panulirus argus- 50 m

Caulerpa racemosa- 50 m

Lobophora- 50 m

Number of Samples- 17

Disease and Human Impacts:

None

Dive Site: Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10; ROV 17-08; 21-V-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-08. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	West Coast ROV 17-08 C-10 Notes	Samples
Algae		9
Cyanobacteria		
Chlorophyta		3
<i>Anadyomene stellata</i>	X	1
<i>Avrainvillea</i> sp.	X	
<i>Caulerpa racemosa</i>	X	
Chlorophyta	X	
Chlorophyta- Filamentous	X	
<i>Halimeda copiosa</i>	X	
<i>Halimeda discoidea</i>	X	
<i>Halimeda goreau</i>	X	1
<i>Halimeda incrassata</i>	X	
<i>Halimeda</i> sp.	X	
<i>Halimeda tuna</i>	X	1
<i>Penicillus dumetosus</i>	X	
<i>Penicillus</i> sp.	X	
<i>Udotea cyathiformis</i>	X	
<i>Udotea</i> sp.	X	
Ochrophyta		1
<i>Dictyota</i> sp.	X	
<i>Lobophora</i> sp.	X	1
Phaeophyceae	X	
Rhodophyta		5
<i>Amphiroa fragilissima</i>	X	
<i>Amphiroa rigida</i>	X	
Corallinophycidae		3
Crustose coralline (CCA)	X	
<i>Jania pumila</i>		1
<i>Peyssonnelia</i> sp.	X	
Rhodophyta	X	1
Rose Petal CCA	X	
Porifera		5

Calcarea		
Calcarea sp. Cu-01	X	
Demospongiae		
		5
<i>Agelas cerebrum</i>	X	
<i>Agelas cervicornis</i>	X	
<i>Agelas citrina</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas dilatata</i>	X	
<i>Agelas</i> sp. Cu-08	X	
<i>Aiolochoxia crassa</i>	X	
<i>Aiolochoxia crassa</i> var. gray	X	
<i>Aiolochoxia crassa</i> var. purple	X	
<i>Aiolochoxia crassa</i> var. purple-blue	X	
<i>Amphimedon compressa</i>	X	
<i>Amphimedon</i> sp. Cu-01	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina sciophila</i>	X	
<i>Aplysina</i> sp. Cu-03	X	
<i>Aplysina</i> sp. Cu-04	X	
<i>Auletta</i> cf. <i>tuberosa</i>	X	
Axinellidae Cu-01	X	
<i>Cinachyrella</i> sp. Cu-03	X	
<i>Cribrorchalina vasculum</i>	X	
Demospongiae unid. sp.	X	1
Dictyoceratida unid. sp.		1
<i>Geodia neptuni</i>	X	
<i>Geodia</i> sp. Cu-03	X	
<i>Halisarca caerulea</i>	X	
<i>Leiodermatium</i> sp.	X	
<i>Lissodendoryx colombiensis</i>	X	
<i>Mycale laxissima</i>	X	
<i>Myrmekioderma</i> sp. Cu-02	X	
<i>Neofibularia nolitangere</i>	X	
<i>Niphates alba</i>	X	
<i>Niphates arenata</i>	X	
<i>Niphates</i> sp. Cu-01	X	
<i>Niphates</i> sp. Cu-02	X	
<i>Oceanapia</i> sp. Cu-01	X	
<i>Oceanapia</i> sp. Cu-02	X	
<i>Oceanapia</i> sp. Cu-04	X	
<i>Petrosia weinbergi</i>	X	

Dive Site: Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10; ROV 17-08; 21-V-17-1

Petrosiidae Cu-03	X	
Petrosiidae unid. sp.	X	
<i>Polymastia</i> sp. Cu-01	X	
<i>Polymastia</i> sp. Cu-02	X	
<i>Scopalina ruetzleri</i>	X	
<i>Siphonodictyon</i> sp. Cu-01	X	
<i>Spirastrella hartmani</i>	X	
<i>Spirastrella</i> sp. Cu-01	X	
<i>Terpios cf. belindae</i>		1
Tetractinellida Cu-01	X	
Verongiida		2
Verongiida Cu-01	X	
Verongiida Cu-08	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia purpurea</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
Plakortis sp. Cu-01	X	
Cnidaria		1
Hydrozoa		
Hydroidolina	X	
<i>Millepora alcicornis</i>	X	
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		
<i>Ellisella</i> sp.	X	
<i>Eunicea</i> sp.	X	
<i>Gorgonia ventalina</i>	X	
Gorgoniidae	X	
<i>Nicella</i> sp.	X	
Plexauridae	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Pterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		
<i>Antipathes atlantica</i>	X	
<i>Plumapathes pennacea</i>	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		1
<i>Agaricia agaricites</i>	X	

Dive Site: Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10; ROV 17-08; 21-V-17-1

<i>Agaricia</i> sp.	X	
<i>Colpophyllia natans</i>	X	
<i>Diploria labyrinthiformis</i>	X	
<i>Eusmilia fastigiata</i>	X	
<i>Helioseris cucullata</i>	X	
<i>Isophyllia sinuosa</i>	X	
<i>Isophyllia</i> sp.	X	
<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	1
<i>Orbicella faveolata</i>	X	
<i>Orbicella franksi</i>	X	
<i>Porites astreoides</i>	X	
<i>Porites</i> sp.	X	
<i>Pseudodiploria strigosa</i>	X	
<i>Siderastrea siderea</i>	X	
<i>Stephanocoenia intersepta</i>	X	
Other		1
Annelida		1
Polychaeta		1
Non-Fauna		
Disease		
Bleaching	X	

Dive Site: Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10; ROV 17-08; 21-V-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-08. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	West Coast ROV 17-08 C-10 Notes
Commercially Important Species	18
Actinopterygii	17
Perciformes	14
<i>Cephalopholis cruentata</i> - Graysby	4
<i>Cephalopholis fulva</i> - Coney	3
<i>Lutjanus cyanopterus</i> - Cubera Snapper	1
<i>Lutjanus jocu</i> - Dog Snapper	2
<i>Mycteroperca phenax</i> - Scamp	1
<i>Mycteroperca venenosa</i> - yellowfin Grouper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	2
Scorpaeniformes	3
<i>Pterois volitans</i> - Lionfish	3
Elasmobranchii	1
Carcharhiniformes	1
Carcharhinidae - Shark	1
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
<i>Holocentrus</i> sp. - Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Bodianus rufus</i> - Spanish Hogfish	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Caranx</i> sp. - Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis enchrysurus</i> - Yellowtail Reeffish	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Chromis scotti</i> - Purple Reeffish	X

Dive Site: Cuba, W coast, Banco de San Antonio MPA, east wall, Station C-10; ROV 17-08; 21-V-17-1

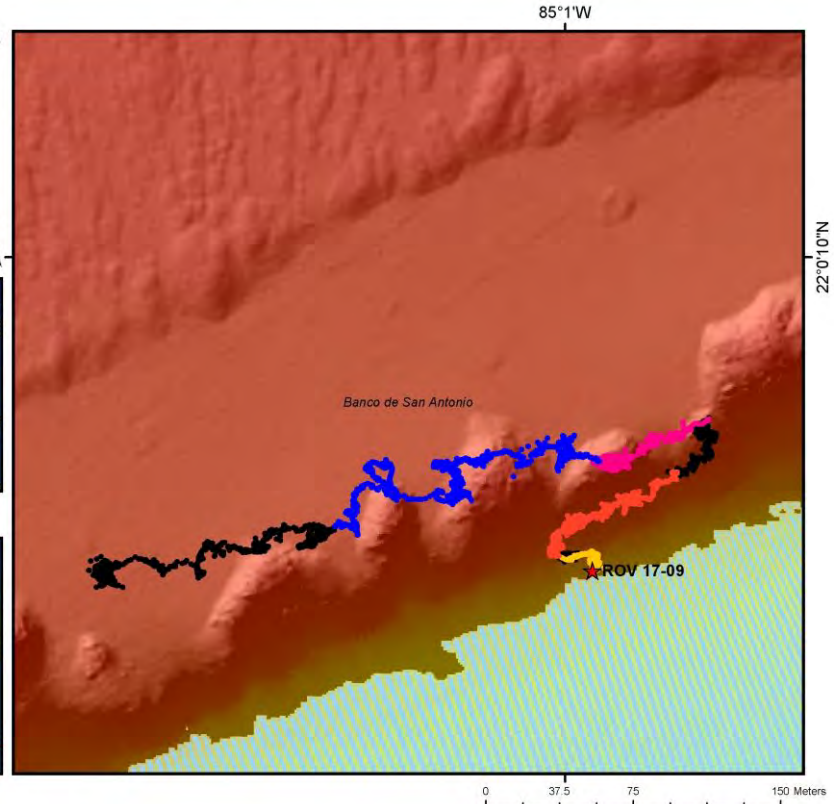
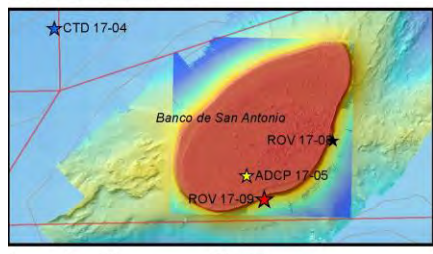
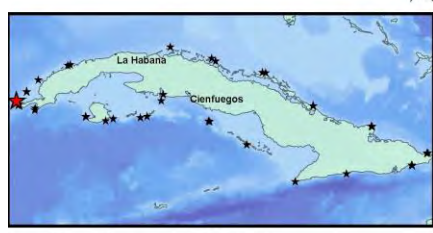
<i>Clepticus parrae</i> - creole wrasse	X
Gobiidae - Goby	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus</i> sp. - Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Kyphosus</i> sp. - Chub	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Serranus annularis</i> - Orangeback Bass	X
<i>Serranus tigrinus</i> - Harlequin Bass	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Balistes vetula</i> - Queen Triggerfish	X
Balistidae - Triggerfish	X
<i>Cantherhines macrocerus</i> - Whitespotted Filefish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Lactophrys triqueter</i> - Smooth Trunkfish	X
<i>Melichthys niger</i> - Black Durgon	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A; ROV 17-09; 21-V-17-3

General Location and Dive Track:

Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A; ROV 17-09; 21-V-17-3

- ★ ROV 17-09
- ★ Mohawk ROV
- Transect Name
 - 201705213 - Transect 01
 - 201705213 - Transect 02
 - 201705213 - Transect 03
 - 201705213 - Transect 04
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:		Dive Overview:	
Project:	CUBA 2017	Vessel:	University of Miami R/V <i>Walton Smith</i>
Principal Investigator:	John Reed	Sonar Data:	NF1602_Cuba_SanAntonioBank_1m
PI Contact Info:	5600 U.S. 1, North, Fort Pierce, FL 34946	Purpose:	Mesophoitic Reef Exploration of Cuba
Website:	http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html	Vehicle:	Mohawk ROV
Scientific Observers:	J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz	Sensors:	Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2
ROV Navigation Data:	TrackLink	Data Management:	Access Database
Ship Position System:	DGPS	Date of Dive:	5/21/2017
Report Analyst:	John Reed, Stephanie Farrington	Specimens:	11
Date Compiled:	10/26/2017	Digital Photos:	539
		No. DVD:	3
		Hard Drive No.:	1

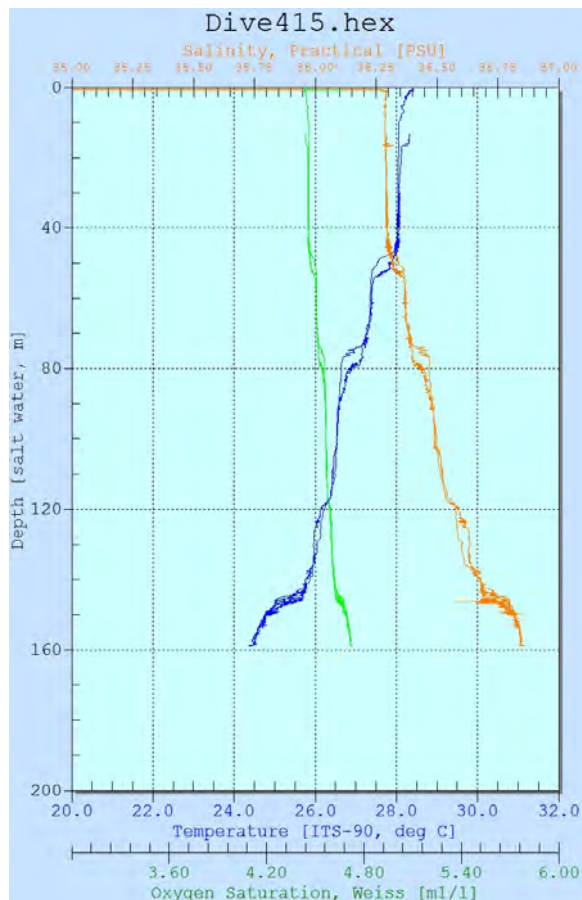
Dive Site: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A; ROV 17-09; 21-V-17-3

Dive Data:

Minimum Bottom Depth (m): 30	Total Transect Length (km): 0.767
Maximum Bottom Depth (m): 150	Surface Current (kn):
On Bottom (Time- GMT): 14:27	On Bottom (Lat/Long): 22.0013°N; -85.0165°W
Off Bottom (Time- GMT): 17:07	Off Bottom (Lat/Long): 22.0012°N; -85.0188°W
Physical (bottom); Temp (°C): 24.6	Salinity: 36.83 Visibility 45 Current (kn): 0.1

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-09 are as follows: Depth Maximum: 159.1 m, Temperature: 24.4-28.4 °C, Salinity: 36.2-36.9 PSU, and Oxygen Saturation: 4.4-4.7 ml/l.

Dive Site: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A; ROV 17-09; 21-V-17-3

Dive Imagery:

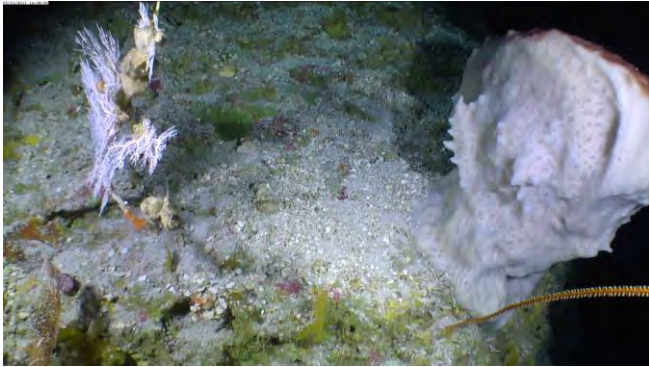


Figure 1: 22°0.0822'N;85°0.9911'W: -150.6 m
Hydrocoral- *Stylaster filograna*, sturdy barrel sponge-
Xestospongia sp. Cu-01 ('bebe')

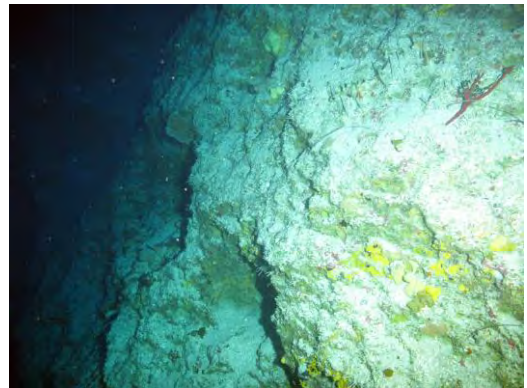


Figure 2: 22°0.0848'N;85°0.9945'W: -140.8 m
Yellow thin Verongida crust on vertical rock wall

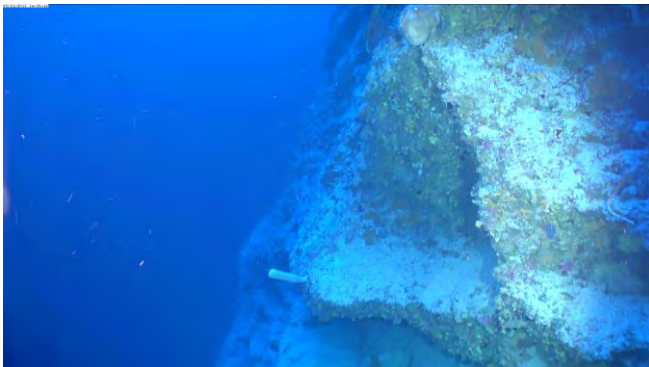


Figure 3: 22°0.0854'N;85°1.004'W: -123.4 m
Dusting of sediment on ledges of deep wall



Figure 4: 22°0.0895'N;85°1.0018'W: -103.4 m
Blackcap Basslet- *Gramma melacara*; grey-brown
Agelas sp. (left), gray and white *Haplosclerida* spp.
(right)



Figure 5: 22°0.0893'N;85°1.0031'W: -104 m
Dense sponge aggregates, encrusting coralline algae
on the 'Wall'

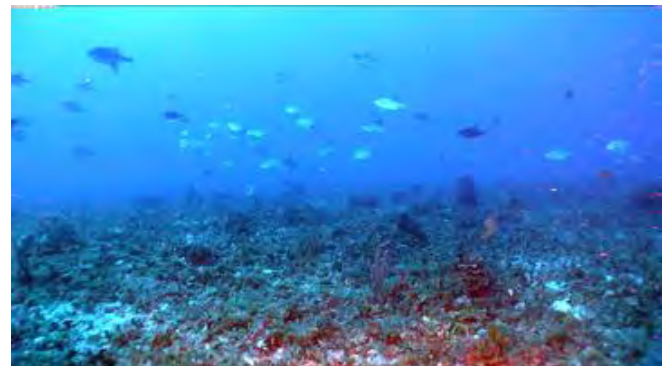


Figure 6: 22°0.0783'N;85°1.1257'W: -40.5 m
Spawning aggregation and nests of Ocean Triggerfish-
Canthidermis sufflamen on deep fore reef

Dive Site: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A; ROV 17-09; 21-V-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 21-V-17-3; ROV 17-09, UNCW Dive 415; Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 150- 30 m.

Transect upslope was on heading of N.

14:07- Launch. Wind- 8 kn from 080°, current- 0.6 kn from E, seas- 1 m swell from SE, water temperature- 28.6 °C, salinity- 36.2.

14:27- On bottom; 50 m, visibility- 50 m, current- 0.1 kn from E.

17:07- End dive.

150 m, deep island slope zone: 70° rock slope, pavement, scalloped facies, sediment veneer. Biota- Chlorophyta and CCA; *Xestospongia*; *Ellisella*; *Stylaster*.

Vertical photo transect upslope, 150- 136 m, 14:27- 14:32; deep island slope zone.

136 m: 2 m wide ledge, caves.

115 m, base of lower mesophotic zone: vertical rock wall, ledges; dense and diverse sponges.

Vertical photo transect upslope, 115- 65 m, 14:34- 15:05; lower mesophotic zone.

104 m: first *Halimeda*, *Aplysina*, *Agelas*, *Geodia*.

100 m: first *Agaricia* (10 cm).

72 m: *Agaricia* common (50 cm to 1 m).

61 m: first *M. cavernosa* (30 cm).

50 m, upper mesophotic zone: 45° slope; upper brow of wall; several partially bleached *Agaricia* (50 cm); dense *Agaricia*, sponges and algae.

Quantitative horizontal photo transect, 45 m, 15:19- 15:34 (30 photos); upper mesophotic zone; upper brow of wall.

Fish video transect, 45- 33 m, 15:35- 16:10, start along upper brow, and crest of deep fringing reef; scamp, ocean trigger, reef fish.

40-30 m: top edge of wall, deep fringing reef with series of 10 m relief mounds (tops 30 m, base 40 m), intersected with sand chutes. Seaward facies of mounds is 45° slope with dense algae and sponges. Biota: 1-1.5 m diameter plates of *Orbicella faveolata* and *O. franksi*, *M. cavernosa* (50 cm- 1 m conical), *Eusmilia fastigiata*, *Porites astreoides*. Shingles of *Orbicella* on facies of mounds.

40 m: North of fringing reef is flat rubble, sediment (depth 40 m), 80% rubble. Biota: algae- *Caulerpa racemosa*, *Penicillus*, *Halimeda*; sponges; spawning aggregation of grey trigger fish, with 0.5 m diameter nest scours in sediment; dozens or hundreds of triggerfish.

Dive Site: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A; ROV 17-09; 21-V-17-3

Maximum Depth Occurrences:

Chlorophyta- 150 m

Crustose coralline algae (CCA)- 150 m

Halimeda- 104 m

Agaricia- 100 m

M. cavernosa- 61 m

Orbicella faveolata- 40 m

Number of Samples- 11

Disease and Human Impacts:

Partially bleached *Agaricia* (50 cm)- 50 m

Dive Site: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A; ROV 17-09; 21-V-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-09. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	West Coast ROV 17-09 C-10A	Notes	Samples
Algae			6
Chlorophyta			3
<i>Anadyomene stellata</i>		X	
<i>Caulerpa racemosa</i>		X	
<i>Caulerpa sertularioides</i>		X	
<i>Caulerpa</i> sp.			1
Chlorophyta		X	1
<i>Cladophoropsis</i> sp.		X	
<i>Halimeda copiosa</i>		X	
<i>Halimeda discoidea</i>		X	
<i>Halimeda</i> sp.			1
<i>Halimeda tuna</i>		X	
<i>Penicillus dumetosus</i>		X	
<i>Penicillus</i> sp.		X	
<i>Rhipocephalus oblongus</i>		X	
<i>Rhipocephalus phoenix</i>		X	
<i>Udotea</i> sp.		X	
Ochrophyta			3
<i>Canistrocarpus cervicornis</i>			1
<i>Dictyota</i> sp.		X	
<i>Lobophora</i> sp.		X	1
<i>Sargassum</i> sp.			1
Rhodophyta			
Crustose coralline (CCA)		X	
<i>Gracilaria</i> sp.		X	
<i>Peyssonnelia</i> sp.		X	
Rhodophyta		X	
Porifera			3
Demospongiae			3
<i>Agelas cerebrum</i>		X	
<i>Agelas cervicornis</i>		X	
<i>Agelas citrina</i>		X	

Dive Site: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A; ROV 17-09; 21-V-17-3

<i>Agelas clathrodes</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas dilatata</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas sventres</i>	X	
<i>Aiolochoxia crassa</i>	X	
<i>Aiolochoxia crassa</i> var. purple	X	
<i>Amphimedon compressa</i>	X	
<i>Aplysina archeri</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina cf. archeri</i>	X	
<i>Aplysina fistularis</i>	X	
<i>Aplysina lacunosa</i>	X	
<i>Aplysina</i> sp. Cu-04	X	
Axinellidae Cu-01	X	
<i>Callyspongia cf. fallax</i>	X	
<i>Callyspongia fallax</i>	X	
<i>Callyspongia plicifera</i>	X	
<i>Callyspongia</i> sp. Cu-03	X	
<i>Ceratoporella nicholsoni</i>	X	
<i>Cinachyrella kuekenthali</i>	X	
<i>Cinachyrella</i> sp. Cu-01	X	
<i>Cliona delitrix</i>	X	
<i>Cribrochalina vasculum</i>	X	
Demospongiae unid. sp.	X	
<i>Dragmacidon cf. alvarezae</i>	X	
<i>Ectyoplasia ferox</i>	X	
<i>Geodia neptuni</i>	X	
<i>Geodia</i> sp. Cu-03	X	
<i>Iotrochota birotulata</i>	X	
<i>Ircinia felix</i>		1
<i>Ircinia strobilina</i>	X	
<i>Mycale laevis</i>	X	
<i>Mycale laxissima</i>	X	
<i>Myrmekioderma</i> sp.		1
<i>Myrmekioderma</i> sp. Cu-02	X	
<i>Neofibularia nolitangere</i>	X	
<i>Niphates alba</i>	X	
<i>Niphates arenata</i>	X	
<i>Niphates digitalis</i>	X	
<i>Niphates</i> sp. Cu-01	X	

Dive Site: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A; ROV 17-09; 21-V-17-3

Niphatidae		1
<i>Oceanapia</i> sp. Cu-02	X	
Petrosiidae unid. sp.	X	
<i>Polymastia</i> sp. Cu-01	X	
<i>Scopalina ruetzleri</i>	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Spirastrella coccinea</i>	X	
<i>Spirastrella hartmani</i>	X	
<i>Svenzea zeai</i>	X	
Verongiida Cu-01	X	
<i>Verongula</i> cf. <i>rigida</i>	X	
<i>Verongula gigantea</i>	X	
<i>Verongula reiswigi</i>	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		1
Hydrozoa		
Hydroidolina	X	
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		
<i>Ellisella</i> sp.	X	
<i>Eunicea</i> sp.	X	
<i>Gorgonia mariae</i>	X	
Gorgoniidae	X	
<i>Nicella</i> sp.	X	
Plexauridae	X	
Antipatharia		
Antipathidae	X	
<i>Stichopathes</i> sp.	X	
Scleractinia		1
<i>Agaricia agaricites</i>	X	
<i>Agaricia</i> sp.	X	
<i>Colpophyllia natans</i>	X	
<i>Dendrogyra cylindrus</i>	X	
<i>Eusmilia fastigiata</i>	X	
<i>Isophyllia rigida</i>	X	
<i>Isophyllia sinuosa</i>	X	
<i>Madracis decactis</i>	X	

Dive Site: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A; ROV 17-09; 21-V-17-3

<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	1
<i>Mycetophyllia</i> sp.	X	
<i>Orbicella annularis</i>	X	
<i>Orbicella faveolata</i>	X	
<i>Orbicella franksi</i>	X	
<i>Porites astreoides</i>	X	
<i>Pseudodiploria strigosa</i>	X	
<i>Scolymia cubensis</i>	X	
<i>Scolymia</i> sp.	X	
<i>Siderastrea siderea</i>	X	
<i>Stephanocoenia intersepta</i>	X	
Other		1
Chordata - Invertebrate		1
Ascidiacea		1
Non-Fauna		
Disease		
Bleaching	X	

Dive Site: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A; ROV 17-09; 21-V-17-3

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-09. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

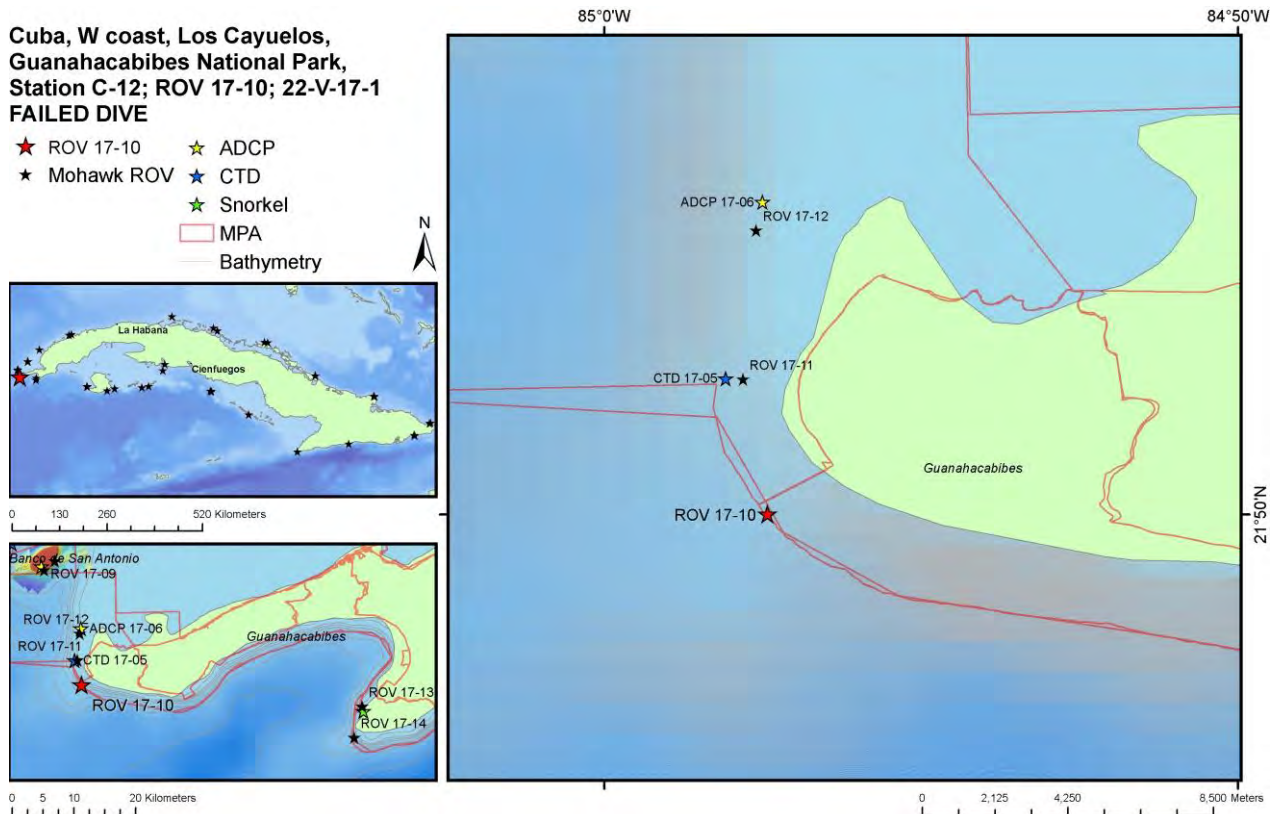
West Coast ROV 17-09 C-10A	
Phylum/Class/Order/Scientific Name - Common Name	Notes
Commercially Important Species	16
Actinopterygii	16
Perciformes	10
<i>Cephalopholis cruentata</i> - Graysby	5
<i>Cephalopholis fulva</i> - Coney	1
<i>Mycteroperca bonaci</i> - Black Grouper	2
<i>Mycteroperca phenax</i> - Scamp	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	1
Scorpaeniformes	6
<i>Pterois volitans</i> - Lionfish	6
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus</i> sp. - Squirrelfish	X
<i>Plectrypops retrospinis</i> - Cardinal Soldierfish	X
<i>Sargocentron vexillarium</i> - Dusky Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Bodianus rufus</i> - Spanish Hogfish	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
Chaetodontidae - Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Coryphopterus personatus</i> - Masked/Glass Goby	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Halichoeres pictus</i> - Rainbow Wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X

Dive Site: Cuba, W coast, Banco de San Antonio MPA, south wall, Station C-10A; ROV 17-09; 21-V-17-3

<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus guttavarius</i> - Shy hamlet	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
<i>Kyphosus</i> sp. - Chub	X
Labridae - Wrasse	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Pomacentrus</i> sp. - Damselfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Serranus phoebe</i> - Tattler	X
<i>Serranus tabacarius</i> - Tobaccofish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
Balistidae - Triggerfish	X
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Melichthys niger</i> - Black Durgon	X

Dive Site: Cuba, W coast, Los Cayuelos, Guanahacabibes National Park, Station C-12; ROV 17-10; 22-V-17-1

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/22/2017

Specimens: 0

Digital Photos: 0

No. DVD: 1

Hard Drive No.: 0

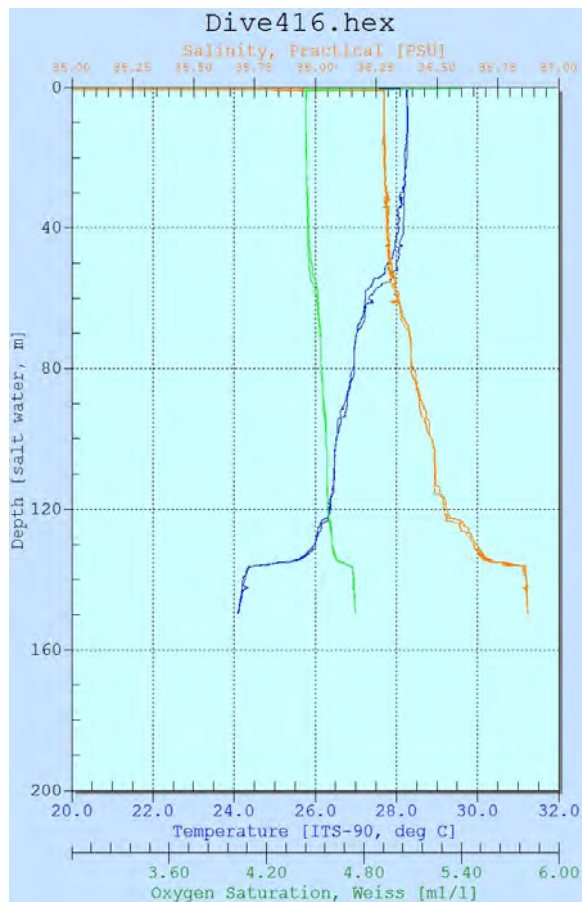
Dive Site: Cuba, W coast, Los Cayuelos, Guanahacabibes National Park, Station C-12; ROV 17-10; 22-V-17-1

Dive Data:

Minimum Bottom Depth (m):	Total Transect Length (km):	0.000
Maximum Bottom Depth (m):	Surface Current (kn):	1.0
On Bottom (Time- GMT):	On Bottom (Lat/Long):	N/A
Off Bottom (Time- GMT):	Off Bottom (Lat/Long):	N/A
Physical (bottom); Temp (°C):	Salinity:	Visibility N/A Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-10 are as follows: Depth Maximum: 149.5 m, Temperature: 24.1-28.3 °C, Salinity: 36.3-36.9 PSU, and Oxygen Saturation: 4.4-4.7 ml/l.

Dive Site: Cuba, W coast, Los Cayuelos, Guanahacabibes National Park, Station C-12; ROV 17-10; 22-V-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 22-V-17-1; ROV 17-10, UNCW Dive 416; Cuba, W coast, Los Cayuelos, Guanahacabibes National Park, Station C-12.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Dive Events- Current too strong, unable to get ROV to bottom.

Site Description/Habitat:

Depth range: 0-149

08:48- Launch. Wind- 7 kn from 056°, current- 1.4 kn, seas- 1 m swell.

09:02- End dive, unable to get to bottom.

Dive Site: Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A; ROV 17-11; 22-V-17-2

General Location and Dive Track:

Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A; ROV 17-11; 22-V-17-2

- ★ ROV 17-11
- ★ Mohawk ROV
- Transect Name
- 201705222 - Transect 01
- 201705222 - Transect 02
- 201705222 - Transect 03
- 201705222 - Transect 04
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry

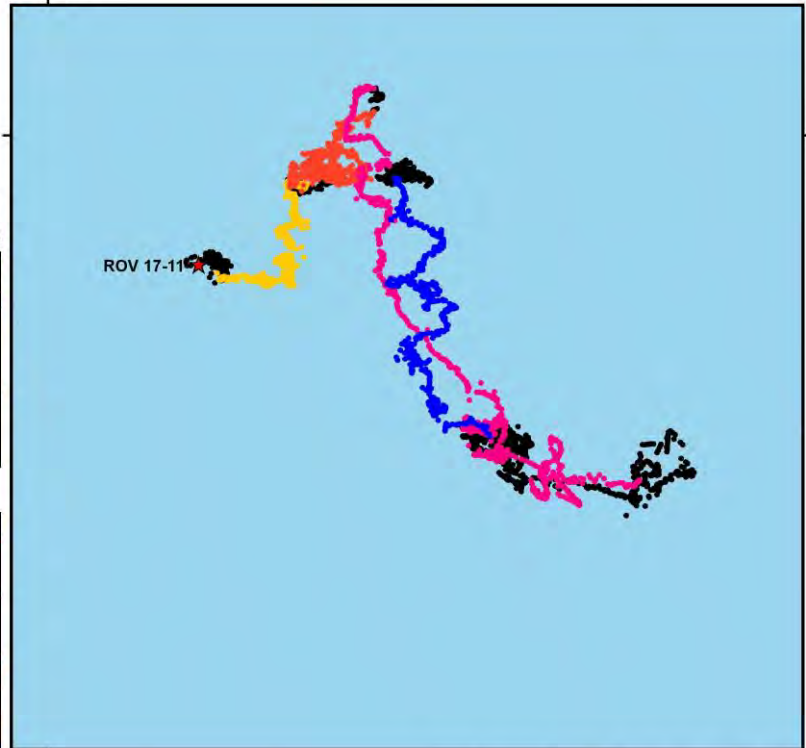


0 130 260 520 Kilometers



0 10 20 40 Kilometers

84°57'50"W



21°52'10"N

0 20 40 80 Meters

Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/22/2017

Specimens: 6

Digital Photos: 699

No. DVD: 3

Hard Drive No.: 1

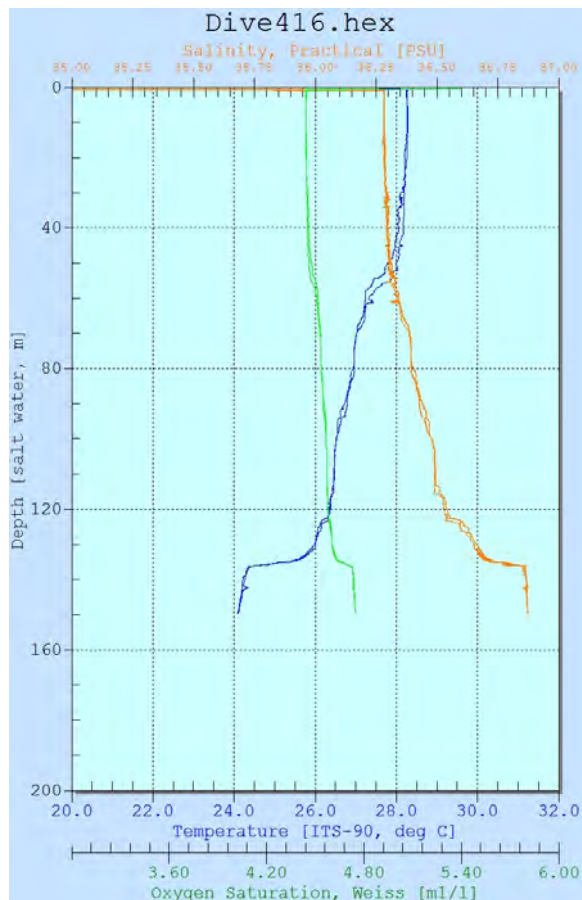
Dive Site: Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A; ROV 17-11; 22-V-17-2

Dive Data:

Minimum Bottom Depth (m): 45	Total Transect Length (km): 0.768
Maximum Bottom Depth (m): 156	Surface Current (kn): 0.2
On Bottom (Time- GMT): 10:44	On Bottom (Lat/Long): 21.8691°N; -84.9635°W
Off Bottom (Time- GMT): 13:22	Off Bottom (Lat/Long): 21.8692°N; -84.9629°W
Physical (bottom); Temp (°C): 23.9	Salinity: 36.87 Visibility 30 Current (kn): 0

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-11 are as follows: Depth Maximum: 159.9 m, Temperature: 23.9-28.3 °C, Salinity: 36.3-36.9 PSU, and Oxygen Saturation: 4.4-4.8 ml/l.

Dive Site: Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A; ROV 17-11; 22-V-17-2

Dive Imagery:

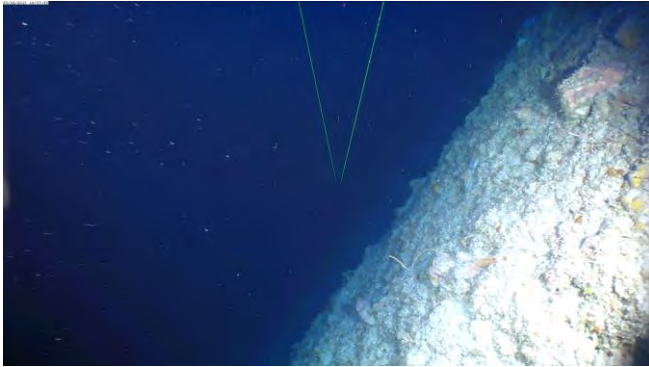


Figure 1: 21°52.1448'N;84°57.7935'W: -131.3 m
Barren deep island slope



Figure 2: 21°52.1522'N;84°57.7919'W: -130.1 m
Unidentified white demersal sponge on deep island slope



Figure 3: 21°52.1638'N;84°57.7868'W: -106.3 m
Barrel sponge- *Xestospongia muta* on the 'Wall'

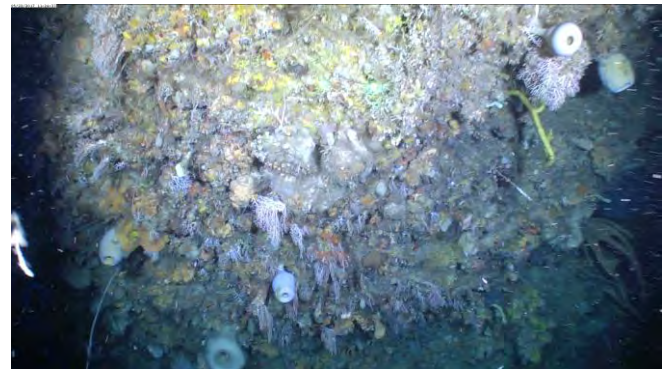


Figure 4: 21°52.1616'N;84°57.7817'W: -103.4 m
Various demersal sponges- *Aplysina bathyphila*, *Aplysina* spp, *Agelas* sp, *Xestospongia* sp. Cu-01, among others, on lower 'Wall'

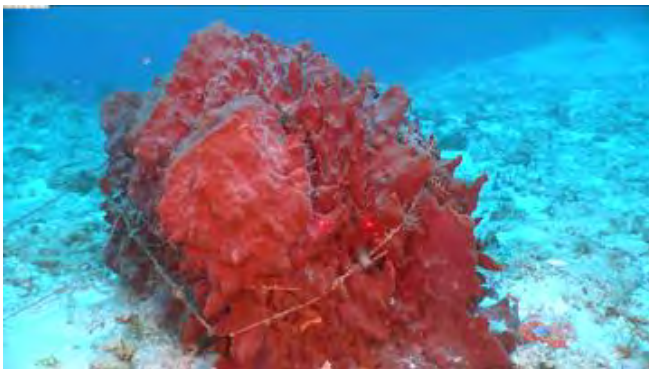


Figure 5: 21°52.1071'N;84°57.7346'W: -47.9 m
Barrel sponge- *Xestospongia muta* wrapped with fishing line



Figure 6: 21°52.1585'N;84°57.7711'W: -66.4 m
Collection of *Swiftia exserta* on deep fore reef slope

Dive Site: Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A; ROV 17-11; 22-V-17-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 22-V-17-2; ROV 17-11, UNCW Dive 417; Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 156- 45 m.

10:32- Launch. Wind- 6 kn from SE, current- 0.2 kn to SE, seas- 1 m swell from S, water temperature- 28.47 °C, salinity- 36.25.

10:45- On bottom; 156 m, visibility- 30 m, current- 0 kn.

13:21- End dive.

156- 110 m, deep island slope zone: carbonate rock pavement, 70° slope.

156 m: Biota: sponges- thin yellow encrusting *Verongiida*, vase.

Quantitative vertical photo transect, upslope from 156 to 129 m, 10:49- 11:07 (30 photos); deep island slope zone.

135 m: more sponge diversity, *Xestospongia*, *Topsentia*; black coral- *Stichopathes*.

110 m, base of lower mesophotic zone: vertical rock wall. Biota: sponges- dense and diverse, *Agelas*, *Xestospongia*, *Geodia*, *Topsentia*; black coral- *Stichopathes*, *Tanacetipathes*; Alcyonacea- *Chironephthya*; Stylaster.

Vertical photo transect upslope, 110- 67 m, 11:13- 11:44; lower mesophotic zone.

92 m: caves and ledges.

75 m: brow of rock buttresses, 60° slope; first *Swiftia exserta*.

70 m: first *Halimeda*; no coral, no CCA.

Fish video transect, 67- 57 m, 11:45- 12:15; along face of upper slope.

67-47 m: 45-60° slope, sediment patches, 30-50% sediment with ½ -1 m boulders. Biota: Gorgonacea- dense *Swiftia exserta* 10-30 cm tall, *Iciligorgia schrammi*; sponges- *Xestospongia*, *Topsentia*, *Niphates* thin rope-like; algae- dense *Halimeda*, no *Lobophora*, no *Caulerpa*; loggerhead turtle; queen conch; pile of fishing line.

Quantitative vertical photo transect, 68 to 55 m, 12:50- 13:11 (30 photos), upper brow of wall, 45-60° slope.

45 m upper mesophotic zone: top of wall, flat, silty-sand, ½ m boulders.

Maximum Depth Occurrences:

Scleractinia- none observed

Swiftia exserta- 75 m

Halimeda- 70 m

Crustose coralline algae- none observed, or sparse

Dive Site: Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A; ROV 17-11; 22-V-17-2

Number of Samples- 6

Disease and Human Impacts:

Pile of fishing line- 57 m

Dive Site: Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A; ROV 17-11; 22-V-17-2

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-11. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Notes	Samples
West Coast ROV 17-11 C-12A		
Algae		1
Chlorophyta		1
<i>Chaetomorpha</i> sp.	X	
Chlorophyta		1
Chlorophyta- Filamentous Green	X	
<i>Halimeda copiosa</i>	X	
<i>Halimeda discoidea</i>	X	
<i>Halimeda</i> sp.	X	
<i>Halimeda tuna</i>	X	
<i>Udotea</i> sp.	X	
<i>Valonia</i> sp.	X	
Ochrophyta		
<i>Dictyota</i> sp.	X	
<i>Lobophora</i> sp.	X	
Rhodophyta		
Crustose coralline (CCA)	X	
<i>Peyssonnelia</i> sp.	X	
Porifera		4
Calcarea		
Calcarea sp. Cu-03	X	
Demospongiae		4
<i>Agelas cervicornis</i>	X	
<i>Agelas citrina</i>	X	
<i>Agelas clathrodes</i>	X	
<i>Agelas dilatata</i>	X	
<i>Agelas flabelliformis</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Aiolochoxia crassa</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina</i> sp. Cu-04	X	
<i>Auletta cf. tuberosa</i>	X	
Axinellidae Cu-01	X	

Dive Site: Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A; ROV 17-11; 22-V-17-2

<i>Callyspongia armigera</i>	X	
<i>Callyspongia fallax</i>	X	
<i>Callyspongia plicifera</i>	X	
<i>Callyspongia</i> sp. Cu-02	X	
<i>Ceratoporella nicholsoni</i>	X	
<i>Cinachyrella kuekenthali</i>	X	
<i>Cinachyrella</i> sp. Cu-03	X	
<i>Cinachyrella</i> sp. Cu-04	X	
<i>Ciocalypta cf. porrecta</i>	X	
<i>Corallistes</i> sp.	X	
Demospongiae sp. Cu-25	X	
Demospongiae unid. sp.	X	1
<i>Dragmacidon cf. alvarezae</i>	X	
<i>Geodia neptuni</i>	X	
<i>Geodia</i> sp. Cu-03	X	
Haplosclerida unid. sp.		1
<i>Ircinia strobilina</i>	X	
Microcionidae unid. sp.	X	
<i>Neopetrosia cf. dutchi</i>	X	
<i>Niphates digitalis</i>	X	
<i>Niphates erecta</i>	X	
<i>Oceanapia</i> sp.		1
<i>Oceanapia</i> sp. Cu-01	X	
<i>Oceanapia</i> sp. Cu-02	X	
Petrosiidae Cu-07	X	
Petrosiidae Cu-19	X	
Petrosiidae Cu-20	X	
<i>Ptilocaulis walpersi</i>	X	
Spirastrellidae unid. sp.	X	
Tetractinellida Cu-06	X	
Verongiida Cu-01	X	
Verongiida Cu-05	X	
Verongiida Cu-06	X	
<i>Verongula</i> sp. Cu-02	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp.		1
<i>Xestospongia</i> sp. Cu-01	X	
<i>Xestospongia</i> sp. Cu-03	X	
Homoscleromorpha		
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		1
Hydrozoa		

Dive Site: Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A; ROV 17-11; 22-V-17-2

Hydroidolina	X	
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		1
<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Nicella goreau</i>	X	
<i>Swiftia exserta</i>	X	1
Antipatharia		
Antipathidae	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Other		
Echinodermata		
Comatulida	X	

Dive Site: Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A; ROV 17-11; 22-V-17-2

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-11. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	West Coast ROV 17-11 C-12A Notes
Commercially Important Species	16
Actinopterygii	15
Perciformes	15
<i>Cephalopholis cruentata</i> - Graysby	3
<i>Cephalopholis fulva</i> - Coney	3
<i>Epinephelus guttatus</i> - Red Hind	2
<i>Epinephelus morio</i> - Red Grouper	1
<i>Epinephelus striatus</i> - Nassau Grouper	1
<i>Lutjanus analis</i> - Mutton Snapper	2
<i>Lutjanus griseus</i> - Gray Snapper	1
<i>Mycteroperca bonaci</i> - Black Grouper	1
Serranidae - Grouper	1
Reptilia	1
Testudines	1
<i>Caretta caretta</i> - Loggerhead Turtle	1
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus</i> sp. - Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Calamus</i> sp. - Porgy	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis enchrysur</i> - Yellowtail Reefish	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X

Dive Site: Cuba, W coast, Faro Roncali, off lighthouse, Guanahacabibes National Park, Station C-12A; ROV 17-11; 22-V-17-2

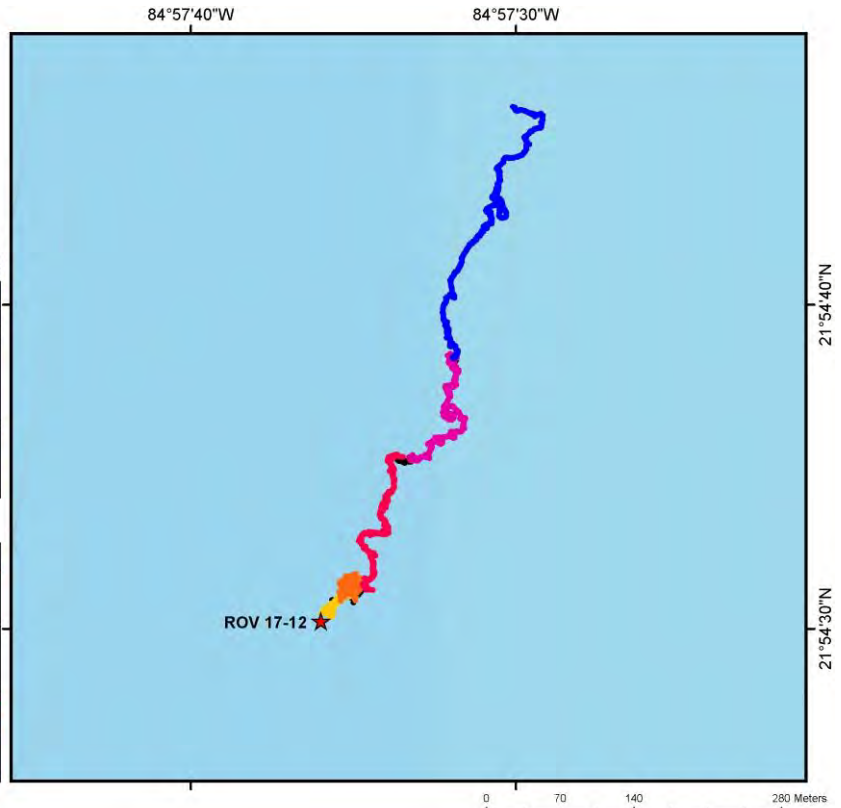
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus nigricans</i> - Black Hamlet	X
Labridae - Wrasse	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Prognathodes aya</i> - Bank Butterflyfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scomberomorus regalis</i> - Cero	X
<i>Serranus tigrinus</i> - Harlequin Bass	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Balistes vetula</i> - Queen Triggerfish	X
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Melichthys niger</i> - Black Durgon	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B; ROV 17-12; 22-V-17-4

General Location and Dive Track:

Cuba, W coast, Las Tumbas,
Guanahacabibes National Park,
Station C-12B; ROV 17-12; 22-V-17-4

- ★ ROV 17-12
- ★ Mohawk ROV
- Transect Name
- 201705224 - Transect 01
- 201705224 - Transect 02
- 201705224 - Transect 03
- 201705224 - Transect 04
- 201705224 - Transect 05
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investigator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/22/2017

Specimens: 6

Digital Photos: 828

No. DVD: 3

Hard Drive No.: 1

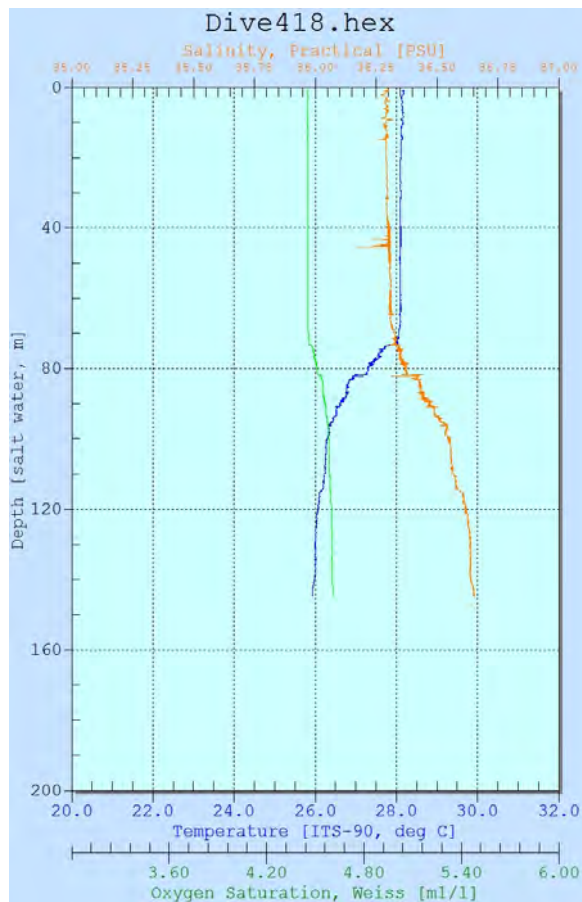
Dive Site: Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B; ROV 17-12; 22-V-17-4

Dive Data:

Minimum Bottom Depth (m): 38	Total Transect Length (km): 0.910
Maximum Bottom Depth (m): 148	Surface Current (kn): 0.1
On Bottom (Time- GMT): 15:26	On Bottom (Lat/Long): 21.9084°N; -84.96°W
Off Bottom (Time- GMT): 18:14	Off Bottom (Lat/Long): 21.9128°N; -84.9583°W
Physical (bottom); Temp (°C): 25.9	Salinity: 36.65 Visibility 30 Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-12 are as follows: Depth Maximum: 144.6 m, Temperature: 25.9-28.2 °C, Salinity: 36.3-36.7 PSU, and Oxygen Saturation: 4.4-4.6 ml/l.

Dive Site: Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B; ROV 17-12; 22-V-17-4

Dive Imagery:



Figure 1: 21°54.5208'N;84°57.5833'W: -121.2 m
Arrow crab- *Stenorynchus seticornis* in *Xestospongia* sp. Cu-01

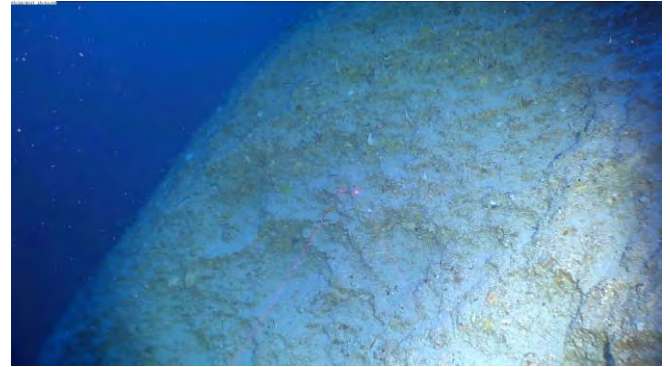


Figure 2: 21°54.5098'N;84°57.5956'W: -135.5 m
Barren rock pavement with scalloped facies on deep island slope

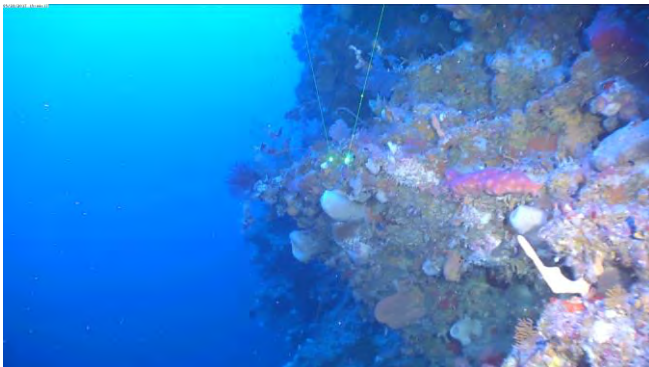


Figure 3: 21°54.5211'N;84°57.5869'W: -91.5 m
Dense cover of biota on deep the 'Wall'



Figure 4: 21°54.526'N;84°57.5836'W: -78.7 m
Dense black corals- tentatively identified as *Plumapathes* on the 'Wall'



Figure 5: 21°54.564'N;84°57.5685'W: -64.2 m
Shingles of *Agaricia* plate corals on deep fore reef slope

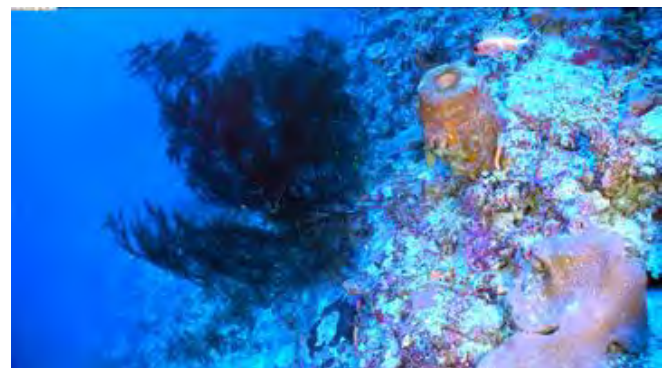


Figure 6: 21°54.5692'N;84°57.5657'W: -63.3 m
Large (1 m tall) black coral- *Antipathidae*

Dive Site: Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B; ROV 17-12; 22-V-17-4

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 22-V-17-4; ROV 17-12, UNCW Dive 418; Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 148- 38 m.

Transect up slope heading E.

15:14- Launch. Wind- 15 kn from 140°, current- 0.1 kn to 121°, seas- 0.3- 1 m from SSE, water temperature- 28.50 °C, salinity- 36.27.

15:36- On bottom; 148 m, visibility- 30 m.

18:19- End dive.

148-115m, deep island slope zone: 70° rock pavement slope. Biota: Sponges- thin encrusting yellow Verongiida, *Xestospongia*, Tetractinellida, *Topsentia*; black coral- *Tanacetipathes*; Gorgonacea- *Nicella goreau* fans.

Vertical photo transect upslope, 148- 120 m, 15:27- 15:35; deep island slope zone.

115 m, lower mesophotic zone: base of wall, rugged, eroded vertical rock.

Vertical photo transect upslope, 115- 65 m, 15:37- 16:04; lower mesophotic zone.

100m: dense sponges- *Agelas clathrodes*, *Xestospongia*, *Aplysina archeri*, *Aplysina* rope sponges.

78 m: vertical eroded rock. First *Agaricia* (10 cm), 1-2 m *Antipathes* bushes, dense CCA, lionfish.

65 m: dense *Agaricia*, up to 1 m diameter; *Iciligorgia schrammi*.

60 m: upper brow of wall, 45-60° slope. Series of overhanging rock buttresses, ~20 wide with 20 m wide sand chutes. 10 m wide zone with shingle like *Agaricia*.

Quantitative horizontal photo transect, 65-60 m, 16:05- 16:32 (30 photos); upper brow of wall, 45-60° slope.

50 m, upper mesophotic zone: upper brow of buttresses. Dense *Iciligorgia schrammi*.

Vertical photo transect upslope, 50- 40 m, 16:35- 17:40; upper mesophotic zone.

46 m: first *Montastraea cavernosa*. 50 cm *Agaricia*, bleached with 10 cm boring sponge *Cliona*.

40 m: top of buttresses, fringing reef about 10 m wide with series of 5 m tall rock mounds intersected with sand chutes. On east side of mounds, flattens out, mostly sediment, 45 m depth. Biota: shingles of coral on facies of mounds, *Orbicella faveolata*, *Agaricia*, *M. cavernosa*, sponges, shallow water gorgonian species.

Fish video transect, 41- 45 m, 17:45- 18:13; deep fringing fore reef.

Morning dive site had no fringing reef along top rim to block sediment flow over reef wall, therefore had more sand on the deep slope, no corals, and no CCA.

Maximum Depth Occurrences:

Agaricia sp.- 78 m; dense at 65 m

Dive Site: Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B; ROV 17-12; 22-V-17-4

Crustose coralline algae- 78 m

Lionfish- 78 m

Montastraea cavernosa- 46 m

Orbicella faveolata- 40 m; dense shingles on mound facies

Number of Samples- 6

Disease and Human Impacts:

Partially bleached *Agaricia* spp. (50 cm)- 46 m

Dive Site: Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B; ROV 17-12; 22-V-17-4

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-12. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	West Coast ROV 17-12 C-12B Notes	Samples
Algae		
Chlorophyta		
<i>Halimeda copiosa</i>	X	
<i>Halimeda goreau</i>	X	
<i>Halimeda</i> sp.	X	
<i>Halimeda tuna</i>	X	
<i>Microdictyon</i> sp.	X	
<i>Rhipocephalus oblongus</i>	X	
<i>Rhipocephalus phoenix</i>	X	
Ochrophyta		
<i>Dictyota</i> sp.	X	
<i>Lobophora</i> sp.	X	
Rhodophyta		
Crustose coralline (CCA)	X	
<i>Peyssonnelia</i> sp.	X	
Rose Petal CCA	X	
Porifera		1
Calcarea		
Calcarea sp. Cu-01	X	
Demospongiae		
<i>Agelas cervicornis</i>	X	
<i>Agelas citrina</i>	X	
<i>Agelas clathrodes</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas dilatata</i>	X	
<i>Agelas dispar</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas</i> sp. Cu-10	X	
<i>Agelas tubulata</i>	X	
<i>Agelas wiedenmayeri</i>	X	
<i>Aiolochoxia crassa</i>	X	
<i>Amphimedon compressa</i>	X	

Dive Site: Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B; ROV 17-12;
22-V-17-4

<i>Aplysina archeri</i>	X
<i>Aplysina bathyphila</i>	X
<i>Aplysina cauliformis</i>	X
<i>Aplysina fistularis</i>	X
<i>Aplysina sciophila</i>	X
<i>Aplysina</i> sp. Cu-04	X
<i>Asteropus</i> sp. Cu-01	X
<i>Auletta cf. tuberosa</i>	X
<i>Callyspongia armigera</i>	X
<i>Callyspongia fallax</i>	X
<i>Ceratoporella nicholsoni</i>	X
<i>Ciocalypta cf. porrecta</i>	X
<i>Clathria</i> sp. Cu-01	X
<i>Clathria venosa</i>	X
<i>Cliona delitrix</i>	X
<i>Corallistes</i> sp.	X
<i>Cribrochalina vasculum</i>	X
Demospongiae unid. sp.	X
<i>Dragmacidon cf. alvarezae</i>	X
<i>Erylus</i> sp. Cu-01	X
<i>Geodia neptuni</i>	X
<i>Geodia</i> sp. Cu-03	X
<i>Geodia</i> sp. Cu-04	X
<i>Geodia</i> sp. Cu-05	X
<i>Iotrochota birotulata</i>	X
<i>Ircinia strobilina</i>	X
<i>Monanchora arbuscula</i>	X
<i>Mycale laevis</i>	X
<i>Mycale laxissima</i>	X
<i>Niphates alba</i>	X
<i>Niphates arenata</i>	X
<i>Niphates digitalis</i>	X
<i>Niphates</i> sp. Cu-01	X
<i>Oceanapia</i> sp. Cu-01	X
Petrosiidae Cu-02	X
<i>Scopalina ruetzleri</i>	X
<i>Siphonodictyon</i> sp. Cu-01	X
<i>Smenospongia echina</i>	X
<i>Spirastrella coccinea</i>	X
<i>Spirastrella hartmani</i>	X
<i>Svenzea zeai</i>	X
Tetractinellida Cu-01	X

Dive Site: Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B; ROV 17-12;
22-V-17-4

Verongiida		1
Verongiida Cu-01	X	
Verongiida Cu-05	X	
Verongiida Cu-08	X	
<i>Verongula gigantea</i>	X	
<i>Verongula</i> sp. Cu-01	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
Oscarellidae unid. sp.	X	
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		5
Hydrozoa		
Hydroidolina	X	
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		
		2
<i>Ellisella</i> sp.	X	
<i>Eunicea</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	2
<i>Muricea</i> sp.	X	
<i>Nicella</i> sp.	X	
<i>Plexaurella</i> sp.	X	
Plexauridae	X	
<i>Pseudoplexaura</i> sp.	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		
Antipathidae	X	
<i>Plumapathes pennacea</i>	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		
		3
<i>Agaricia agaricites</i>	X	
<i>Agaricia</i> sp.	X	3
<i>Colpophyllia natans</i>	X	
<i>Eusmilia fastigiata</i>	X	
<i>Helioseris cucullata</i>	X	
<i>Isophyllia sinuosa</i>	X	
<i>Meandrina meandrites</i>	X	

Dive Site: Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B; ROV 17-12; 22-V-17-4

<i>Montastraea cavernosa</i>	X
<i>Mycetophyllia</i> sp.	X
<i>Orbicella faveolata</i>	X
<i>Porites astreoides</i>	X
<i>Porites</i> sp.	X
<i>Scolymia</i> sp.	X
Other	
Arthropoda	
<i>Panulirus argus</i>	X
Non-Fauna	
Disease	
Bleaching	X

Dive Site: Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B; ROV 17-12; 22-V-17-4

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-12. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	West Coast ROV 17-12 C-12B Notes
Commercially Important Species	18
Actinopterygii	15
Perciformes	9
<i>Cephalopholis cruentata</i> - Graysby	1
<i>Cephalopholis fulva</i> - Coney	1
<i>Lutjanus apodus</i> - Schoolmaster	3
<i>Lutjanus griseus</i> - Gray Snapper	1
<i>Mycteroperca phenax</i> - Scamp	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	2
Scorpaeniformes	6
<i>Pterois volitans</i> - Lionfish	6
Elasmobranchii	1
Orectolobiformes	1
<i>Ginglymostoma cirratum</i> - Nurse Shark	1
Reptilia	2
Testudines	2
<i>Caretta caretta</i> - Loggerhead Turtle	1
<i>Eretmochelys imbricata</i> - Hawksbill sea turtle	1
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Anguilliformes	
<i>Gymnothorax funebris</i> - Green Moray Eel	X
Beryciformes	
<i>Holocentrus</i> sp. - Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus chirurgus</i> - Doctorfish	X
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon sedentarius</i> - Reef Butterflyfish	X

Dive Site: Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B; ROV 17-12;
22-V-17-4

<i>Chaetodon striatus</i> - Banded Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Chromis scotti</i> - Purple Reeffish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Coryphopterus glaucofraenum</i> - Bridled goby	X
<i>Coryphopterus personatus</i> - Masked/Glass Goby	X
<i>Elacatinus horsti</i> - Yellowline Goby	X
<i>Elagatis bipinnulata</i> - rainbow runner	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon carbonarium</i> - Caesar Grunt	X
<i>Haemulon flavolineatum</i> - French Grunt	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon striatum</i> - Striped Grunt	X
<i>Haemulon vittatum</i> - Boga	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus</i> sp. - Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
<i>Kyphosus</i> sp. - Chub	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Microspathodon chrysurus</i> - Yellowtail Damselfish	X
<i>Mulloidichthys martinicus</i> - Yellow goatfish	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Pomacanthus paru</i> - French Angelfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Scomberomorus regalis</i> - Cero	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyræna barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Balistes vetula</i> - Queen Triggerfish	X

Dive Site: Cuba, W coast, Las Tumbas, Guanahacabibes National Park, Station C-12B; ROV 17-12;
22-V-17-4

<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15; ROV 17-13; 23-V-17-1

General Location and Dive Track:

Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15; ROV 17-13; 23-V-17-1

- ★ ROV 17-13
- ★ Mohawk ROV
- Transect Name
- 201705231 - Transect 01
- 201705231 - Transect 02
- 201705231 - Transect 03
- 201705231 - Transect 04
- 201705231 - Transect 05
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/23/2017

Specimens: 0

Digital Photos: 463

No. DVD: 2

Hard Drive No.: 1

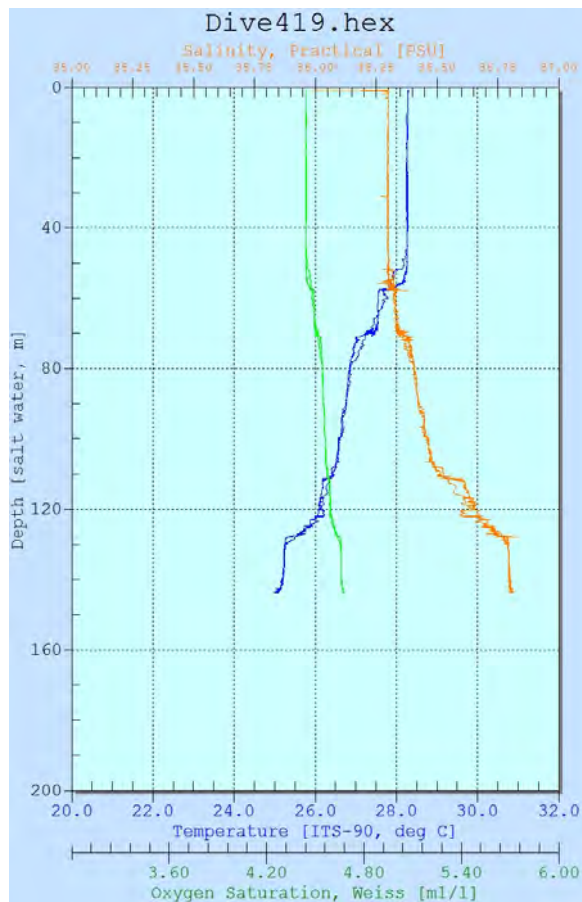
Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15; ROV 17-13; 23-V-17-1

Dive Data:

Minimum Bottom Depth (m): 25	Total Transect Length (km): 0.340
Maximum Bottom Depth (m): 145	Surface Current (kn): 0.5
On Bottom (Time- GMT): 8:28	On Bottom (Lat/Long): 21.8038°N; -84.519°W
Off Bottom (Time- GMT): 10:12	Off Bottom (Lat/Long): 21.8043°N; -84.518°W
Physical (bottom); Temp (°C): 25.2	Salinity: 36.8 Visibility 30 Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-13 are as follows: Depth Maximum: 143.8 m, Temperature: 25-28.3 °C, Salinity: 36.3-36.8 PSU, and Oxygen Saturation: 4.4-4.7 ml/l.

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15; ROV 17-13; 23-V-17-1

Dive Imagery:



Figure 1: 21°48.272'N;84°31.1037'W: ~70 m
60 cm diameter *Agaricia grahamae* on deep fore reef slope



Figure 2: 21°48.2352'N;84°31.1278'W: ~70 m
Encrusting sponges, green and red algae on rugged 'Wall'

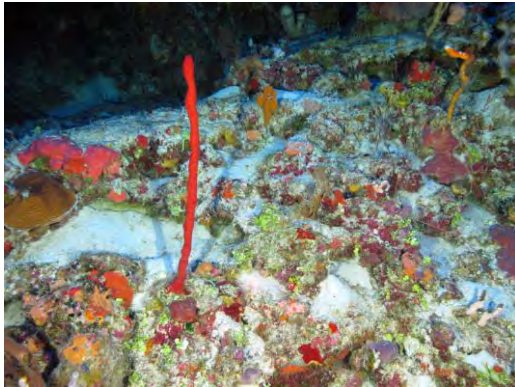


Figure 3: 21°48.2513'N;84°31.1142'W: ~70 m
Finger sponge- *Amphimedon* sp. and various encrusting sponges and algae



Figure 4: 21°48.2602'N;84°31.11'W: ~70 m
Ear sponge- *Agelas citrina*, pedunculate- *Aplysina bathyphila*, branching- *Agelas* sp., spherical- *Cinachyrella* sp., pink barrel- *Xestospongia* sp., Cu-01



Figure 5: 21°48.2819'N;84°31.0849'W: ~70 m
Large (50 cm) barrel sponge- *Xestospongia muta*, and live and dead *Agaricia* coral plates

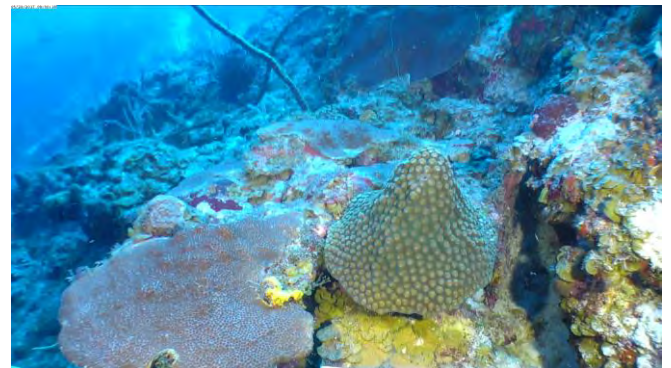


Figure 6: 21°48.2835'N;84°31.0981'W: ~70 m
Great star coral (right)- *Montastrea cavernosa*, plate coral- *Orbicella faveolata*

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15; ROV 17-13; 23-V-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 23-V-17-1; ROV 17-13, UNCW Dive 419; Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes. HiPack dive track recording failed. Used the live ArcGIS live GPS dive track feed to compensate. This data only includes location, not depth or time. Time was estimated for the nav data based on dive notes. The accuracy of this dive track's time and depth cannot be verified.

Site Description/Habitat:

Depth range: 145- 25 m.

Transect up slope heading SE.

08:16- Launch. Wind- 7 kn from 170°, current- 0.5 kn to 180°, seas- 0.3 m from SE; water temperature- 28.58 °C, salinity- 36.25.

08:28- On bottom; 145 m, visibility- 30 m.

10:11- End dive.

145- 130 m, deep island slope: steep rock slope.

Vertical photo transect upslope, 145- 130 m, 8:26- 8:30; deep island slope zone.

130 m, base of lower mesophotic zone: vertical rock wall, eroded rock, karst-like topography, 1-2 m wide ledges, small caves, cavities. Biota; yellow encrusting Verongiida, *Xestospongia*, *Aplysina archeri*.

Vertical photo transect upslope, 130- 70, 8:42- 9:06; lower mesophotic zone.

125 m: first CCA, lionfish.

91 m: vertical rugged wall; first *Halimeda*.

81 m: same geology, small caves, cavities. 80% cover sponges, *Aplysina* rope sponges (*fulva*?), *Agelas* plates.

71 m: first *Agaricia* (10 cm).

Quantitative horizontal photo transect, 70-71 m, 9:06- 9:20 (30 photos); near vertical wall, fishing line; *Agaricia* common, 10-20 cm, one 50 cm.

56 m: *Agaricia* common (10-20 cm).

52 m, upper mesophotic zone: top of vertical wall, start 60° slope. First *Lobophora*.

Vertical photo transect upslope, 52- 30 m, 9:26- 9:52; upper mesophotic zone.

47 m: first *Orbicella faveolata*, 50 cm *Agaricia*.

45 m: 45° slope, *Pseudopterogorgia*.

37 m: first *M. cavernosa* (10 cm). Corals diverse- *Porites astreoides*, *Pseudodiploria*, *Agaricia*, *Orbicella*, *Siderastrea*.

30-25 m: top of deep fringing reef, 5 m relief, intersected with narrow, 1-2 m wide sand chutes every 10-20 m. One 1-m diameter *Acropora cervicornis*, 90% dead with turf (26 m depth), *Mycetophyllia*, *Madracis decactis*, conical *M. cavernosa*, *Siderastrea siderea*.

Fish video transect, 39- 27 m, 9:55- 10:11, top of fringing reef.

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15; ROV 17-13; 23-V-17-1

Maximum Depth Occurrences:

Crustose coralline algae- 125 m

Lionfish- 125 m

Halimeda- 91 m

Agaricia- 71 m; common at 56 m

Lobophora- 52 m

Orbicella faveolata- 47 m

Montastraea cavernosa- 37 m

Number of Samples- 0

Disease and Human Impacts:

Fishing line, anchor line

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15; ROV 17-13; 23-V-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video at dive site ROV 17-13. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	West Coast ROV 17-13 C-15 Notes
Algae	
Chlorophyta	
<i>Anadyomene stellata</i>	X
Chlorophyta	X
Chlorophyta- Filamentous Green	X
<i>Halimeda copiosa</i>	X
<i>Halimeda tuna</i>	X
<i>Penicillus pyriformis</i>	X
<i>Udotea</i> sp.	X
Ochrophyta	
<i>Dictyota</i> sp.	X
<i>Lobophora</i> sp.	X
Rhodophyta	
Crustose coralline (CCA)	X
<i>Peyssonnelia</i> sp.	X
Porifera	
Calcarea	
<i>Leucetta floridana</i>	X
Demospongiae	
<i>Agelas cervicornis</i>	X
<i>Agelas citrina</i>	X
<i>Agelas clathrodes</i>	X
<i>Agelas dilatata</i>	X
<i>Agelas dispar</i>	X
<i>Agelas flabelliformis</i>	X
<i>Agelas sceptrum</i>	X
<i>Agelas</i> sp. Cu-08	X
<i>Aiolochoxia crassa</i>	X
<i>Amphimedon compressa</i>	X
<i>Amphimedon</i> sp. Cu-01	X
<i>Aplysina archeri</i>	X
<i>Aplysina bathyphila</i>	X
<i>Aplysina cauliformis</i>	X

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15; ROV 17-13; 23-V-17-1

<i>Aplysina fistularis</i>	X
<i>Aplysina sciophila</i>	X
<i>Aplysina</i> sp. Cu-03	X
<i>Asteropus</i> sp. Cu-01	X
<i>Cinachyrella kuekenthali</i>	X
<i>Ciocalypta</i> cf. <i>porrecta</i>	X
<i>Corallistes</i> sp.	X
<i>Cribrochalina vasculum</i>	X
Demospongiae sp. Cu-02	X
Demospongiae sp. Cu-08	X
<i>Dragmacidon alvarezae</i>	X
<i>Geodia</i> cf. <i>cribata</i>	X
<i>Geodia neptuni</i>	X
<i>Ircinia strobilina</i>	X
<i>Lissodendoryx colombiensis</i>	X
Microcionidae unid. sp.	X
<i>Mycale laxissima</i>	X
<i>Niphates arenata</i>	X
<i>Niphates digitalis</i>	X
<i>Oceanapia</i> sp. Cu-01	X
<i>Oceanapia</i> sp. Cu-04	X
<i>Petrosia weinbergi</i>	X
Petrosiidae Cu-03	X
<i>Siphonodictyon coralliphagum</i>	X
<i>Spirastrella coccinea</i>	X
<i>Spirastrella hartmani</i>	X
Spirastrellidae unid. sp.	X
Verongiida Cu-01	X
Verongiida Cu-05	X
Verongiida Cu-08	X
<i>Verongula reiswigi</i>	X
<i>Verongula rigida</i>	X
<i>Xestospongia muta</i>	X
<i>Xestospongia</i> sp. Cu-01	X
<i>Xestospongia</i> sp. Cu-03	X
Homoscleromorpha	
<i>Plakortis</i> sp. Cu-01	X
Cnidaria	
Hydrozoa	
Hydroidolina	X
Stylasteridae	X
Alcyonacea - Alcyoniina	

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15; ROV 17-13; 23-V-17-1

<i>Chironephthya caribaea</i>	X
Alcyonacea - gorgonian	
<i>Callogorgia gracilis</i>	X
<i>Ellisella</i> sp.	X
Gorgoniidae	X
<i>Nicella</i> sp.	X
Plexauridae	X
<i>Swiftia exserta</i>	X
Antipatharia	
<i>Aphanipathes</i> sp.	X
<i>Stichopathes</i> sp.	X
<i>Tanacetipathes</i> sp.	X
Scleractinia	
<i>Acropora cervicornis</i>	X
<i>Agaricia agaricites</i>	X
<i>Agaricia</i> sp.	X
<i>Montastraea cavernosa</i>	X
<i>Mussa angulosa</i>	X
<i>Mycetophyllia</i> sp.	X
<i>Orbicella faveolata</i>	X
<i>Orbicella franksi</i>	X
<i>Porites astreoides</i>	X
<i>Porites</i> sp.	X
<i>Siderastrea siderea</i>	X
<i>Stephanocoenia intersepta</i>	X

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15; ROV 17-13; 23-V-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-13. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

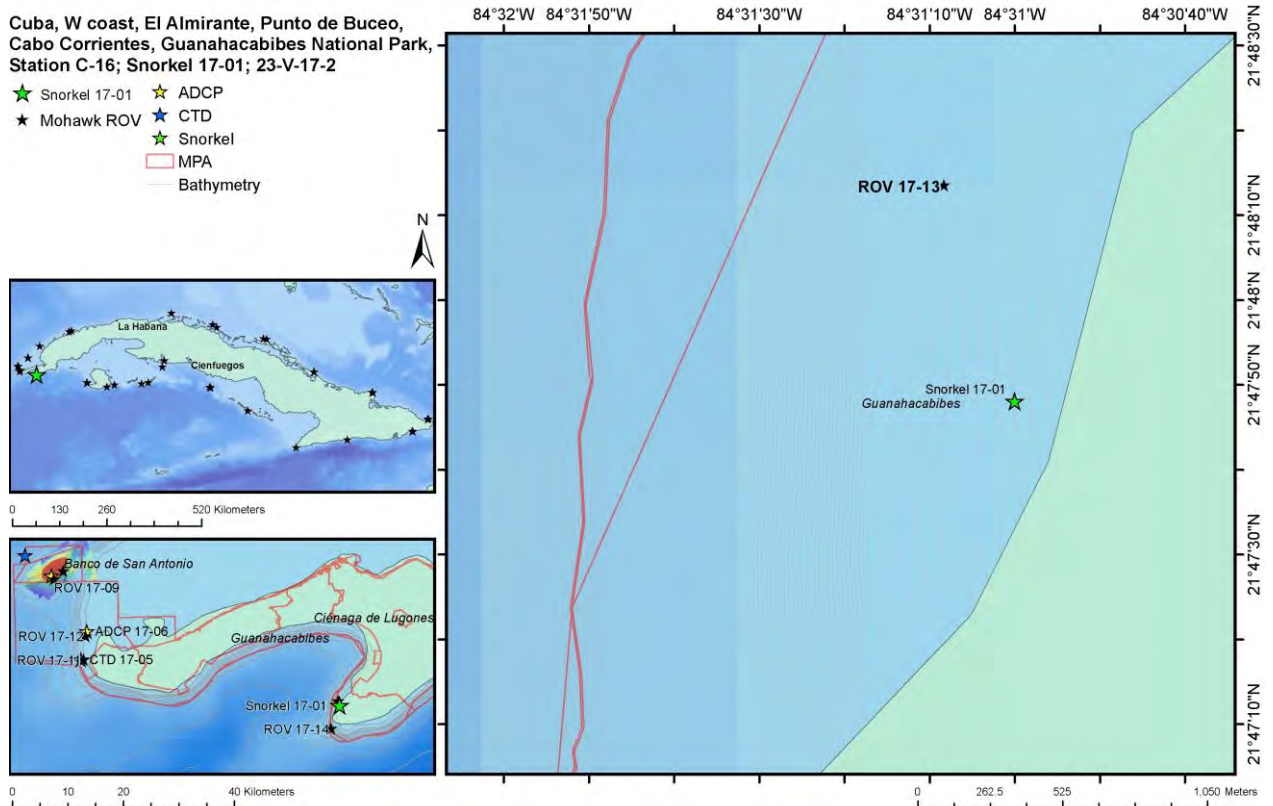
Phylum/Class/Order/Scientific Name - Common Name	West Coast ROV 17-13 C-15 Notes
Commercially Important Species	17
Actinopterygii	17
Perciformes	14
<i>Cephalopholis cruentata</i> - Graysby	3
<i>Epinephelus guttatus</i> - Red Hind	1
<i>Epinephelus morio</i> - Red Grouper	1
<i>Lutjanus apodus</i> - Schoolmaster	4
<i>Lutjanus buccanella</i> - Blackfin Snapper	3
<i>Mycteroperca tigris</i> - tiger grouper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	1
Scorpaeniformes	3
<i>Pterois volitans</i> - Lionfish	3
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus</i> sp. - Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Anisotremus surinamensis</i> - Black margate	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Chromis multilineata</i> - Brown chromis	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Coryphopterus personatus</i> - Masked/Glass Goby	X
<i>Elagatis bipinnulata</i> - rainbow runner	X
<i>Grama loreto</i> - Fairy Basslet	X
<i>Grama melacara</i> - Blackcap Basslet	X
<i>Haemulon carbonarium</i> - Caesar Grunt	X

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-15; ROV 17-13; 23-V-17-1

<i>Haemulon flavolineatum</i> - French Grunt	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon sciurus</i> - Bluestriped Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Mulloidichthys martinicus</i> - Yellow goatfish	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Melichthys niger</i> - Black Durgon	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-16; Snorkel 17-01; 23-V-17-2

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: N/A

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Snorkel

Sensors: GoPro

Data Management: Access Database

Date of Dive: 5/23/2017

Specimens: 29

Digital Photos: 52

No. DVD:

Hard Drive No.:

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-16; Snorkel 17-01; 23-V-17-2

Dive Data:

Minimum Bottom Depth (m): 3	Total Transect Length (km): 0.000
Maximum Bottom Depth (m): 4	Surface Current (kn):
On Bottom (Time- GMT): 11:00	On Bottom (Lat/Long): 21.7967°N; -84.5167°W
Off Bottom (Time- GMT): 13:14	Off Bottom (Lat/Long): 21.7967°N; -84.5167°W
Physical (bottom); Temp (°C): N/A	Salinity: N/A Visibility: N/A Current (kn): N/A

Physical Environment:

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-16; Snorkel 17-01; 23-V-17-2

Dive Imagery:



Figure 1: 21°47.801'N;84°31'W: 3 m
Shallow reef with staghorn coral- *Acropora cervicornis*
and dense algal cover



Figure 2: 21°47.801'N;84°31'W: 3 m
Shallow patch reef with *Acropora cervicornis*, *Porites porites*, *Orbicella annularis*, etc.



Figure 3: 21°47.801'N;84°31'W: 3 m
Orbicella faveolta and staghorn coral- *Acropora cervicornis*



Figure 4: 21°47.801'N;84°31'W: 3 m
Acropora cervicornis and plexaurid octocorals

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-16; Snorkel 17-01; 23-V-17-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 23-V-17-2; Snorkel dive 17-01; Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-16.

Objectives- Collect *Montastraea cavernosa* for genetics, GoPro video of reef.

Site Description/Habitat:

Depth range: 3-4 m.

Patch reef.

Number of Samples- 29

Montastraea cavernosa- 16

Dive Site: Cuba, W coast, El Almirante, Punto de Buceo, Cabo Corrientes, Guanahacabibes National Park, Station C-16; Snorkel 17-01; 23-V-17-2

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic biota identified or collected from snorkel dive site 17-01.

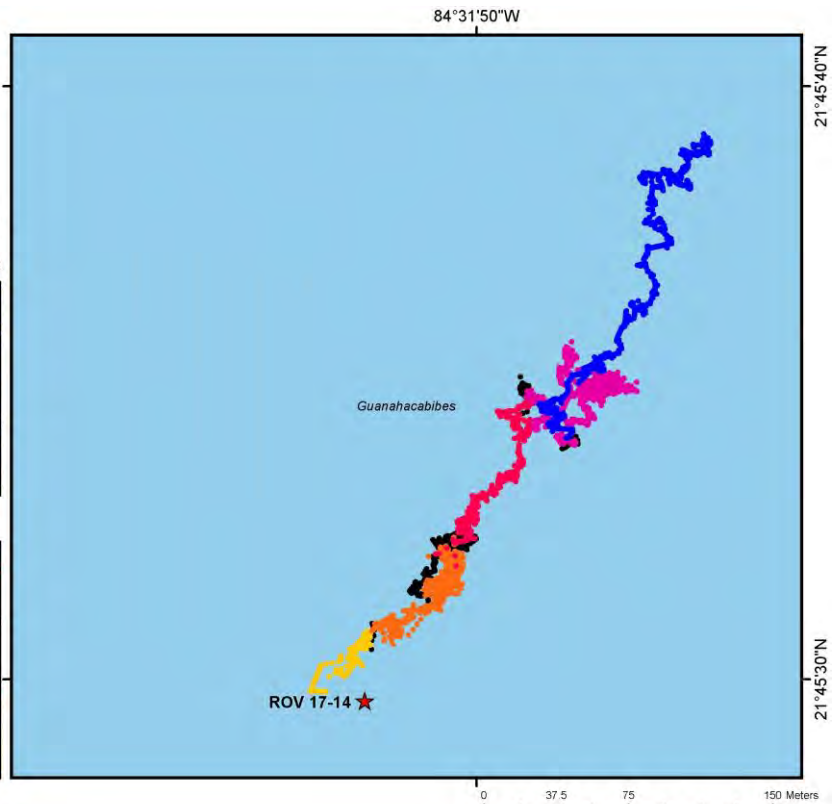
West Coast Snorkel 17-01 C-16		
Phylum/Class/Scientific Name	Notes	Samples
Algae		5
Ochrophyta		3
<i>Canistrocarpus cervicornis</i>		1
<i>Dictyota ciliolata</i>	X	
<i>Lobophora</i> sp.	X	
<i>Padina sanctae-crucis</i>		1
<i>Sargassum</i> sp.		1
Rhodophyta		2
<i>Centroceras</i> sp.	X	
<i>Ceramium cimbricum</i>	X	
Corallinophycidae		1
<i>Hypnea</i> sp.	X	
<i>Jania capillacea</i>	X	
<i>Jania rubens</i>		1
Cnidaria		16
Scleractinia		16
<i>Montastraea cavernosa</i>		16

Dive Site: Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park, Station C-16A; ROV 17-14; 23-V-17-3

General Location and Dive Track:

Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park, Station C-16A; ROV 17-14; 23-V-17-3

- ★ ROV 17-14
- ★ Mohawk ROV
- Transect Name
- 201705233 - Transect 01
- 201705233 - Transect 02
- 201705233 - Transect 03
- 201705233 - Transect 04
- 201705233 - Transect 05
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investigator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

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ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/23/2017

Specimens: 3

Digital Photos: 525

No. DVD: 2

Hard Drive No.: 1

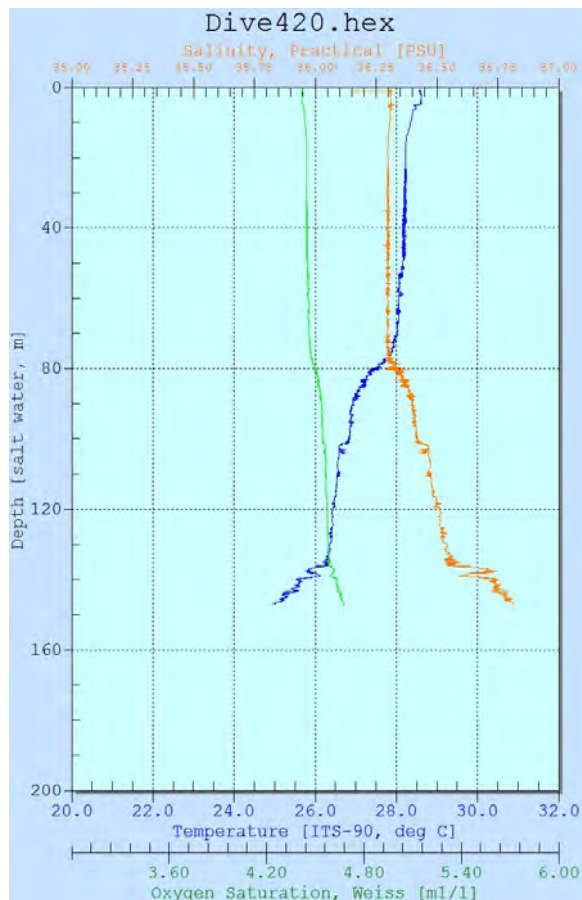
Dive Site: Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park, Station C-16A; ROV 17-14; 23-V-17-3

Dive Data:

Minimum Bottom Depth (m): 28	Total Transect Length (km): 1.001
Maximum Bottom Depth (m): 150	Surface Current (kn): 0.3
On Bottom (Time- GMT): 15:19	On Bottom (Lat/Long): 21.7582°N; -84.5311°W
Off Bottom (Time- GMT): 18:15	Off Bottom (Lat/Long): 21.7603°N; -85.5297°W
Physical (bottom); Temp (°C): 25	Salinity: 36.81 Visibility 40 Current (kn): 0.3

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-14 are as follows: Depth Maximum: 146.8 m, Temperature: 25-28.6 °C, Salinity: 36.3-36.8 PSU, and Oxygen Saturation: 4.4-4.7 ml/l.

Dive Site: Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park, Station C-16A; ROV 17-14; 23-V-17-3

Dive Imagery:

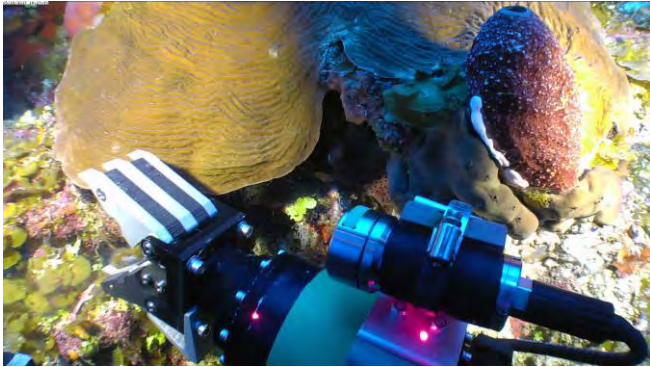


Figure 1: 21°45.5397'N;84°31.841'W: -52 m
Collection of *Agaricia* sp. on deep fore reef slope



Figure 2: 21°45.5382'N;84°31.8395'W: -52.3 m
Agaricia collection



Figure 3: 21°45.5281'N;84°31.8418'W: -92.5 m
Deep fore reef escarpment, the 'Wall'

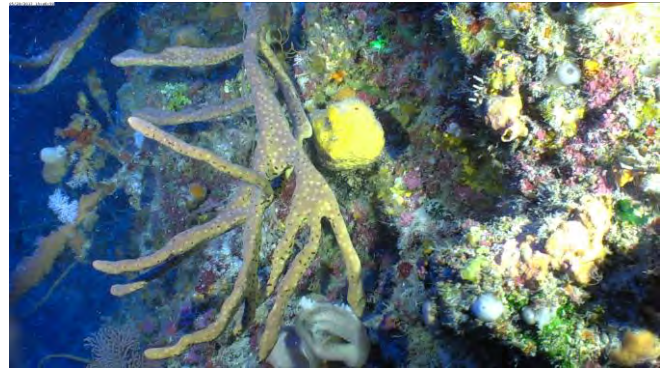


Figure 4: 21°45.5323'N;84°31.8372'W: -81.1 m
Rope sponge zone- *Agelas* spp.



Figure 5: 21°45.536'N;84°31.8407'W: -54.5 m
Vase sponge- *Callyspongia plicifera*, with a rare smooth and rugose surface



Figure 6: 21°45.5489'N;84°31.8338'W: -46.4 m
Plate corals- *Agaricia* sp. on deep fore reef slope

Dive Site: Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park, Station C-16A; ROV 17-14; 23-V-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 23-V-17-3; ROV 17-14, UNCW Dive 420; Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park, Station C-16A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 150- 28 m.

Transect up slope heading NW.

15:10- Launch. Wind- 14 kn from 140°, current- 0.3 kn to SW, seas- 1 m from SE; water temperature- 28.76 °C, salinity- 36.26.

15:18- On bottom; 150 m, visibility- 40 m.

18:15- End dive.

150 m, deep island slope zone: 70- 80° rock pavement slope, scalloped facies, vertical sand chutes. Biota: few sponges- thin encrusting yellow Verongiida, Tetractinellida, *Xestospongia*; *Ellisella* whips, *Ellisella barbadensis*; *Tanacetipathes*, *Stichopathes*.

Vertical photo transect upslope, 150- 125 m, 15:18- 15:25; deep island slope zone.

125 m, lower mesophotic zone: vertical rock wall, eroded karst-like rock, sand chutes. Start dense, diverse sponges- *Aplysina archeri*.

Vertical photo transect upslope, 125- 67 m, 15:25- 15:53; lower mesophotic zone.

106 m: first CCA.

97 m: vertical wall with 2 m wide ledges, small caves, cavities.

81 m: first *Swiftia exserta*, *Halimeda*, purple leaf *Peyssonnelia*.

67 m: vertical wall; still no coral.

59 m: first *Agaricia* (30 cm).

56 m, upper mesophotic zone: top of vertical wall, start 60 to 45° rock slope of upper buttresses. Dense *Halimeda*, sponges, *Callyspongia*.

52 m: first *Lobophora*.

48 m: 60° slope, with sediment patches on upper brow of wall. First *Orbicella faveolata* (50 cm), dense coral zone.

Quantitative horizontal photo transect, 45- 50 m, 16:16- 16:39 (30 photos); upper slope of wall, 60°.

Vertical photo transect upslope, 45- 30 m, 16:43- 17:40; upper mesophotic zone.

40- 28 m: fringing reef along top of wall, fore slope 45- 60°, top 28-31 m, intersected by series of sand chutes. Fields of *Muricea* on top, *M. cavernosa*, *Orbicella faveolata*. Back side of fringing reef is mostly flat sand, 40 m depth.

Fish video transect, 40- 30 m, 17:43- 18:15; fore reef slope and top of deep fringing reef.

Dive Site: Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park, Station C-16A; ROV 17-14; 23-V-17-3

Maximum Depth Occurrences:

Crustose coralline algae- 106 m

Swiftia exserta- 81 m

Halimeda- 81 m

Peyssonnelia- 81 m

Agaricia- 59 m

Lobophora- 52 m

Orbicella faveolata- 48 m

Number of Samples- 3

Disease and Human Impacts:

Fishing line

Dive Site: Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park, Station C-16A; ROV 17-14; 23-V-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-14. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

West Coast ROV 17-14 C-16A		
Phylum/Class/Scientific Name	Notes	Sum of samplecount
Algae	16	1
Chlorophyta	9	1
<i>Anadyomene stellata</i>	1	
Chlorophyta	1	
Chlorophyta- Filamentous Green	1	
<i>Halimeda copiosa</i>	1	1
<i>Halimeda discoidea</i>	1	
<i>Halimeda goreau</i>	1	
<i>Halimeda tuna</i>	1	
<i>Microdictyon</i> sp.	1	
<i>Udotea cyathiformis</i>	1	
Ochrophyta	3	
<i>Dictyota</i> sp.	1	
<i>Lobophora</i> sp.	2	
Rhodophyta	4	
<i>Amphiroa fragilissima</i>	1	
Crustose coralline (CCA)	1	
<i>Peyssonnelia</i> sp.	1	
Rose Petal CCA	1	
Porifera	47	1
Demospongiae	46	1
<i>Agelas cervicornis</i>	1	
<i>Agelas citrina</i>	1	
<i>Agelas conifera</i>	1	
<i>Agelas dilatata</i>	1	
<i>Agelas dispar</i>	1	
<i>Agelas flabelliformis</i>	1	
<i>Agelas sceptrum</i>	1	
<i>Agelas</i> sp. Cu-08	1	
<i>Agelas wiedenmayeri</i>	1	
<i>Aiolochoira crassa</i>	1	
<i>Amphimedon compressa</i>	1	

Dive Site: Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park, Station C-16A; ROV 17-14; 23-V-17-3

<i>Aplysina archeri</i>	1	
<i>Aplysina bathyphila</i>	1	
<i>Aplysina cauliformis</i>	1	
<i>Aplysina fistularis</i>	1	
<i>Aplysina sciophila</i>	1	
<i>Aplysina</i> sp. Cu-04	1	
<i>Asteropus</i> sp. Cu-01	1	
<i>Callyspongia</i> sp.		1
<i>Callyspongia</i> sp. Cu-04	1	
<i>Callyspongia vaginalis</i>	1	
<i>Ceratoporella nicholsoni</i>	1	
Demospongiae sp. Cu-01	1	
Demospongiae unid. sp.	1	
<i>Dragmacidon</i> cf. <i>alvarezae</i>	1	
<i>Geodia neptuni</i>	1	
<i>Geodia</i> sp. Cu-03	1	
<i>Ircinia felix</i>	1	
<i>Ircinia strobilina</i>	1	
<i>Mycale laevis</i>	1	
<i>Mycale laxissima</i>	1	
<i>Niphates arenata</i>	1	
<i>Niphates digitalis</i>	1	
<i>Niphates</i> sp. Cu-01	1	
<i>Oceanapia</i> sp. Cu-04	1	
<i>Petrosia weinbergi</i>	1	
Petrosiidae Cu-15	1	
Petrosiidae unid. sp.	1	
<i>Ptilocaulis walpersi</i>	1	
<i>Siphonodictyon coralliphagum</i>	1	
<i>Spirastrella coccinea</i>	1	
<i>Spirastrella hartmani</i>	1	
<i>Svenzea zeai</i>	1	
Verongiida Cu-01	1	
Verongiida Cu-05	1	
<i>Xestospongia muta</i>	1	
<i>Xestospongia</i> sp. Cu-01	1	
Homoscleromorpha	1	
<i>Plakortis</i> sp. Cu-01	1	
Cnidaria	35	1
Hydrozoa	3	
Hydroidolina	1	
<i>Millepora alcicornis</i>	1	

Dive Site: Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park, Station C-16A; ROV 17-14; 23-V-17-3

Stylasteridae	1	
Alcyonacea - Alcyoniina	1	
<i>Chironephthya caribaea</i>	1	
Alcyonacea - gorgonian	8	
Ellisella sp.	1	
Gorgoniidae	1	
<i>Iciligorgia schrammi</i>	1	
<i>Muricea</i> sp.	1	
<i>Nicella</i> sp.	1	
Plexauridae	1	
Primnoidae	1	
<i>Swiftia exserta</i>	1	
Antipatharia	5	
<i>Antipathes atlantica</i>	1	
Antipathidae	1	
<i>Plumapathes pennacea</i>	1	
<i>Stichopathes</i> sp.	1	
<i>Tanacetipathes</i> sp.	1	
Scleractinia	18	1
<i>Agaricia agaricites</i>	1	
<i>Agaricia</i> sp.	1	1
<i>Colpophyllia natans</i>	1	
<i>Eusmilia fastigiata</i>	1	
<i>Helioseris cucullata</i>	1	
<i>Meandrina meandrites</i>	1	
<i>Montastraea cavernosa</i>	1	
<i>Mussa angulosa</i>	1	
Mycetophyllia sp.	1	
<i>Orbicella annularis</i>	1	
<i>Orbicella faveolata</i>	1	
<i>Porites astreoides</i>	1	
<i>Pseudodiploria strigosa</i>	1	
Scleractinia- unid cup	1	
<i>Scolymia cubensis</i>	1	
<i>Scolymia</i> sp.	1	
<i>Siderastrea siderea</i>	1	
<i>Stephanocoenia intersepta</i>	1	

Dive Site: Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park, Station C-16A; ROV 17-14; 23-V-17-3

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-14. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Class/Order/Scientific Name- Common Name	ROV 17-14 Notes
Target Species	56
Actinopterygii	56
Perciformes	
<i>Cephalopholis cruentata</i> - Graysby	2
<i>Epinephelus guttatus</i> - Red Hind	1
<i>Epinephelus striatus</i> - Nassau Grouper	3
<i>Lutjanus apodus</i> - Schoolmaster	7
<i>Lutjanus mahogoni</i> - Mahogany Snapper	1
<i>Mycteroperca bonaci</i> - Black Grouper	2
<i>Mycteroperca phenax</i> - Scamp	2
<i>Mycteroperca tigris</i> - tiger grouper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	29
Scorpaeniformes	
<i>Pterois volitans</i> - Lionfish	8
Other Fish Species	
Actinopterygii	
Beryciformes	
<i>Holocentrus</i> sp. - Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Bodianus pulchellus</i> - Spotfin Hogfish	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Chromis multilineata</i> - Brown chromis	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Coryphopterus personatus</i> - Masked/Glass Goby	X
<i>Elacatinus genie</i> - Cleaning goby	X
Gobiidae - Goby	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	
<i>Haemulon flavolineatum</i> - French Grunt	X

Dive Site: Cuba, W coast, Cabo Corrientes, Guanahacabibes National Park, Station C-16A; ROV 17-14; 23-V-17-3

<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon sciurus</i> - Bluestriped Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Kyphosus</i> sp. - Chub	X
Labridae - Wrasse	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Pronotogrammus martinicensis</i> - Roughtongue Bass	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scomberomorus regalis</i> - Cero	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
Balistidae - Triggerfish	X
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Melichthys niger</i> - Black Durgon	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21; ROV 17-15; 25-V-17-1

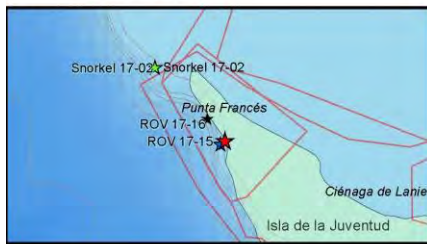
General Location and Dive Track:

Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21; ROV 17-15; 25-V-17-1

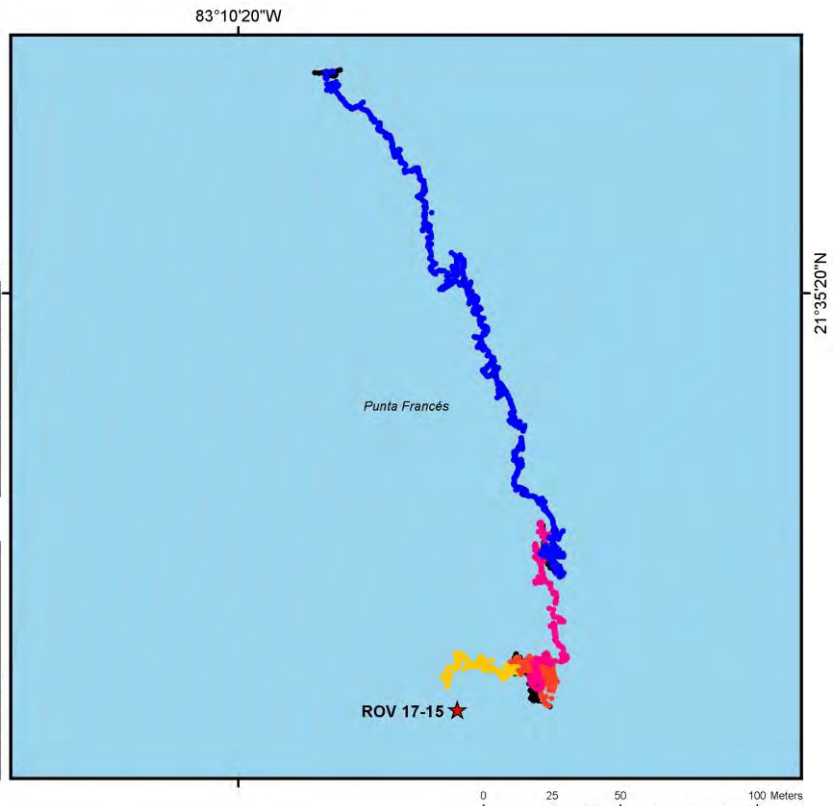
- ★ ROV 17-15
- ★ Mohawk ROV
- Transect Name
- 201705251 - Transect 01
- 201705251 - Transect 02
- 201705251 - Transect 03
- 201705251 - Transect 04
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



0 130 260 520 Kilometers



0 3.5 7 14 Kilometers



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/25/2017

Specimens: 0

Digital Photos: 575

No. DVD: 2

Hard Drive No.: 1

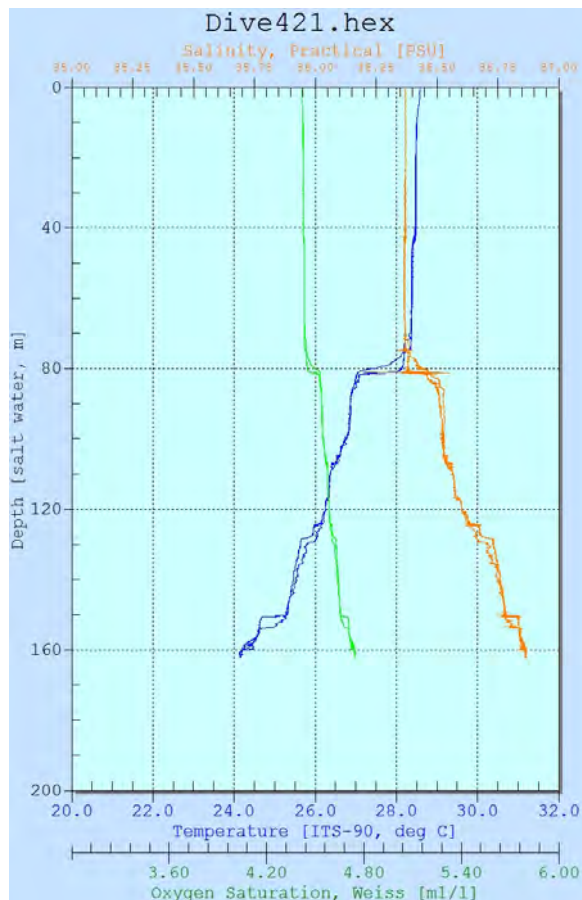
Dive Site: Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21; ROV 17-15; 25-V-17-1

Dive Data:

Minimum Bottom Depth (m): 25	Total Transect Length (km): 0.478
Maximum Bottom Depth (m): 158	Surface Current (kn): 0.1
On Bottom (Time- GMT): 10:11	On Bottom (Lat/Long): 21.5875°N; -83.1715°W
Off Bottom (Time- GMT): 12:00	Off Bottom (Lat/Long): 21.5895°N; -83.1723°W
Physical (bottom); Temp (°C): 24.3	Salinity: 36.85 Visibility 25 Current (kn): 0

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-15 are as follows: Depth Maximum: 162.3 m, Temperature: 24.1-28.6 °C, Salinity: 36.2-36.9 PSU, and Oxygen Saturation: 4.4-4.7 ml/l.

Dive Site: Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21; ROV 17-15; 25-V-17-1

Dive Imagery:

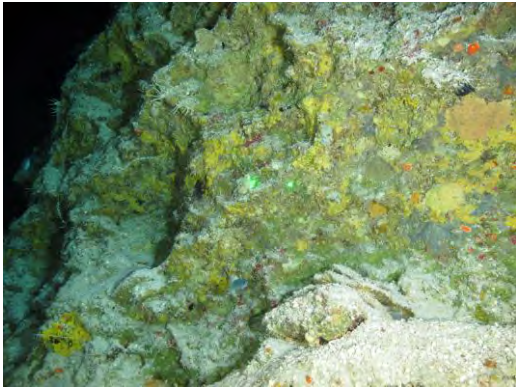


Figure 1: 21°35.26'N;83°10.276'W: -126 m
Rugged rock on deep island slope with yellow encrusting Verongida sponges



Figure 2: 21°35.26'N;83°10.2719'W: -93.1 m
Candelabra demosponge- *Aiolochroia* sp. on the 'Wall'

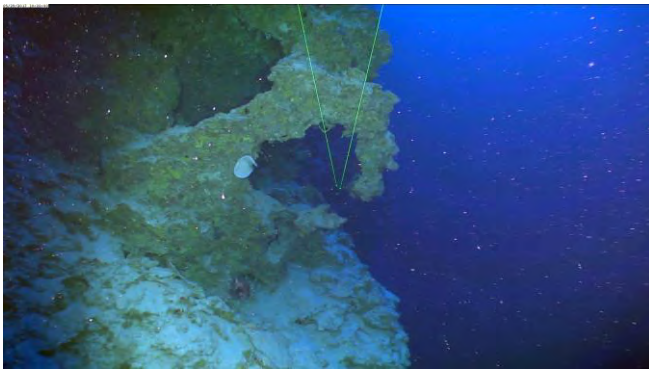


Figure 3: 21°35.2588'N;83°10.2759'W: -121 m
Eroded rock wall of lower deep fore reef escarpment, the 'Wall'



Figure 4: 21°35.2562'N;83°10.2748'W: -51.7 m
Rope sponges- *Aplysina* sp., and plate corals- *Agaricia* sp.



Figure 5: 21°35.255'N;83°10.274'W: -48.9 m
Large *Agaricia lamarcki* with evidence of zooxanthellae loss.

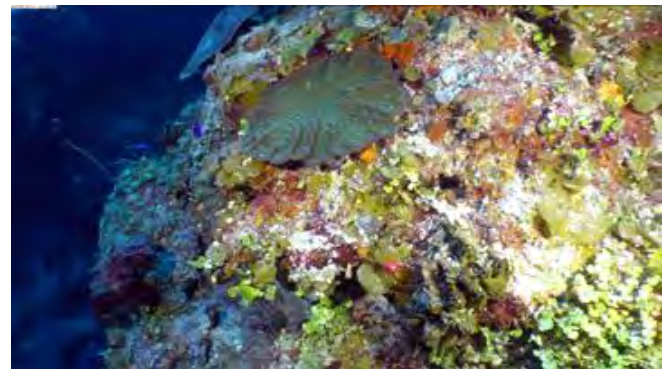


Figure 6: 21°35.3263'N;83°10.2842'W: -30 m
Mycetophyllia aliciae on deep fringing reef crest

Dive Site: Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21; ROV 17-15; 25-V-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 25-V-17-1; ROV 17-15, UNCW Dive 421; Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 158- 25 m.

Transect up slope heading 090°.

9:59- Launch. Wind- 14 kn from 178°, current- 0.1 kn to 10°, seas- 0.5 m from SW; water temperature- 28.77 °C, salinity- 36.32.

10:11- On bottom; 158 m, visibility- 25 m, current- 0.

11:59- End dive.

158 m, deep island slope zone: 45-60° rock slope, rough rock, jumble of 50 cm boulders, flat dead *Agaricia* plates, sediment veneer.

Vertical photo transect upslope, 158- 131 m, 10:07- 10:18; deep island slope zone.

143 m: CCA, yellow encrusting sponge, small gorgonians, two *Panulirus argus*.

140 m: 70° slope, rock pavement with scalloped surface; *Ellisella* whip coral.

120 m, base of lower mesophotic zone: start vertical eroded rock, karst-like topography, 1-2 m wide ledges, cavities, small caves. Biota: *Xestospongia*, sclerosponges *Ceratoporella?*, *Stichopathes*.

Vertical photo transect upslope, 120- 63 m, 10:21- 10:39; lower mesophotic zone.

105 m: *Aplysina* rope sponges *A. fulva?*, *Geodia*, *Antipathes* fan black coral.

67 m: still vertical rugged rock, first *Halimeda*

66 m: first *Agaricia* (10 cm), ledges, caves.

55 m, upper mesophotic zone: 60° slope, upper brow of buttresses on wall. 50 cm *Agaricia*.

Quantitative horizontal photo transect, 50-43 m, 10:42- 10:56 (30 photos); abundant *Agaricia* 10-50 cm diameter, *Halimeda*.

44 m: first *M. cavernosa*.

40- 30 m: upper brow of overhanging buttresses, 45-90° slope, intersected with deep sand chutes every 10-15 m apart along the fringing reef rim. Dense *Agaricia*, 1 m plates, chains of *Halimeda*, *Mycetophyllia*, *Orbicella*.

36 m: *Stephanocoenia intersepta*, *Siderastrea siderea*.

33 m: first *Orbicella faveolata*, 1 m diameter.

25 m: still steep, 60-80° slope fore reef, end vertical transect.

10-15 m: per Patricia González, reef continues to 10-15 m depth, as spur and groove.

Fish video survey, 40- 30 m, 11:00- 11:59, upper brow and fore reef slope.

Dive Site: Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21; ROV 17-15; 25-V-17-1

Maximum Depth Occurrences:

CCA, crustose coralline algae- 143 m

Panulirus argus- 143 m

Halimeda- 67 m

Agaricia- 66 m

Montastraea cavernosa- 44 m

Orbicella faveolata- 33 m

Number of Samples- 0

Disease and Human Impacts:

None

Dive Site: Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21; ROV 17-15; 25-V-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video at dive site ROV 17-15. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Southwest Coast ROV 17-15 C-21 Notes
Algae	
Chlorophyta	
<i>Halimeda copiosa</i>	X
<i>Halimeda discoidea</i>	X
<i>Halimeda goreau</i>	X
<i>Halimeda</i> sp.	X
<i>Halimeda tuna</i>	X
<i>Rhipocephalus oblongus</i>	X
<i>Udotea cyathiformis</i>	X
<i>Udotea</i> sp.	X
Ochrophyta	
<i>Dictyota</i> sp.	X
<i>Lobophora</i> sp.	X
Rhodophyta	
Crustose coralline (CCA)	X
<i>Peyssonnelia</i> sp.	X
Porifera	
Calcarea	
Calcarea sp. Cu-02	X
Demospongiae	
<i>Agelas cerebrum</i>	X
<i>Agelas cervicornis</i>	X
<i>Agelas citrina</i>	X
<i>Agelas dilatata</i>	X
<i>Agelas sceptrum</i>	X
<i>Aiolochoia crassa</i>	X
<i>Aiolochoia crassa</i> var. purple	X
<i>Aplysina archeri</i>	X
<i>Aplysina bathyphila</i>	X
<i>Aplysina cauliformis</i>	X
<i>Aplysina fistularis</i>	X
<i>Ceratoporella nicholsoni</i>	X
<i>Chondrosia</i> sp.	X

Dive Site: Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21; ROV 17-15; 25-V-17-1

<i>Clathria</i> sp. Cu-03	X
<i>Cliona delitrix</i>	X
<i>Cribrochalina vasculum</i>	X
Demospongiae sp. Cu-14	X
Demospongiae sp. Cu-22	X
Demospongiae unid. sp.	X
<i>Dragmacidon alvarezae</i>	X
<i>Ectyoplasia ferox</i>	X
<i>Geodia cf. criбата</i>	X
<i>Geodia neptuni</i>	X
<i>Hymeniacion caerulea</i>	X
<i>Ircinia campana</i>	X
<i>Ircinia strobilina</i>	X
<i>Leiodermatium</i> sp.	X
<i>Mycale laxissima</i>	X
<i>Niphates digitalis</i>	X
<i>Petrosia weinbergi</i>	X
Petrosiidae Cu-15	X
Petrosiidae Cu-18	X
Petrosiidae unid. sp.	X
<i>Polymastia</i> sp. Cu-01	X
<i>Siphonodictyon coralliphagum</i>	X
<i>Smenospongia</i> sp.	X
<i>Spirastrella coccinea</i>	X
<i>Spirastrella hartmani</i>	X
<i>Svenzea zeai</i>	X
Verongiida Cu-01	X
Verongiida Cu-03	X
Verongiida Cu-04	X
Verongiida Cu-05	X
Verongiida Cu-06	X
<i>Verongula cf. rigida</i>	X
<i>Verongula gigantea</i>	X
<i>Xestospongia muta</i>	X
<i>Xestospongia</i> sp. Cu-01	X
Homoscleromorpha	
<i>Plakortis</i> sp. Cu-01	X
Cnidaria	
Hydrozoa	
<i>Millepora alcicornis</i>	X
Anthozoa- non coral	
Actiniaria	X

Dive Site: Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21; ROV 17-15; 25-V-17-1

Zoanthidae	X
Alcyonacea - gorgonian	
<i>Ellisella</i> sp.	X
Gorgoniidae	X
<i>Nicella</i> sp.	X
Plexauridae	X
<i>Pseudopterogorgia</i> sp.	X
Antipatharia	
<i>Antipathes atlantica</i>	X
<i>Elatopathes abietina</i>	X
<i>Stichopathes</i> sp.	X
Scleractinia	
<i>Agaricia agaricites</i>	X
<i>Agaricia</i> sp.	X
<i>Colpophyllia natans</i>	X
<i>Helioseris cucullata</i>	X
<i>Meandrina meandrites</i>	X
<i>Montastraea cavernosa</i>	X
Mycetophyllia sp.	X
<i>Orbicella faveolata</i>	X
<i>Porites divaricata</i>	X
<i>Porites</i> sp.	X
<i>Scolymia cubensis</i>	X
<i>Scolymia</i> sp.	X
<i>Siderastrea siderea</i>	X
<i>Stephanocoenia intersepta</i>	X

Dive Site: Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21; ROV 17-15; 25-V-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-15. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Southwest Coast ROV 17-15 C-21 Notes
Commercially Important Species	16
Actinopterygii	16
Perciformes	15
<i>Cephalopholis cruentata</i> - Graysby	5
<i>Lutjanus apodus</i> - Schoolmaster	3
<i>Lutjanus buccanella</i> - Blackfin Snapper	2
<i>Lutjanus jocu</i> - Dog Snapper	1
<i>Lutjanus mahogoni</i> - Mahogany Snapper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	3
Scorpaeniformes	1
<i>Pterois volitans</i> - Lionfish	1
Other	
Actinopterygii	
Beryciformes	X
<i>Holocentrus</i> sp. - Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Anisotremus surinamensis</i> - Black margate	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon sedentarius</i> - Reef Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Coryphopterus personatus</i> - Masked/Glass Goby	X
<i>Equetus punctatus</i> - Spotted Drum	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon aurolineatum</i> - Tomtate	X
<i>Haemulon flavolineatum</i> - French Grunt	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X

Dive Site: Cuba, S coast, SW tip of Isla de la Juventud, Punta de Pedernales MPA, Station C-21; ROV 17-15; 25-V-17-1

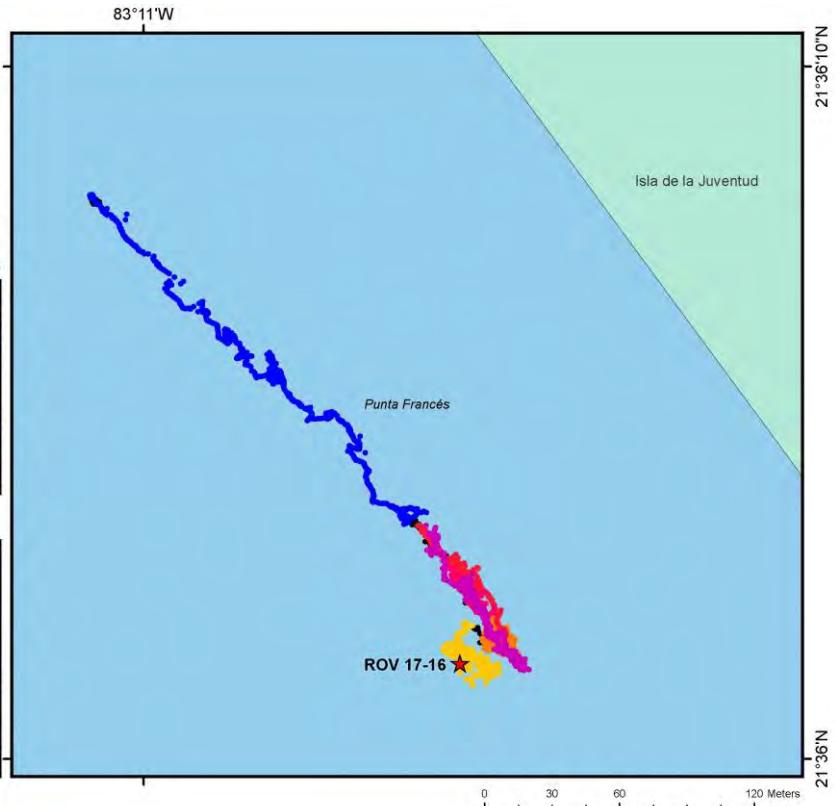
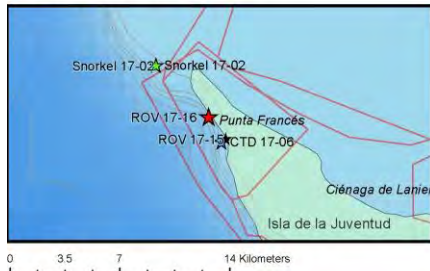
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus</i> sp. - hamlet	X
<i>Hypoplectrus unicolor</i> - Butter Hamlet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Pomacanthus paru</i> - French Angelfish	X
<i>Prognathodes aya</i> - Bank Butterflyfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Sphyaena barracuda</i> - Great Barracuda	X
<i>Stegastes leucostictus</i> - Beaugregory	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
<i>Trachinotus blochii</i> - Permit	X
Tetraodontiformes	
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A; ROV 17-16; 25-V-17-3

General Location and Dive Track:

Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A; ROV 17-16; 25-V-17-3

- ★ ROV 17-16
- ★ Mohawk ROV
- Transect_Name
- 201705253 - Transect 01
- 201705253 - Transect 02
- 201705253 - Transect 03
- 201705253 - Transect 04
- 201705253 - Transect 05
- 201705253 - Transect 06
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/25/2017

Specimens: 0

Digital Photos: 549

No. DVD: 2

Hard Drive No.: 1

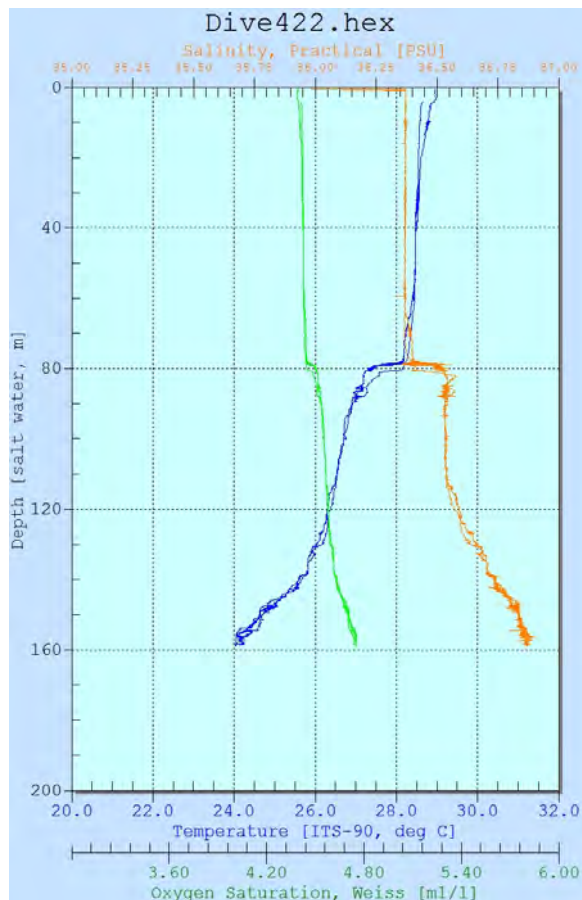
Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A; ROV 17-16; 25-V-17-3

Dive Data:

Minimum Bottom Depth (m): 28	Total Transect Length (km): 0.722
Maximum Bottom Depth (m): 150	Surface Current (kn): 0.1
On Bottom (Time- GMT): 14:24	On Bottom (Lat/Long): 21.6004°N; -83.1821°W
Off Bottom (Time- GMT): 16:29	Off Bottom (Lat/Long): 21.6022°N; -83.1836°W
Physical (bottom); Temp (°C): 24.7	Salinity: 36.83 Visibility 40 Current (kn): 0.1

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-16 are as follows: Depth Maximum: 158.9 m, Temperature: 24-29 °C, Salinity: 36.4-36.9 PSU, and Oxygen Saturation: 4.4-4.8 ml/l.

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A; ROV 17-16; 25-V-17-3

Dive Imagery:

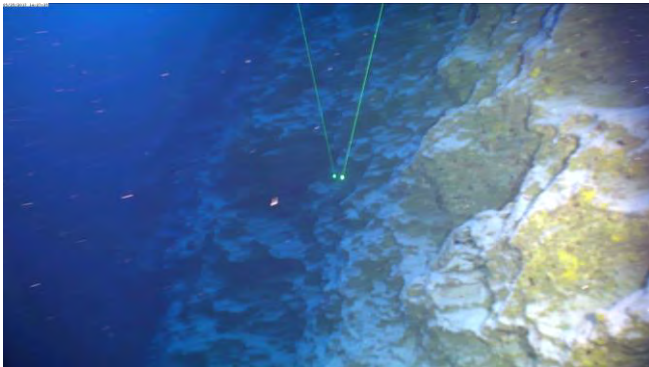


Figure 1: 21°36.0242'N;83°10.922'W: -139.4 m
Barren but rugged deep island slope (10 cm lasers)

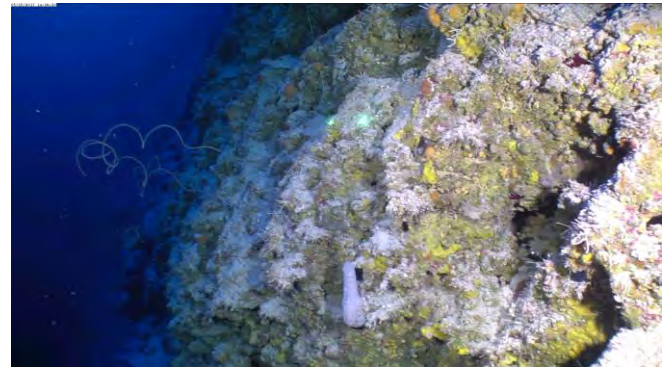


Figure 2: 21°36.0281'N;83°10.9175'W: -111.6 m
Deep 'Wall' with wire coral- *Stichopathes lutkeni*



Figure 3: 21°36.0248'N;83°10.9117'W: -65.9 m
Elisella elongata octocoral on upper wall

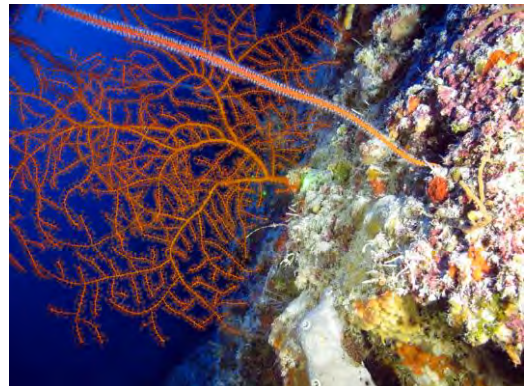


Figure 4: 21°36.0324'N;83°10.9158'W: -81.7 m
Whip octocoral- *Ellisella barbadensis*, and fan- *Swiftia exserta*



Figure 5: 21°36.0331'N;83°10.9156'W: -82.1 m
Lionfish- *Pterois volitans* or *P. miles* on the 'Wall' (10 cm lasers)

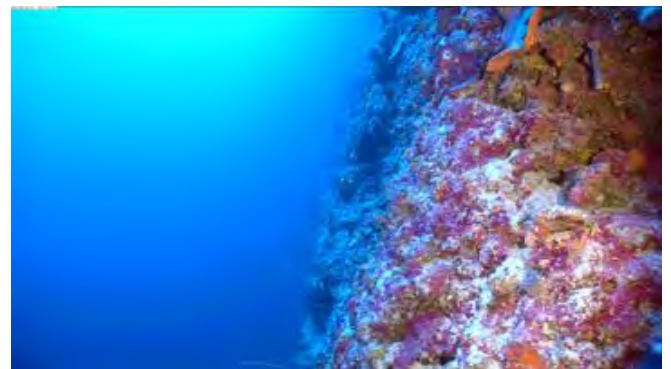


Figure 6: 21°36.0305'N;83°10.9143'W: -69.7 m
Dense crustose coralline algae on the 'Wall'

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A; ROV 17-16; 25-V-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 25-V-17-3; ROV 17-16, UNCW Dive 422; Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 150- 28 m.

Transect up slope heading 045°.

14:07- Launch. Wind- 8 kn from 180°, current- 0.1 kn to 277°, seas- calm; water temperature- 29.0 °C, salinity- 36.32.

14:25- On bottom; 150 m, visibility- 40 m, current- 0.

16:28- End dive.

150 m, deep island slope zone: 80-90° rock pavement, scalloped surface, eroded, small boulders and dead *Agaricia* plates on level areas, sediment chutes. Relatively barren, thin encrusting yellow *Verongiida*.

Vertical photo transect upslope, 150- 115 m, 14:24- 14:37; deep island slope.

134 m: first CCA.

120 m: same habitat, 80° rock pavement, *Stichopathes*, first *Halimeda*.

115 m, lower mesophotic zone: begin vertical eroded rock wall, ledges begin at 110 m. Biota- diverse sponges begin, *Sclerosponges*, *Geodia*, *Oceanapia*, *Xestospongia*, *Ellisella* whip coral.

Vertical photo transect upslope, 115- 60 m, 14:37- 15:04; lower mesophotic zone, wall.

100 m: mostly vertical rock pavement, little eroded surfaces, no caves, no sand chutes, lots of sediment on flat surfaces, relatively low density of large sponges.

83 m: first lionfish, *Swiftia exserta*, *Sclerosponges* still abundant.

79 m: ledge with small caves; rippled water (fresh water outflow?).

78 m: first *Agaricia* (15 cm), sponges more common.

72 m: base of overhanging buttresses, base of sand chutes; *Agaricia* 50 cm.

65 m: *Aplysina* rope sponges *A. fulva?*, *Agelas clathrodes* plates.

64 m: start abundant *Agaricia*, dense sponges.

Quantitative horizontal photo transect, 60- 58 m, 15:04- 3:21 (30 photos), lower part of buttress zone.

Vertical photo transect upslope, 60 m to top of wall 35 m, 15:22- 15:32; upper mesophotic zone.

59 m: first *M. cavernosa*, yellow rope sponge *Agelas sceptrum*.

50 m: vertical eroded, karst-like rock.

45 m: 2 m wide ledges, large cavities, caves.

41 m, upper mesophotic zone: upper brow of buttresses. Biota: abundant 30 cm *Agaricia*, *Halimeda* chains, *Antipatharia*, *Mycetophyllia*.

35 m: 60° slope, upper brow. First *Lobophora*, *Pseudopterogorgia*.

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A; ROV 17-16; 25-V-17-3

Quantitative horizontal photo transect, 35-32 m, 15:32- 15:52 (30 photos); upper slope of buttresses, intersected with sand chutes. *Millepora alcicornis*.

28 m: first *Orbicella faveolata*. Reef slope still going up. End vertical transect.

Fish video transect, 35- 40 m, 15:53- 16:28, along fore reef slope.

Maximum Depth Occurrences:

Crustose coralline algae (CCA)- 134 m

Halimeda- 120 m

Swiftia exserta- 83 m

Agaricia- 78 m

Orbicella faveolata- 28 m

Number of Samples- 0

Disease and Human Impacts:

None

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A; ROV 17-16; 25-V-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video at dive site ROV 17-16. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Southwest Coast ROV 17-16 C-21A Notes
Algae	
Cyanobacteria	
Chlorophyta	
Chlorophyta	X
<i>Halimeda copiosa</i>	X
<i>Halimeda goreau</i>	X
<i>Halimeda</i> sp.	X
<i>Halimeda tuna</i>	X
<i>Penicillus</i> sp.	X
<i>Rhipocephalus oblongus</i>	X
<i>Rhipocephalus phoenix</i>	X
Ochrophyta	
<i>Dictyota</i> sp.	X
<i>Lobophora</i> sp.	X
Rhodophyta	
<i>Amphiroa</i> sp.	X
Crustose coralline (CCA)	X
<i>Peyssonnelia</i> sp.	X
Porifera	
Demospongiae	
<i>Agelas cervicornis</i>	X
<i>Agelas citrina</i>	X
<i>Agelas dilatata</i>	X
<i>Agelas dispar</i>	X
<i>Agelas sceptrum</i>	X
<i>Agelas wiedenmayeri</i>	X
<i>Aiolochoia crassa</i>	X
<i>Aiolochoia</i> sp. Cu-02	X
<i>Amphimedon</i> sp. Cu-01	X
<i>Aplysina archeri</i>	X
<i>Aplysina bathyphila</i>	X
<i>Aplysina cauliformis</i>	X
<i>Aplysina fistularis</i>	X

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A; ROV 17-16; 25-V-17-3

<i>Aplysina</i> sp. Cu-04	X
<i>Ceratoporella nicholsoni</i>	X
<i>Cliona delitrix</i>	X
<i>Cribrochalina vasculum</i>	X
Demospongiae sp. Cu-10	X
Demospongiae sp. Cu-14	X
Demospongiae sp. Cu-22	X
Demospongiae sp. Cu-25	X
Demospongiae unid. sp.	X
<i>Geodia</i> cf. <i>cribata</i>	X
<i>Haliclona</i> sp. Cu-01	X
<i>Halisarca caerulea</i>	X
<i>Ircinia felix</i>	X
<i>Ircinia strobilina</i>	X
<i>Mycale</i> cf. <i>laevis</i>	X
<i>Mycale laxissima</i>	X
<i>Niphates arenata</i>	X
Petrosiidae Cu-12	X
Petrosiidae Cu-15	X
Petrosiidae Cu-20	X
Petrosiidae unid. sp.	X
<i>Siphonodictyon brevitubulatum</i>	X
<i>Siphonodictyon coralliphagum</i>	X
<i>Smenospongia aurea</i>	X
<i>Spirastrella coccinea</i>	X
<i>Spirastrella hartmani</i>	X
Spirastrellidae unid. sp.	X
<i>Terpios belindae</i>	X
Verongiida Cu-01	X
Verongiida Cu-04	X
Verongiida Cu-05	X
<i>Verongula reiswigi</i>	X
<i>Verongula rigida</i>	X
<i>Xestospongia muta</i>	X
Xestospongia sp. Cu-01	X
Homoscleromorpha	
<i>Plakortis</i> sp. Cu-01	X
Cnidaria	
Hydrozoa	
Hydroidolina	X
<i>Millepora alvicornis</i>	X
Stylasteridae	X

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A; ROV 17-16; 25-V-17-3

Alcyonacea - Alcyoniina	
<i>Chironephthya caribaea</i>	X
Alcyonacea - gorgonian	
<i>Ellisella</i> sp.	X
Gorgoniidae	X
<i>Nicella</i> sp.	X
Plexauridae	X
<i>Pseudopterogorgia</i> sp.	X
<i>Swiftia exserta</i>	X
Antipatharia	
<i>Antipathes atlantica</i>	X
Antipathidae	X
<i>Stichopathes</i> sp.	X
<i>Tanacetipathes</i> sp.	X
<i>Tanacetipathes tanacetum</i>	X
Scleractinia	
<i>Agaricia agaricites</i>	X
<i>Agaricia</i> sp.	X
<i>Colpophyllia natans</i>	X
<i>Helioseris cucullata</i>	X
<i>Meandrina meandrites</i>	X
<i>Montastraea cavernosa</i>	X
<i>Mycetophyllia</i> sp.	X
<i>Orbicella faveolata</i>	X
<i>Porites astreoides</i>	X
Scleractinia- unid cup	X
<i>Scolymia cubensis</i>	X
<i>Siderastrea siderea</i>	X
<i>Stephanocoenia intersepta</i>	X

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A; ROV 17-16; 25-V-17-3

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-16. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

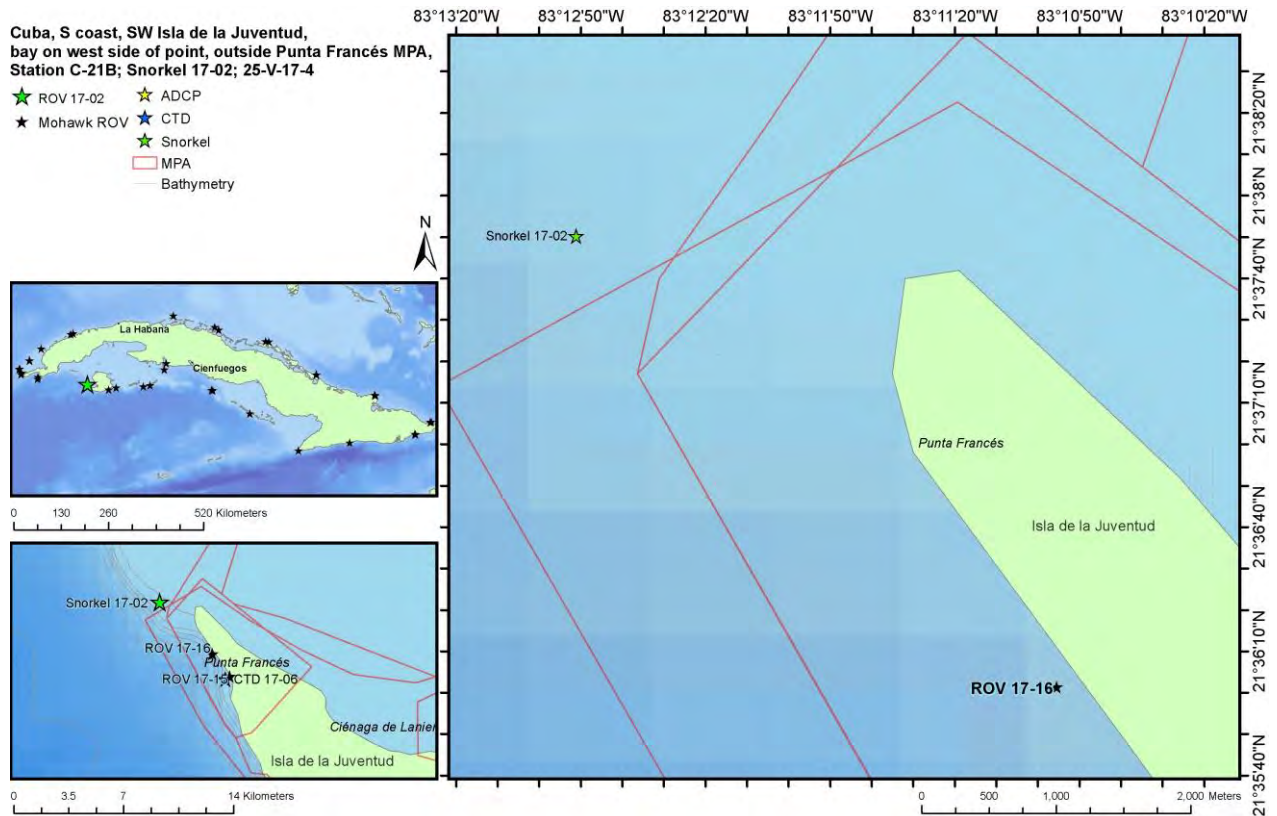
Phylum/Class/Order/Scientific Name - Common Name	Southwest Coast ROV 17-16 C-21A Notes
Commercially Important Species	37
Actinopterygii	37
Perciformes	35
<i>Cephalopholis cruentata</i> - Graysby	1
<i>Cephalopholis fulva</i> - Coney	1
<i>Lutjanus apodus</i> - Schoolmaster	7
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	26
Scorpaeniformes	2
<i>Pterois volitans</i> - Lionfish	2
Other	
Actinopterygii	
Aulopiformes	X
<i>Synodus</i> sp. - Lizardfish	X
Beryciformes	
<i>Holocentrus</i> sp. - Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
<i>Plectrypops retrospinis</i> - Cardinal Soldierfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
Chaetodontidae - Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon flavolineatum</i> - French Grunt	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21A; ROV 17-16; 25-V-17-3

<i>Hypoplectrus puella</i> - Barred Hamlet	X
<i>Hypoplectrus</i> sp. - hamlet	X
<i>Hypoplectrus unicolor</i> - Butter Hamlet	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Serranus annularis</i> - Orangeback Bass	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyaena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Trachinotus blochii</i> - Permit	X
Tetraodontiformes	
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, outside Punta Francés MPA, Station C-21B; Snorkel 17-02; 25-V-17-4

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: N/A

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Snorkel

Sensors: GoPro

Data Management: Access Database

Date of Dive: 5/25/2017

Specimens: 24

Digital Photos: 42

No. DVD:

Hard Drive No.:

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, outside Punta Francés
MPA, Station C-21B; Snorkel 17-02; 25-V-17-4

Dive Data:

Minimum Bottom Depth (m): 4	Total Transect Length (km): 0.000
Maximum Bottom Depth (m): 5	Surface Current (kn): 0.2
On Bottom (Time- GMT): 18:00	On Bottom (Lat/Long): 21.6306°N; -83.2142°W
Off Bottom (Time- GMT): 19:30	Off Bottom (Lat/Long): 21.6306°N; -83.2142°W
Physical (bottom); Temp (°C): N/A	Salinity: N/A Visibility N/A Current (kn): N/A

Physical Environment:

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, outside Punta Francés MPA, Station C-21B; Snorkel 17-02; 25-V-17-4

Dive Imagery:



Figure 1: 21°37.838'N;83°12.852'W: 5 m
Orbicella faveolata over 1 m diameter

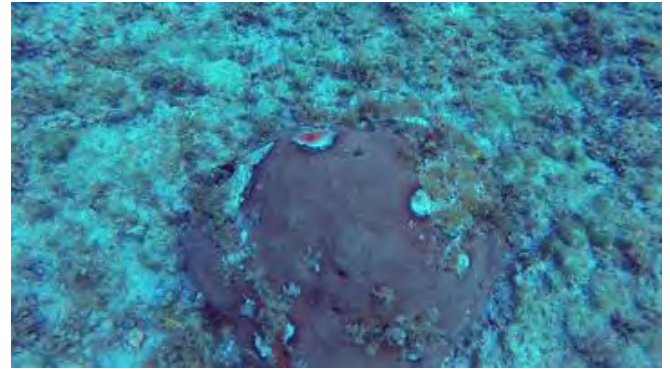


Figure 2: 21°37.838'N;83°12.852'W: 5 m
One of two black band disease infections observed at this snorkel site. Four separate lesions were active on this *Siderastrea siderea*

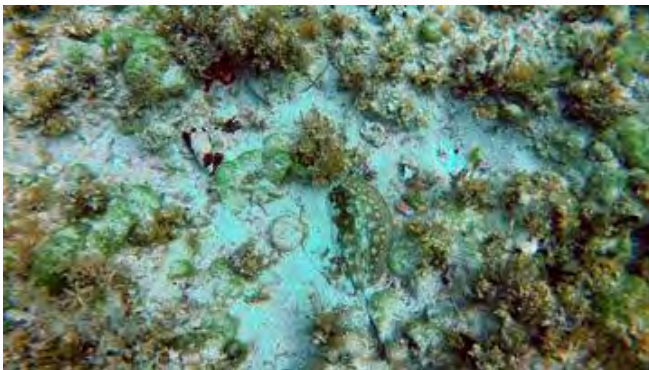


Figure 3: 21°37.838'N;83°12.852'W: 5 m
Yellow Stingray- *Urobatis jamaicensis*



Figure 4: 21°37.838'N;83°12.852'W: 5 m
Black band disease on *Pseudodiploria strigosa*

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, outside Punta Francés MPA, Station C-21B; Snorkel 17-02; 25-V-17-4

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 25-V-17-4; Snorkel 17-02; Cuba, S coast, SW Isla de la Juventud, bay on west side of point, outside Punta Francés MPA, Station C-21B

Objectives- Collect *Montastraea cavernosa* for genetics, GoPro video of reef.

Site Description/Habitat:

Hard bottom, 4-5 m:

Number of Samples- 24

Algae- 19

Gorgonacea- 2 (*Pseudopterogorgia acerosa*, *Pterogorgia citrina*)

Montastraea cavernosa- 3

Dive Site: Cuba, S coast, SW Isla de la Juventud, bay on west side of point, Punta Francés MPA, Station C-21B; Snorkel 17-02; 25-V-17-4

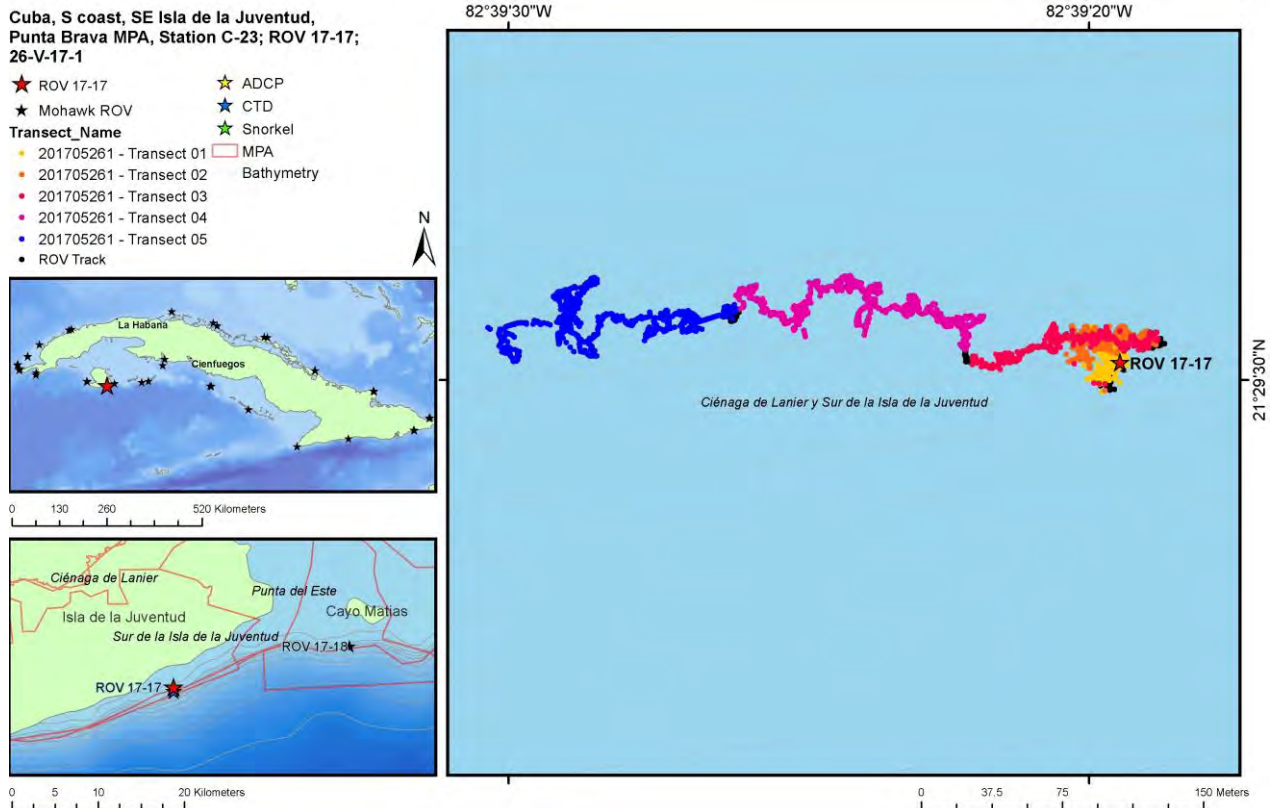
Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic biota identified or collected from snorkel dive site 17-02.

Southwest Coast Snorkel 17-02 C-21B		
Phylum/Class/Scientific Name	Notes	Samples
Algae		13
Chlorophyta	X	5
<i>Avrainvillea fulva</i>		1
<i>Cladophora fuliginosa</i>		1
<i>Dasycladus vermicularis</i>		1
<i>Dictyosphaeria cavernosa</i>		1
<i>Halimeda</i> sp.	X	
<i>Microdictyon marinum</i>		1
Ochrophyta		4
<i>Dictyota ciliolata</i>		1
<i>Dictyota</i> sp.		1
<i>Lobophora</i> sp.		1
<i>Sargassum</i> sp.		1
Rhodophyta		4
<i>Amphiroa rigida</i>		1
<i>Ceramium</i> sp.	X	
Corallinophycidae		1
<i>Digenea simplex</i>		1
<i>Gelidiella acerosa</i>		1
<i>Jania capillacea</i>	X	
<i>Jania rubens</i>	X	
<i>Polysiphonia</i> sp.	X	
Cnidaria		5
Alcyonacea - gorgonian		2
<i>Pseudopterogorgia acerosa</i>		1
<i>Pterogorgia citrina</i>		1
Scleractinia		3
<i>Montastraea cavernosa</i>		3

Dive Site: Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA, Station C-23; ROV 17-17; 26-V-17-1

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/26/2017

Specimens: 4

Digital Photos: 489

No. DVD: 3

Hard Drive No.: 1

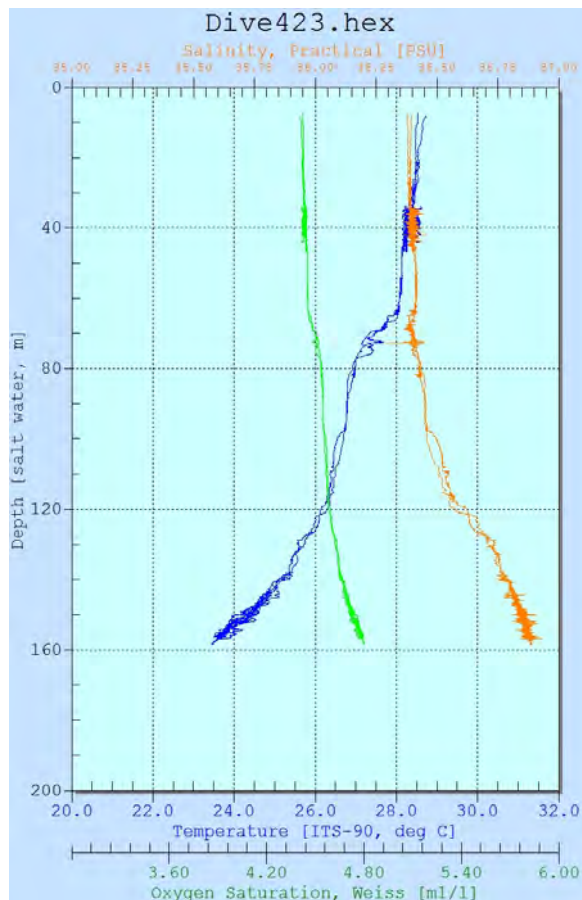
Dive Site: Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA, Station C-23; ROV 17-17; 26-V-17-1

Dive Data:

Minimum Bottom Depth (m): 37	Total Transect Length (km): 0.758
Maximum Bottom Depth (m): 150	Surface Current (kn): 0.2
On Bottom (Time- GMT): 9:15	On Bottom (Lat/Long): 21.4918°N; -82.6554°W
Off Bottom (Time- GMT): 11:28	Off Bottom (Lat/Long): 21.4917°N; -82.6583°W
Physical (bottom); Temp (°C): 24.1	Salinity: 36.85 Visibility 50 Current (kn): 0.7

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-17 are as follows: Depth Maximum: 158.5 m, Temperature: 23.5-28.7 °C, Salinity: 36.3-36.9 PSU, and Oxygen Saturation: 4.4-4.8 ml/l.

Dive Site: Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA, Station C-23; ROV 17-17; 26-V-17-1

Dive Imagery:

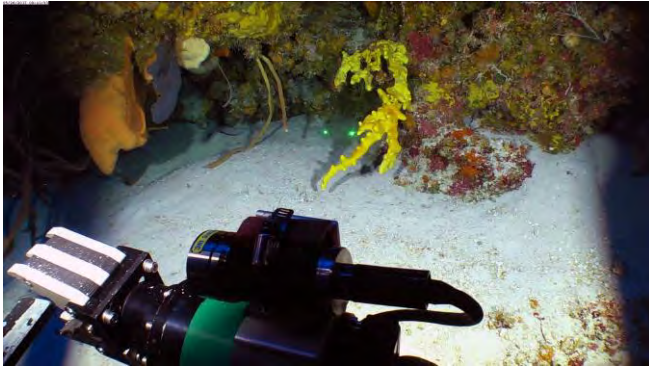


Figure 1: 21°29.5127'N;82°39.3236'W: -82.7 m
Collecting yellow finger sponge- *Aiolochroia* sp. on ledge of the 'Wall'

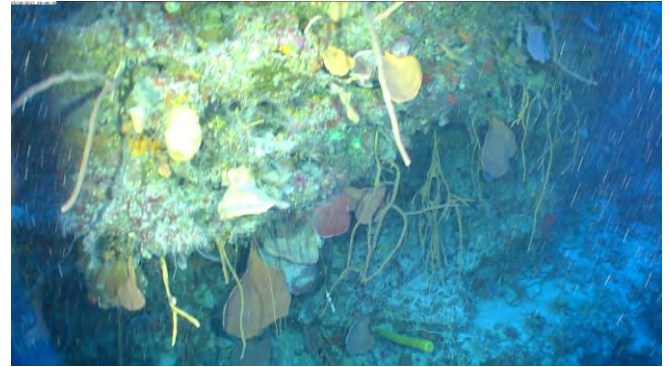


Figure 2: 21°29.512'N;82°39.3209'W: -74 m
Ledge and overhang covered with various demosponges- *Agelas*, *Aplysina*, *Niphates*

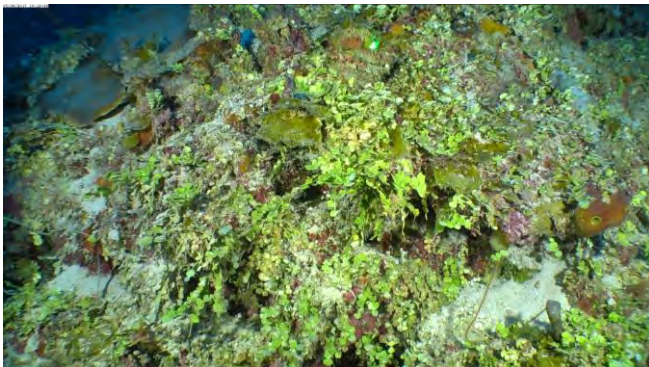


Figure 3: 21°29.5097'N;82°39.3691'W: -55.3 m
Dense *Halimeda copiosa* on deep fore reef slope



Figure 4: 21°29.5168'N;82°39.374'W: -47 m
Pair of 50 cm tall *Xestospongia muta*



Figure 5: 21°29.5195'N;82°39.4495'W: -42.4 m
Agaricia sp. with boring sponge- *Cliona delitrix*



Figure 6: 21°29.5213'N;82°39.4825'W: -45.1 m
1 m long Southern Stingray- *Dasyatis americana* on back reef (10 cm lasers)

Dive Site: Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA, Station C-23; ROV 17-17; 26-V-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 26-V-17-1; ROV 17-17, UNCW Dive 423; Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA, Station C-23.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 150- 37 m.

Transect up slope heading 322°.

8:31- Launch. Wind- 10 kn from 116°, current- 0.2 kn to SW, seas- 1 m from SE; water temperature- 28.88 °C, salinity- 36.35.

9:15- On bottom; 150 m, visibility- 50 m, current- 0.7 kn from N

11:29- End dive.

150 m, deep island slope zone: 80° rock pavement, scalloped surface; sparse yellow encrusting Verongiida sponges.

Vertical photo transect, 150- 118 m, 09-17- 9z:29; deep island slope zone.

135 m: 80-90° rock pavement, fairly barren; sponges- *Xestospongia*, *Corallistes* cup sponge.

118 m, lower mesophotic zone: base of vertical wall. First CCA, thin encrusting Chlorophyta; dense sponges- *Polymastia*; *Stichopathes*, *Ellisella*, sclerosponges.

Vertical photo transect, 118- 64 m, 9:29- 9:52; lower mesophotic zone.

105 m: vertical wall, scalloped surface, not eroded; *Aplysina* rope sponges, *Aplysina archeri*.

85 m: eroded rock wall, karst-like topography, 2 m wide ledges, caves; dense, diverse sponges.

75 m: first *Halimeda*, ledges, caves.

65 m: first *Swiftia exserta*

64 m: first *Agaricia* (15, 30 cm).

60- 40 m: overhanging buttresses, with sand chutes, 1-2 m wide every 10- 15 m.

Quantitative horizontal photo transect, 60-55 m, 9:54- 10:11 (30 photos); along upper brow, some sand chutes; *Lobophora*, dense *Agaricia*.

Vertical photo transect, 55- 37, 10:12- 10:53; upper buttresses and deep fringing reef..

56 m: first *M. cavernosa*.

45 m: *Helioseris cucullata*.

40 m, upper mesophotic zone: top of buttresses forming fringing reef (oriented E-W) along top of wall, with sand chutes, north side of fringing reef is flat sand, 45 m; shallow water gorgonians- *Eunicea*, dense *Muricea* on top, *Ellisella barbadensis*, *Erythropodium*; coral- *Orbicella faveolata* at 37 m uncommon, low diversity of corals, mostly *Agaricia*; sponges- *Callyspongia vaginalis*, *Callyspongia plicifera*.

Fish video transect, 45- 40 m, 10:58- 11:29, along fore reef slope; very few fish.

Dive Site: Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA, Station C-23; ROV 17-17; 26-V-17-1

Maximum Depth Occurrences:

CCA, crustose coralline algae- 115 m

Halimeda- 75 m

Swiftia exserta- 65 m

Agaricia- 64 m

Montastraea cavernosa- 56 m

Orbicella faveolata- 37 m

Number of Samples- 4

Disease and Human Impacts:

None

Dive Site: Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA, Station C-23; ROV 17-17; 26-V-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-17. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Southwest Coast ROV 17-17 C-23 Notes	Samples
Algae		
Chlorophyta		
<i>Halimeda copiosa</i>	X	
<i>Halimeda</i> sp.	X	
Ochrophyta		
<i>Lobophora</i> sp.	X	
Phaeophyceae	X	
<i>Styopodium zonale</i>	X	
Rhodophyta		
Crustose coralline (CCA)	X	
<i>Peyssonnelia</i> sp.	X	
Porifera		3
Demospongiae		3
<i>Agelas citrina</i>	X	
<i>Agelas dilatata</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Aiolochoira crassa</i>	X	
<i>Aiolochoira crassa</i> var. purple-blue	X	
<i>Aiolochoira</i> sp.		1
<i>Aplysina archeri</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina fistularis</i>	X	
<i>Aplysina sciophila</i>	X	
<i>Aplysina</i> sp. Cu-04	X	
<i>Ceratoporella nicholsoni</i>	X	
<i>Cliona delitrix</i>	X	
<i>Cribrochalina</i> sp.		1
<i>Cribrochalina vasculum</i>	X	
Demospongiae sp. Cu-11	X	
Demospongiae sp. Cu-14	X	
Demospongiae unid. sp.	X	
<i>Geodia cf. criбата</i>	X	

Dive Site: Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA, Station C-23; ROV 17-17; 26-V-17-1

<i>Mycale laxissima</i>	X	
<i>Niphates arenata</i>	X	
<i>Niphates digitalis</i>	X	
Petrosiidae Cu-06	X	
Petrosiidae Cu-15	X	
<i>Polymastia</i> sp. Cu-01	X	
<i>Polymastia</i> sp. Cu-04	X	
<i>Smenospongia</i> sp.	X	1
<i>Spirastrella coccinea</i>	X	
<i>Spirastrella hartmani</i>	X	
<i>Svenzea zeai</i>	X	
Tetractinellida Cu-06	X	
Verongiida Cu-01	X	
Verongiida Cu-04	X	
Verongiida Cu-05	X	
Verongiida Cu-08	X	
<i>Verongula rigida</i>	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		1
Hydrozoa		
Hydroidolina	X	
Anthozoa- non coral		
Actiniaria	X	
Alcyonacea - gorgonian		
<i>Ellisella</i> sp.	X	
<i>Eunicea</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Muricea</i> sp.	X	
<i>Nicella</i> sp.	X	
<i>Plexaurella</i> sp.	X	
Plexauridae	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		1
Antipathidae	X	
<i>Stichopathes lutkeni</i>		1
<i>Stichopathes</i> sp.	X	
Scleractinia		

Dive Site: Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA, Station C-23; ROV 17-17; 26-V-17-1

<i>Agaricia</i> sp.	X
<i>Colpophyllia natans</i>	X
<i>Helioseris cucullata</i>	X
<i>Isophyllia sinuosa</i>	X
<i>Meandrina meandrites</i>	X
<i>Montastraea cavernosa</i>	X
<i>Mycetophyllia</i> sp.	X
<i>Orbicella annularis</i>	X
<i>Orbicella faveolata</i>	X
<i>Porites divaricata</i>	X
<i>Siderastrea siderea</i>	X
<i>Stephanocoenia intersepta</i>	X

Dive Site: Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA, Station C-23; ROV 17-17; 26-V-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-17. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Southwest Coast ROV 17-17 C-23 Notes
Commercially Important Species	31
Actinopterygii	30
Perciformes	30
<i>Lutjanus apodus</i> - Schoolmaster	1
<i>Lutjanus jocu</i> - Dog Snapper	1
<i>Lutjanus mahogoni</i> - Mahogany Snapper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	27
Elasmobranchii	1
Myliobatiformes	1
<i>Dasyatis americana</i> - Southern Stingray	1
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus</i> sp. - Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis enchrysurus</i> - Yellowtail Reeffish	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Chromis multilineata</i> - Brown chromis	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon flavolineatum</i> - French Grunt	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X

Dive Site: Cuba, S coast, SE Isla de la Juventud, Punta Brava MPA, Station C-23; ROV 17-17; 26-V-17-1

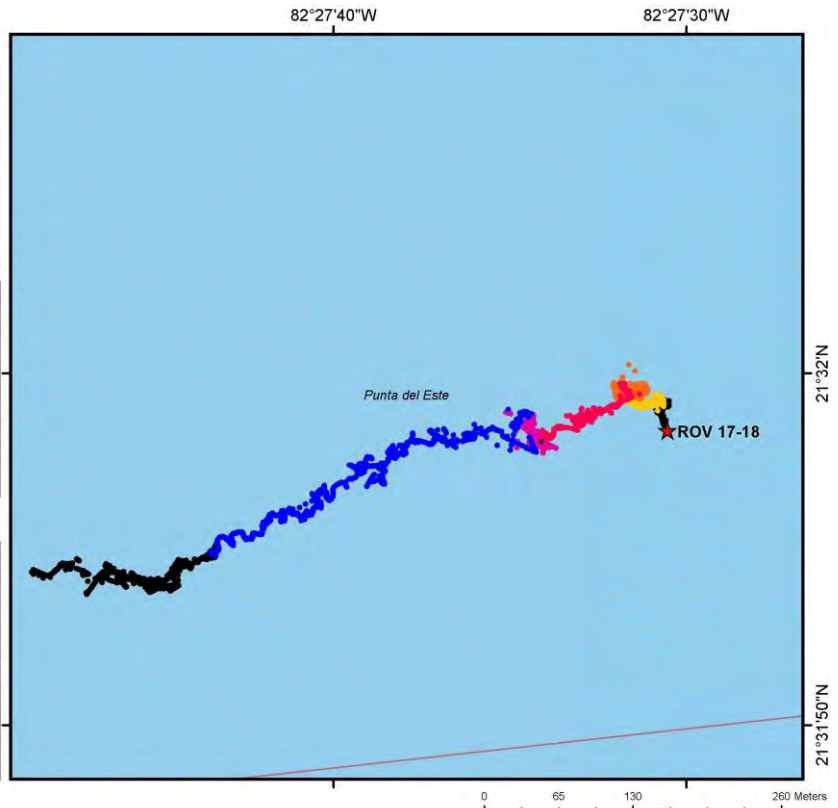
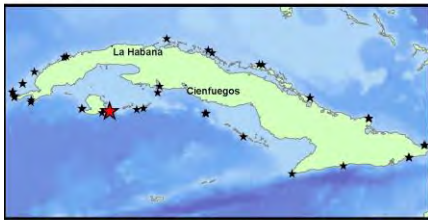
<i>Hypoplectrus unicolor</i> - Butter Hamlet	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X

Dive Site: Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA, Station C-24; ROV 17-18; 26-V-17-3

General Location and Dive Track:

Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA, Station C-24; ROV 17-18; 26-V-17-3

- ★ ROV 17-18
- ★ Mohawk ROV
- Transect_Name
- 201705263 - Transect 01
- 201705263 - Transect 02
- 201705263 - Transect 03
- 201705263 - Transect 04
- 201705263 - Transect 05
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/26/2017

Specimens: 5

Digital Photos: 755

No. DVD: 3

Hard Drive No.: 1

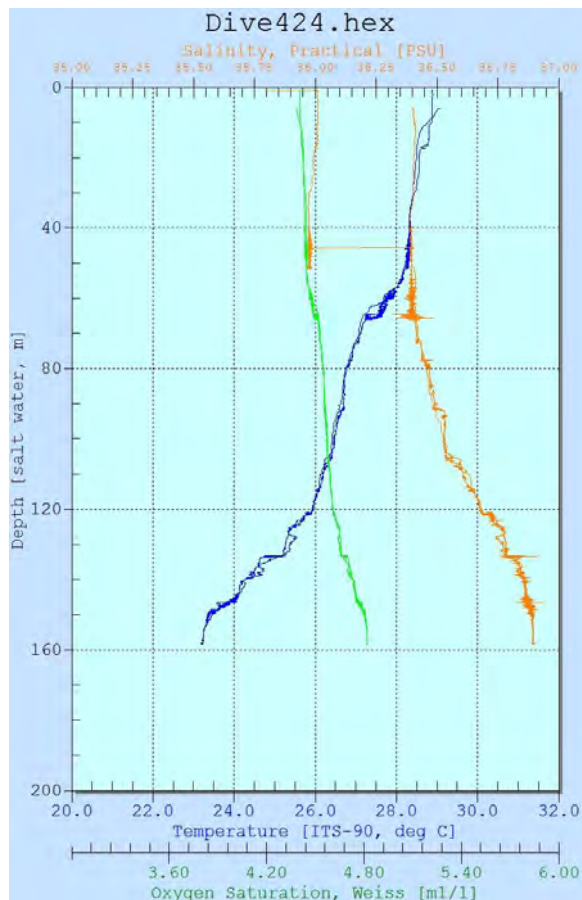
Dive Site: Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA, Station C-24; ROV 17-18; 26-V-17-3

Dive Data:

Minimum Bottom Depth (m): 40	Total Transect Length (km): 1.081
Maximum Bottom Depth (m): 150	Surface Current (kn): 0.1
On Bottom (Time- GMT): 15:03	On Bottom (Lat/Long): 21.5329°N; -82.4585°W
Off Bottom (Time- GMT): 17:40	Off Bottom (Lat/Long): 21.5316°N; -82.4635°W
Physical (bottom); Temp (°C): 23.6	Salinity: 36.88 Visibility 50 Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-18 are as follows: Depth Maximum: 158.4 m, Temperature: 23.2-29 °C, Salinity: 36-36.9 PSU, and Oxygen Saturation: 4.4-4.8 ml/l.

Dive Site: Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA, Station C-24; ROV 17-18; 26-V-17-3

Dive Imagery:

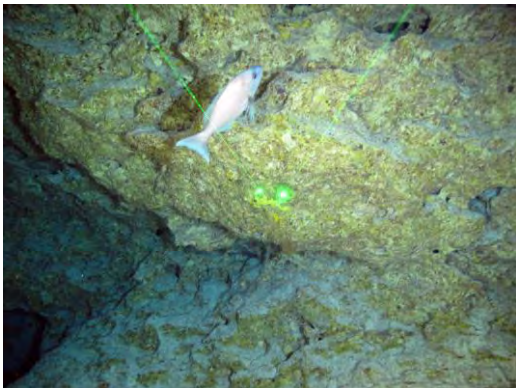


Figure 1: 21°31.9844'N;82°27.5143'W: -152.8 m
Silk Snapper- *Lutjanus vivanus* on wall of deep island slope



Figure 2: 21°31.9919'N;82°27.5294'W: -73 m
Plate coral- *Agaricia grahamae*; spherical sponge- *Geodia* sp., purple tube- *Aplysina archeri*, plate- *Agelas dilatata*, and encrusting sponges



Figure 3: 21°31.9693'N;82°27.5719'W: -60.2 m
Large *Agaricia lamarcki* coral (10 cm lasers)



Figure 4: 21°31.9625'N;82°27.6396'W: -44.9 m
Large grouper on crest of deep fringing reef



Figure 5: 21°31.9106'N;82°27.7325'W: -48.6 m
Yellowtail Snapper- *Ocyurus chrysurus* on deep fore reef slope



Figure 6: 21°31.9085'N;82°27.792'W: -48.3 m
Finger coral- *Madracis auretenra*, and rope sponges- *Agelas cf. sceptrum*

Dive Site: Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA, Station C-24; ROV 17-18; 26-V-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 26-V-17-3; ROV 17-18, UNCW Dive 424; Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA, Station C-24.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 150- 40 m.

Transect up slope heading 350°, 1.6 nmi to fringing reef breakers.

14:52- Launch. Wind- 11 kn from 097°, current- 0.2 kn to 290°, seas- 1 m swell from SE; water temperature- 29.41 °C, salinity- 36.35.

15:05- On bottom; 150 m, visibility- 50 m

17:41- End dive.

150 m, deep island slope zone: 90° rock pavement, scalloped surface, horizontal layering, with ledges. Biota- low density, yellow encrusting Verongiida sponges, *Stichopathes*, *Nicella* fans.

144 m: eroded, rugged rock wall, deep sand chutes, ledges, caves. First CCA.

Vertical photo transect, 144- 105 m, 15:09- 15:22; deep island slope zone.

140 m: lionfish

135 m: sclerosponges, *Stichopathes*, *Ellisella* whip coral.

120 m: rugged rock wall, dense CCA.

115 m: 80° rock pavement wall; sponges more common, *Oceanapia*.

105 m, base of lower mesophotic zone: 80° rock pavement, scalloped surface; sponges common- *Aplysina* rope sponges, dense CCA, sclerosponges.

Vertical photo transect, 105- 65 m, 15:22- 15:39; lower mesophotic zone.

100 m: vertical wall; large sponges common, *Agelas sceptrum*, *Geodia*.

93 m: 1 m tall *Antipatharia* fans

84 m: ledges, dense sponges; rope sponge zone.

78 m: bottom of overhanging buttresses; first *M. cavernosa* (10 cm).

77 m: first *Agaricia*, *Peyssonnelia*; dense sponges.

69 m: large plate *Agaricia*, 50-100 cm.

Quantitative horizontal photo transect, 65-60 m, 15:39- 15:52 (30 photos); across buttresses, no sand chutes; abundant *Agaricia* to 1 m.

60 m: upper brow of buttresses, 60° slope, no sand chutes; first *Lobophora*.

Vertical photo transect, 60- 40 m, 15:54- 16:07; upper brow of buttresses.

45 m, upper mesophotic zone: upper brow, 45° slope, first *Orbicella faveolata*; low density of biota.

40 m: top of buttresses, forming fringing reef. Top and fore reef slope, mostly old dead plate coral, relatively barren. No large sand chutes, only few shallow chutes. Landward of is flat sediment, rubble, 46 m depth.

Fish video transect, 40- 46 m, 16:07- 16:46, along reef crest and fore reef.

Dive Site: Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA, Station C-24; ROV 17-18; 26-V-17-3

Maximum Depth Occurrences:

CCA, crustose coralline algae- 144 m

Lionfish- 140 m

Montastraea cavernosa- 78 m

Agaricia- 77 m

Peyssonnelia- 77 m

Orbicella faveolata- 45 m

Number of Samples- 5

Disease and Human Impacts:

None

Dive Site: Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA, Station C-24; ROV 17-18; 26-V-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-18. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

		Southwest Coast ROV 17-18 C-24	
Phylum/Class/Scientific Name	Notes		Samples
Algae			1
Chlorophyta			
Chlorophyta	X		
<i>Halimeda copiosa</i>	X		
<i>Halimeda discoidea</i>	X		
<i>Halimeda goreau</i>	X		
<i>Halimeda</i> sp.	X		
<i>Halimeda tuna</i>	X		
Ochrophyta			
<i>Dictyota</i> sp.	X		
<i>Lobophora</i> sp.	X		
<i>Sargassum hystrix</i>	X		
Rhodophyta			1
Crustose coralline (CCA)	X		
<i>Jania</i> sp.			1
<i>Peyssonnelia</i> sp.	X		
Rose Petal CCA	X		
Porifera			3
Demospongiae			3
<i>Agelas cerebrum</i>	X		
<i>Agelas citrina</i>	X		
<i>Agelas dilatata</i>	X		
<i>Agelas sceptrum</i>	X		
<i>Aiolochoira crassa</i>	X		
<i>Amphimedon compressa</i>	X		
<i>Amphimedon</i> sp.			1
<i>Aplysina archeri</i>	X		
<i>Aplysina bathyphila</i>	X		
<i>Aplysina fistularis</i>	X		
<i>Ceratoporella nicholsoni</i>	X		
Corallistes sp.	X		
<i>Cribrochalina vasculum</i>	X		
Demospongiae sp. Cu-07	X		

Dive Site: Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA, Station C-24; ROV 17-18; 26-V-17-3

Demospongiae sp. Cu-11	X	
Demospongiae sp. Cu-14	X	
Demospongiae sp. Cu-22	X	
Demospongiae unid. sp.	X	
<i>Erylus cf. formosus</i>	X	
<i>Geodia cf. criбата</i>	X	
<i>Geodia neptuni</i>	X	
<i>Mycale laxissima</i>	X	
<i>Niphates digitalis</i>	X	
<i>Oceanapia</i> sp. Cu-02	X	
Petrosiidae Cu-12	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Smenospongia aurea</i>	X	
<i>Smenospongia echina</i>	X	
<i>Spirastrella coccinea</i>	X	
<i>Spirastrella hartmani</i>	X	
Spirastrellidae unid. sp.	X	
<i>Svenzea zeai</i>	X	
Verongiida Cu-01	X	
Verongiida Cu-05	X	
<i>Verongula gigantea</i>	X	
<i>Verongula reiswigi</i>	X	
<i>Verongula rigida</i>	X	
<i>Xestospongia muta</i>	X	1
<i>Xestospongia purpurea</i>	X	
Xestospongia sp.		1
Xestospongia sp. Cu-01	X	
Homoscleromorpha		
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		1
Hydrozoa		
Hydroidolina	X	
Stylasteridae	X	
Anthozoa- non coral		
Actiniaria	X	
Alcyonacea - gorgonian		
<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Nicella</i> sp.	X	
Plexauridae	X	
Antipatharia		

Dive Site: Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA, Station C-24; ROV 17-18; 26-V-17-3

<i>Antipathidae</i>	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		1
<i>Agaricia lamarcki</i>		1
<i>Agaricia</i> sp.	X	
<i>Colpophyllia natans</i>	X	
<i>Helioseris cucullata</i>	X	
<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Mycetophyllia</i> sp.	X	
<i>Orbicella faveolata</i>	X	
<i>Porites astreoides</i>	X	
<i>Scolymia cubensis</i>	X	
<i>Siderastrea siderea</i>	X	
<i>Stephanocoenia intersepta</i>	X	

Dive Site: Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA, Station C-24; ROV 17-18; 26-V-17-3

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-18. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Southwest Coast ROV 17-18 C-24 Notes
Commercially Important Species	61
Actinopterygii	61
Perciformes	58
<i>Cephalopholis cruentata</i> - Graysby	1
<i>Epinephelus guttatus</i> - Red Hind	2
<i>Epinephelus morio</i> - Red Grouper	2
<i>Lutjanus apodus</i> - Schoolmaster	2
<i>Lutjanus buccanella</i> - Blackfin Snapper	1
<i>Lutjanus mahogoni</i> - Mahogany Snapper	2
<i>Lutjanus vivanus</i> - Silk Snapper	1
<i>Mycteroperca bonaci</i> - Black Grouper	1
<i>Mycteroperca tigris</i> - tiger grouper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	45
Scorpaeniformes	3
<i>Pterois volitans</i> - Lionfish	3
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
<i>Holocentrus</i> sp. - Squirrelfish	X
Perciformes	
<i>Acanthurus chirurgus</i> - Doctorfish	X
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Coryphopterus personatus</i> - Masked/Glass Goby	X
Gobiidae - Goby	X
<i>Gobiosoma</i> sp. - Goby	X
<i>Gramma melacara</i> - Blackcap Basslet	X

Dive Site: Cuba, S coast, E of Isla de la Juventud, Archipiélago de Los Canarreos, Cayo Matías MPA, Station C-24; ROV 17-18; 26-V-17-3

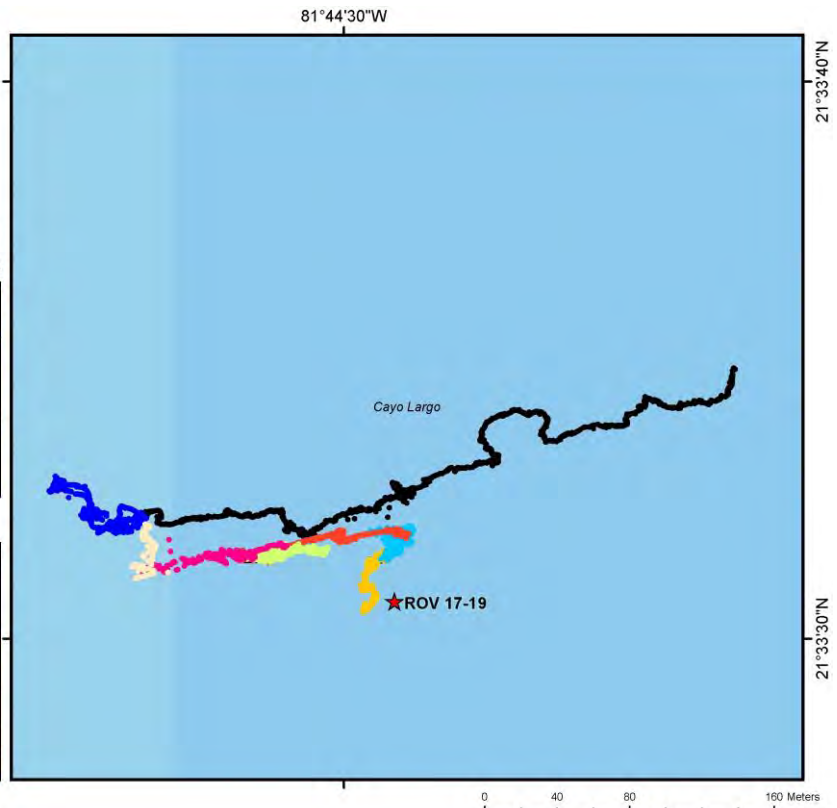
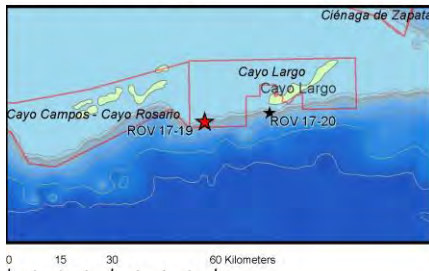
<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon sciurus</i> - Bluestriped Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus indigo</i> - Indigo hamlet	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
<i>Lachnolaimus maximus</i> - Hogfish	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Prognathodes guyanensis</i> - French butterflyfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
Balistidae - Triggerfish	X
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28; ROV 17-19; 27-V-17-1

General Location and Dive Track:

Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28; ROV 17-19; 27-V-17-1

- ★ ROV 17-19
- ★ Mohawk ROV
- ★ ADCP
- ★ CTD
- ★ Snorkel
- Transect_Name
- 201705271 - Transect 01
- 201705271 - Transect 02
- 201705271 - Transect 03
- 201705271 - Transect 04
- 201705271 - Transect 05
- 201705271 - Transect 06
- 201705271 - Transect 07
- ROV Track
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/27/2017

Specimens: 3

Digital Photos: 852

No. DVD: 3

Hard Drive No.: 1

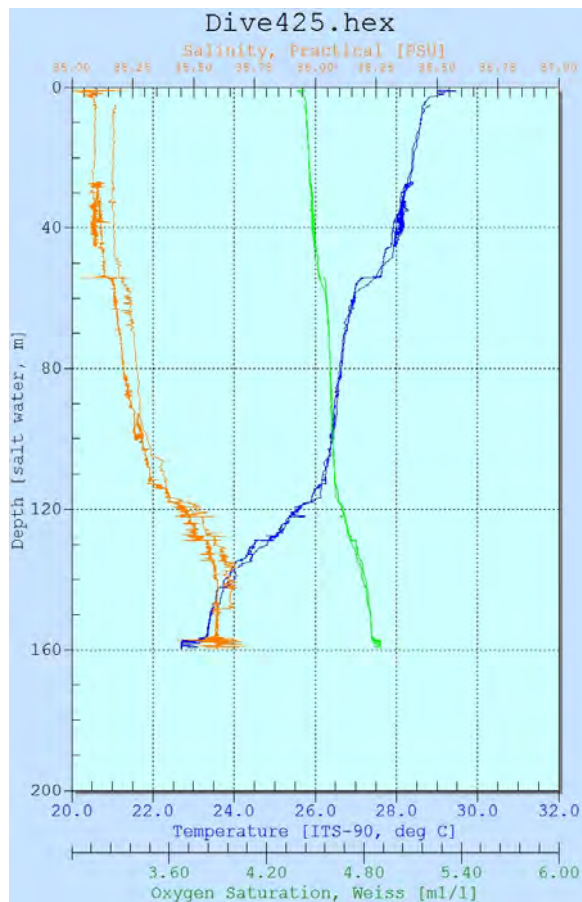
Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28; ROV 17-19; 27-V-17-1

Dive Data:

Minimum Bottom Depth (m): 29	Total Transect Length (km): 1.102
Maximum Bottom Depth (m): 150	Surface Current (kn): 0.1
On Bottom (Time- GMT): 8:46	On Bottom (Lat/Long): 21.5585°N; -81.7414°W
Off Bottom (Time- GMT): 11:44	Off Bottom (Lat/Long): 21.5596°N; -81.7397°W
Physical (bottom); Temp (°C): 23.5	Salinity: 35.6 Visibility 50 Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-19 are as follows: Depth Maximum: 159.7 m, Temperature: 22.7-29.2 °C, Salinity: 35.1-35.7 PSU, and Oxygen Saturation: 4.4-4.9 ml/l.

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28; ROV 17-19; 27-V-17-1

Dive Imagery:



Figure 1: 21°33.5254'N;81°44.4845'W: -115.4 m
Hydroid- *Dentitheca dendritica*, closeup

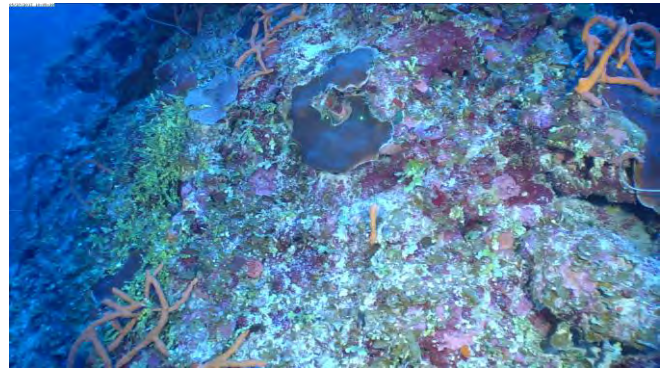


Figure 2: 21°33.5257'N;81°44.5321'W: -61.2 m
Steep upper buttress with *Agaricia* sp., *Halimeda* sp., rope sponges- *Agelas* sp., and coralline algae



Figure 3: 21°33.5357'N;81°44.5607'W: -35 m
Red Grouper- *Epinephelus morio* on deep fringing reef



Figure 4: 21°33.5342'N;81°44.5681'W: -34.4 m
Tiger Grouper- *Mycteroperca tigris*

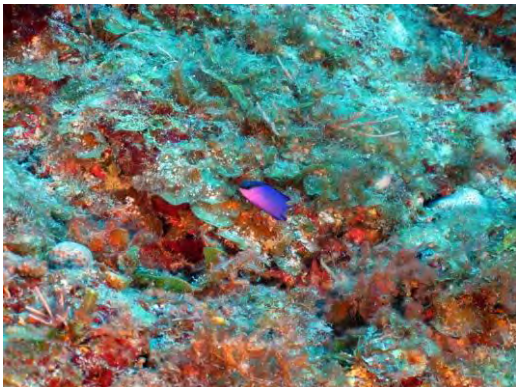


Figure 5: 21°33.5387'N;81°44.495'W: -45.9 m
Blackcap Basslet- *Grama melacara*



Figure 6: 21°33.5718'N;81°44.4088'W: -38.2 m
Plates of *Orbicella faveolata*, and rope sponge- *Agelas* cf. *cervicornis*, with Lionfish- *Pterois volitans/miles*

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28; ROV 17-19; 27-V-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 27-V-17-1; ROV 17-19, UNCW Dive 425; Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 150- 29 m.

Transect up slope heading 317°.

08:30- Launch. Wind- 4 kn from 070°, current- 0.1 kn to 344°, seas- 0.75 m swell from SE water temperature- 29.09 °C, salinity- 36.35.

08:46- On bottom; 150 m, visibility- 50 m, current- ?

11:45- End dive.

150 m, deep island slope zone: 70-80° rock pavement, scalloped surface, sediment veneer and old dead *Agaricia* plates on flat surfaces, sand chutes. Biota: sponges- thin yellow encrusting Verongiida, *Aplysina* rope sponges; first CCA and Chlorophyta; black coral- *Stichopathes*; Gorgonacea- *Nicella goreau* (140 m); crinoid- *Davidaster*.

Vertical photo transect upslope, 150- 127 m; 8:46- 8:57; deep island slope zone.

130 m: more sponge diversity.

125 m, lower mesophotic zone: start vertical rock wall, dense sponges, CCA dense, sclerosponges.

Vertical photo transect upslope, 125- 100 m, 8:59- 9:23; lower mesophotic zone.

115 m: Eroded wall, karst-like morphology, ledges, sand chutes; *Acanthogorgia*; *Antipatharia*, *Xestospongia*, *Tanacetipathes*, *Nicella* fans.

104 m: first plate coral, *Stephanocoenia intersepta*? (15 cm); first *Agaricia* (10 cm).

100 m: dense small *Agaricia*, *Stephanocoenia*; first *Dictyota*.

Quantitative horizontal photo transect, 100 m, 09:23- 09:38 (30 photos); across wall face, dense cover of sponges.

Vertical photo transect upslope, 100- 60 m, 9:38- 10:00; continue lower mesophotic zone.

96 m: ledges, caves.

89 m: first *Halimeda*.

84 m: lower zone of overhanging buttresses. Buttresses intersected with sand chutes from 84 to 35 m.

80 m: first *Peyssonnelia*, wide ledges.

72 m: large *Agaricia* plates 1m diameter; dense *Agaricia* zone.

66 m: vertical rock buttresses.

Quantitative horizontal photo transect, 60- 58 m, 10:00- 10:17 (30 photos), upper buttresses, 45° slope.

62 m: first *M. cavernosa* (10 cm), first *Lobophora*.

Vertical photo transect upslope, 60- 35 m, 10:17- 10:25; upper mesophotic zone, upper brow of buttresses.

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28; ROV 17-19; 27-V-17-1

58 m, upper mesophotic zone: upper buttresses, 45° slope.

50 m: first *Orbicella faveolata*; *Pseudopterogorgia*.

35- 27 m: fringing reef along top of wall, intersected with sand chutes. Biota: corals- *O. faveolata*, *M. cavernosa*, *Porites porites*, *Mycetophyllia*, *Meandrina meandrites*, *Helioseris cucullata*, sheets of dead coral (*Orbicella*?) on fore slope; *Eunicea* gorgonians, lionfish.

Fish video transect, 35 m, 10:25- 10:55; upper mesophotic zone, deep fringing reef; good fish density, red grouper (*Epinephelus morio*).

Maximum Depth Occurrences:

CCA, crustose coralline algae, thin encrusting Chlorophyta- 150 m

Nicella goreau- 140 m

Stephanocoenia intersepta- 104 m (depth record)

Agaricia- 104 m

Halimeda- 89 m

Montastraea cavernosa- 62 m

Lobophora- 62 m

Orbicella faveolata- 50 m

Lionfish- 35 m

Number of Samples- 3

Disease and Human Impacts:

None

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28; ROV 17-19; 27-V-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-19. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Southwest Coast ROV 17-19 C-28 Notes	Samples
Algae		1
Chlorophyta		
Chlorophyta	X	
<i>Halimeda copiosa</i>	X	
<i>Halimeda discoidea</i>	X	
<i>Halimeda tuna</i>	X	
Ochrophyta		
<i>Dictyota</i> sp.	X	
<i>Lobophora</i> sp.	X	
<i>Sargassum hystrix</i>	X	
<i>Sargassum</i> sp.	X	
<i>Stypopodium zonale</i>	X	
Rhodophyta		1
Crustose coralline (CCA)	X	
<i>Peyssonnelia</i> sp.	X	
Rhodophyta	X	
Rose Petal CCA	X	
<i>Wrangelia</i> sp.		1
Porifera		1
Demospongiae		
<i>Agelas cerebrum</i>	X	
<i>Agelas citrina</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas dilatata</i>	X	
<i>Agelas dispar</i>	X	
<i>Agelas flabelliformis</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas wiedenmayeri</i>	X	
<i>Aiolochoia crassa</i>	X	
<i>Aiolochoia crassa</i> var. purple-blue	X	
<i>Aiolochoia</i> sp. Cu-01	X	
<i>Amphimedon compressa</i>	X	
<i>Aplysina archeri</i>	X	

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28; ROV 17-19; 27-V-17-1

<i>Aplysina bathyphila</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina fistularis</i>	X	
<i>Aplysina</i> sp. Cu-03	X	
<i>Aplysina</i> sp. Cu-04	X	
<i>Callyspongia</i> cf. <i>fallax</i>	X	
<i>Callyspongia plicifera</i>	X	
<i>Callyspongia</i> sp. Cu-02	X	
<i>Ceratoporella nicholsoni</i>	X	
<i>Ciocalypta</i> cf. <i>porrecta</i>	X	
<i>Cliona caribbaea</i>	X	
<i>Cliona delitrix</i>	X	
<i>Corallistes</i> sp.	X	
<i>Cribrochalina vasculum</i>	X	
Demospongiae sp. Cu-11	X	
Demospongiae sp. Cu-14	X	
Demospongiae sp. Cu-17	X	
Demospongiae sp. Cu-21	X	
Demospongiae sp. Cu-22	X	
Demospongiae unid. sp.	X	1
<i>Dragnacidon alvarezae</i>	X	
<i>Geodia</i> cf. <i>cribata</i>	X	
<i>Geodia neptuni</i>	X	
<i>Geodia</i> sp. Cu-03	X	
<i>Ircinia strobilina</i>	X	
<i>Mycale laevis</i>	X	
<i>Mycale laxissima</i>	X	
<i>Niphates alba</i>	X	
<i>Niphates arenata</i>	X	
<i>Oceanapia</i> sp. Cu-01	X	
<i>Oceanapia</i> sp. Cu-02	X	
<i>Petrosia weinbergi</i>	X	
Petrosiidae Cu-06	X	
Petrosiidae Cu-12	X	
Petrosiidae Cu-16	X	
Petrosiidae unid. sp.	X	
<i>Ptilocaulis walpersi</i>	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Smenospongia aurea</i>	X	
<i>Smenospongia echina</i>	X	
<i>Spirastrella coccinea</i>	X	
<i>Spirastrella hartmani</i>	X	

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28; ROV 17-19; 27-V-17-1

Spirastrellidae unid. sp.	X	
<i>Svenzea zeai</i>	X	
<i>Terpios belindae</i>	X	
Tetractinellida Cu-01	X	
Verongiida Cu-01	X	
Verongiida Cu-05	X	
<i>Verongula gigantea</i>	X	
<i>Verongula reiswigi</i>	X	
<i>Verongula rigida</i>	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
<i>Oscarella</i> sp. Cu-01	X	
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		1
Hydrozoa		
Hydroidolina	X	
Stylasteridae	X	
Anthozoa- non coral		
<i>Condylactis gigantea</i>	X	
Alcyonacea - gorgonian		
<i>Ellisella elongata</i>	X	
<i>Ellisella</i> sp.	X	
<i>Eunicea</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Nicella</i> sp.	X	
Plexauridae	X	
Primnoidae	X	
<i>Pseudopterogorgia</i> sp.	X	
Antipatharia		1
Antipathidae	X	
<i>Stichopathes</i> sp.	X	1
<i>Tanacetipathes</i> sp.	X	
Scleractinia		
<i>Agaricia</i> sp.	X	
<i>Colpophyllia natans</i>	X	
<i>Helioseris cucullata</i>	X	
<i>Madracis decactis</i>	X	
<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Orbicella faveolata</i>	X	

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28; ROV 17-19; 27-V-17-1

<i>Porites astreoides</i>	X
<i>Porites porites</i>	X
Scleractinia- unid cup	X
<i>Scolymia cubensis</i>	X
<i>Siderastrea siderea</i>	X
<i>Solenastrea bournoni</i>	X
<i>Stephanocoenia intersepta</i>	X

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28; ROV 17-19; 27-V-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-19. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Southwest Coast ROV 17-19 C-28 Notes
Commercially Important Species	52
Actinopterygii	50
Perciformes	45
<i>Epinephelus guttatus</i> - Red Hind	1
<i>Epinephelus morio</i> - Red Grouper	1
<i>Lutjanus apodus</i> - Schoolmaster	9
<i>Lutjanus buccanella</i> - Blackfin Snapper	1
<i>Lutjanus mahogoni</i> - Mahogany Snapper	5
<i>Mycteroperca tigris</i> - tiger grouper	2
<i>Mycteroperca venenosa</i> - yellowfin Grouper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	25
Scorpaeniformes	5
<i>Pterois volitans</i> - Lionfish	5
Elasmobranchii	2
Carcharhiniformes	2
<i>Carcharhinus leucas</i> - Bull Shark	2
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Aulopiformes	X
<i>Synodus</i> sp. - Lizardfish	X
Beryciformes	X
<i>Holocentrus</i> sp. - Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Anisotremus virginicus</i> - Porkfish	X
<i>Bodianus rufus</i> - Spanish Hogfish	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Rosario MPA, Station C-28; ROV 17-19; 27-V-17-1

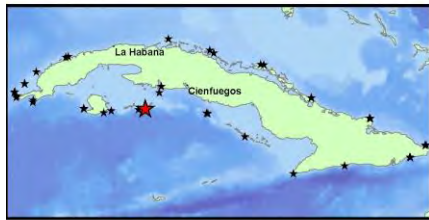
<i>Elacatinus louisae</i> - Spotlight goby	X
<i>Gobiosoma</i> sp. - Goby	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon flavolineatum</i> - French Grunt	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon sciurus</i> - Bluestriped Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus</i> sp. - Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
<i>Kyphosus</i> sp. - Chub	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lucayablennius zingaro</i> - arrow blenny	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Mulloidichthys martinicus</i> - Yellow goatfish	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Pomacentrus</i> sp. - Damsel fish	X
<i>Pronotogrammus martinicensis</i> - Roughtongue Bass	X
Scaridae - Parrotfish	X
<i>Scarus coelestinus</i> - midnight parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes leucostictus</i> - Beaugregory	X
<i>Stegastes partitus</i> - Bicolor Damsel fish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
<i>Trachinotus goodei</i> - Palometa	X
Tetraodontiformes	
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29; ROV 17-20; 27-V-17-3

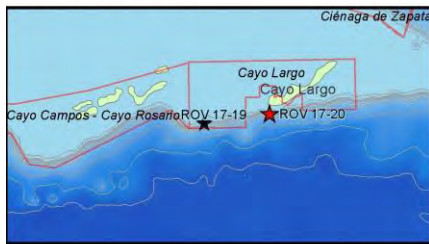
General Location and Dive Track:

Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29; ROV 17-20; 27-V-17-3

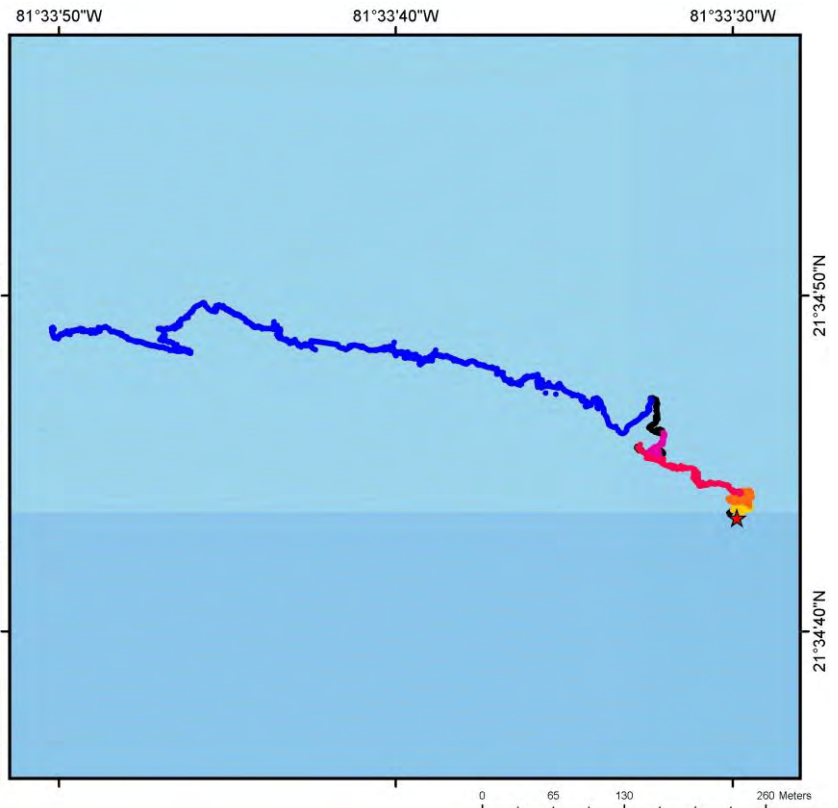
- ★ ROV 17-20
- ★ Mohawk ROV
- Transect_Name
- 201705273 - Transect 01
- 201705273 - Transect 02
- 201705273 - Transect 03
- 201705273 - Transect 04
- 201705273 - Transect 05
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



0 130 260 520 Kilometers



0 15 30 60 Kilometers



Site Overview:

Project: CUBA 2017

Principal Investigator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/27/2017

Specimens: 4

Digital Photos: 565

No. DVD: 3

Hard Drive No.: 1

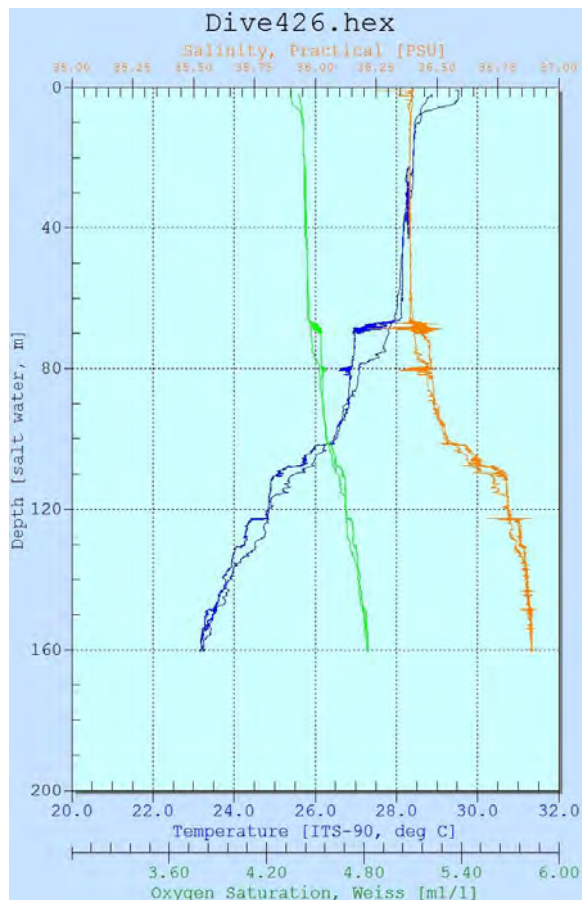
Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29; ROV 17-20; 27-V-17-3

Dive Data:

Minimum Bottom Depth (m): 26	Total Transect Length (km): 1.075
Maximum Bottom Depth (m): 157	Surface Current (kn): 0.2
On Bottom (Time- GMT): 14:50	On Bottom (Lat/Long): 21.5787°N; -81.5583°W
Off Bottom (Time- GMT): 17:15	Off Bottom (Lat/Long): 21.5802°N; -81.5639°W
Physical (bottom); Temp (°C): 23.2	Salinity: 36.89 Visibility 50 Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-20 are as follows: Depth Maximum: 160.6 m, Temperature: 23.2-29.5 °C, Salinity: 36.2-36.9 PSU, and Oxygen Saturation: 4.4-4.8 ml/l.

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29; ROV 17-20; 27-V-17-3

Dive Imagery:

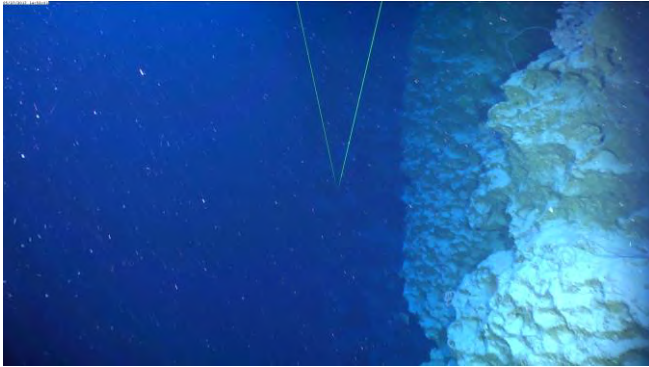


Figure 1: 21°34.7285'N;81°33.4973'W: -155.2 m
Sheer vertical wall on deep island slope (10 cm lasers)

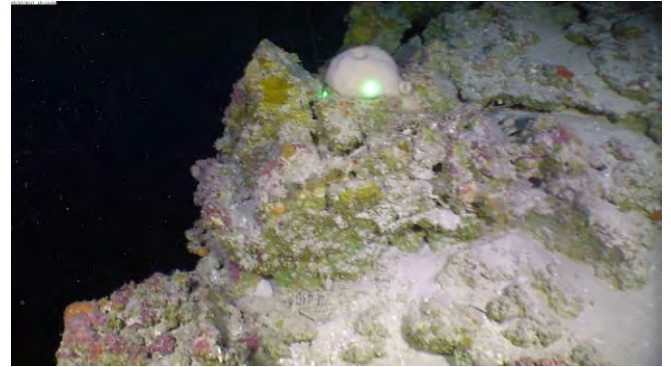


Figure 2: 21°34.736'N;81°33.4922'W: -123.9 m
Sturdy barrel sponge- *Xestospongia* sp. Cu-01, and encrusting yellow Verongida

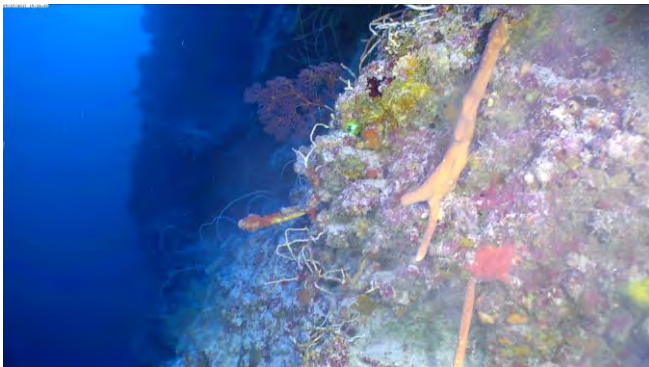


Figure 3: 21°34.7356'N;81°33.4952'W: -92.4 m
Rope sponge- *Agelas* cf. *cervicornis*, wire black coral, and octocorals on the 'Wall'



Figure 4: 21°34.7337'N;81°33.4965'W: -85.4 m
Spherical sponge- *Geodia* sp., and tube- unidentified Demospongiae



Figure 5: 21°34.8068'N;81°33.6809'W: -28.9 m
School of Creole Wrasse- *Clepticus parrae* over crest of deep fringing reef



Figure 6: 21°34.7896'N;81°33.5959'W: -37.6 m
Pseudoplexaurella sp. octocoral on crest of deep fringing reef

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29; ROV 17-20; 27-V-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 27-V-17-3; ROV 17-20, UNCW Dive 426; Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 157- 26 m.

Transect up slope heading 360°.

14:33- Launch. Wind- 8 kn from 108°, current- 0.2 kn to 272°, seas- calm, water temperature- 29.61 °C, salinity- 36.35.

14:50- On bottom; 157 m, visibility- 50 m.

17:15- End dive.

157 m, deep island slope zone: 90° rock wall, horizontal layering, 30 cm tall step-like, scalloped surface. Biota: sponges- thin encrusting yellow Verongiida sponges; Gorgonacea- *Ellisella* whip coral, 30 cm fan gorgonians.

Vertical photo transect upslope, 155- 115 m, 14:52- 15:15; deep island slope zone.

148 m: vertical wall, rugged eroded surface, sand chutes; ledges, caves. Solitary cup coral, *Nidalia* soft coral.

140 m: first CCA, thin encrusting green algae.

125 m: large sponges, *Spongisorites*, sclerosponges.

115 m, lower mesophotic zone: 80-90° wall, eroded karst-like rock. Biota: dense sponges- *Xestospongia*; black coral- 50 cm fine mesh *Antipatharia*, *Stichopathes*.

Vertical photo transect upslope, 104- 70 m. 15:15- 15:33; lower mesophotic zone.

100 m: ledges, caves; dense, diverse sponges- rope sponges, dense CCA, *Agelas clathrodes* plates.

83 m: 1 m wide ledge with cave; salinity 36.41; first *Agaricia* (10 cm); dense sponges.

75 m- first *Agaricia*

Quantitative horizontal photo transect, 70- 69 m, 15:33- 15:46 (30 photos); across face of wall, dense *Agaricia* 10 cm- 1 m diameter.

Vertical photo transect upslope, 70-34 m, 15:47- 15:55.

70-60 m: overhanging buttresses, sand chutes.

69 m: first *Halimeda*

60 m: first *M. cavernosa*; upper brow of wall, 60- 45° slope, sand chutes, lots of sediment.

50- 35 m, upper mesophotic zone: upper brow and fringing reef at top of wall, intersected by sand chutes.

Top of reef are dense areas of 1 m conical mounds, likely old dead coral, *Montastraea cavernosa***? Biota: Gorgonacea- dense plexaurids, *Pseudopterogorgia*, *Eunicea*, *Muricea* on top, *Plexaura*, *Gorgonia ventalina*; no *Swiftia*, no urchins (which is true of most all sites). Landward of fringing reef, 34 m depth, sand, with lots of Cyanobacteria mats.

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29; ROV 17-20; 27-V-17-3

34 m- first *Orbicella faveolata*.

Fish video transect, 34- 26 m, 16:01- 17:15; along fore reef and crest; stopped during collections.

** Alcolado, 2001: shows high nitrogen nutrients and dead coral due waste water from tourist resort on Cayo Largo. Sewage plant dumps secondary treated waste water. Started in 1980s, expanded in 2000. May be reason for the dead corals and cyanobacteria mats we saw with ROV. But also could be by the very strong bleaching event that occurred between August-November 2015 or result of synergistic effects of sewage plant dumps and cumulative effects of high water temperature that provoke strong bleaching event and diseases (per P. González).

Punta Frances November 2015

Cayo Largo del Sur November 2015

Maximum Depth Occurrences:

Crustose coralline algae (CCA)- 140 m

Chlorophyta, thin encrusting- 140 m

Agaricia- 83 m

Halimeda- 69 m

Montastraea cavernosa- 60 m

Orbicella faveolata- 34 m

Lionfish- ~30 m

Number of Samples- 4

Disease and Human Impacts:

Dead coral, old conical *Montastraea* heads; cyanobacteria

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29; ROV 17-20; 27-V-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-20. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Southwest Coast ROV 17-20 C-29		
Phylum/Class/Scientific Name	Notes	Samples
Algae		2
Cyanobacteria		1
Chlorophyta		1
Chlorophyta	X	
Chlorophyta- Filamentous Green	X	
<i>Halimeda copiosa</i>	X	
<i>Halimeda discoidea</i>	X	
<i>Udotea</i> sp.		1
Ochrophyta		
<i>Lobophora</i> sp.	X	
Rhodophyta		
Crustose coralline (CCA)	X	
Porifera		
Calcarea		
<i>Leucetta floridana</i>	X	
<i>Leucetta</i> sp. Cu-02	X	
Demospongiae		
<i>Agelas cerebrum</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas dilatata</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas wiedenmayeri</i>	X	
<i>Aiolochoxia crassa</i>	X	
<i>Aiolochoxia crassa</i> var. dark blue	X	
<i>Aiolochoxia crassa</i> var. gray	X	
<i>Amphimedon compressa</i>	X	
<i>Aplysina archeri</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina fistularis</i>	X	
<i>Aplysina</i> sp. Cu-04	X	
<i>Callyspongia</i> cf. <i>plicifera</i>	X	

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29; ROV 17-20; 27-V-17-3

<i>Callyspongia plicifera</i>	X
<i>Callyspongia</i> sp. Cu-05	X
<i>Ceratoporella nicholsoni</i>	X
<i>Clathria venosa</i>	X
<i>Cliona delitrix</i>	X
Demospongiae sp. Cu-06	X
Demospongiae sp. Cu-14	X
Demospongiae sp. Cu-22	X
Demospongiae unid. sp.	X
<i>Geodia cf. cribata</i>	X
<i>Ircinia felix</i>	X
<i>Ircinia</i> sp. Cu-03	X
<i>Ircinia</i> sp. Cu-04	X
<i>Mycale laevis</i>	X
<i>Mycale laxissima</i>	X
<i>Niphates arenata</i>	X
<i>Niphates digitalis</i>	X
<i>Oceanapia</i> sp. Cu-01	X
<i>Oceanapia</i> sp. Cu-02	X
<i>Petrosia weinbergi</i>	X
Petrosiidae Cu-06	X
Petrosiidae Cu-17	X
Petrosiidae unid. sp.	X
<i>Siphonodictyon coralliphagum</i>	X
<i>Spirastrella coccinea</i>	X
<i>Spirastrella hartmani</i>	X
Spirastrellidae unid. sp.	X
<i>Spongia</i> sp.	X
<i>Svenzea zeai</i>	X
Verongiida Cu-01	X
Verongiida Cu-05	X
<i>Verongula rigida</i>	X
<i>Xestospongia muta</i>	X
<i>Xestospongia</i> sp. Cu-01	X
Homoscleromorpha	
Homosclerophorida unid. sp.	X
<i>Plakortis</i> sp. Cu-01	X
Cnidaria	2
Hydrozoa	
Hydroidolina	X
Stylasteridae	X
Alcyonacea - Alcyoniina	

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29; ROV 17-20; 27-V-17-3

<i>Nidalia</i> sp.	X	
Alcyonacea - gorgonian		2
<i>Bebryce</i> sp.	X	
<i>Ellisella</i> sp.	X	
<i>Eunicea</i> sp.	X	
Gorgoniidae	X	1
<i>Nicella goreau</i>	X	
<i>Nicella</i> sp.	X	
Plexauridae	X	1
<i>Pseudopterogorgia</i> sp.	X	
Antipatharia		
Antipathidae	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		
<i>Agaricia</i> sp.	X	
<i>Colpophyllia natans</i>	X	
<i>Helioseris cucullata</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Orbicella faveolata</i>	X	
<i>Porites astreoides</i>	X	
Scleractinia- unid cup	X	
<i>Scolymia cubensis</i>	X	
<i>Stephanocoenia intersepta</i>	X	
Non-Fauna		
Disease		
Dead Coral	X	

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29; ROV 17-20; 27-V-17-3

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-20. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Southwest Coast ROV 17-20 C-29	
Phylum/Class/Order/Scientific Name - Common Name	Notes
Commercially Important Species	54
Actinopterygii	54
Perciformes	51
<i>Epinephelus guttatus</i> - Red Hind	1
<i>Lutjanus apodus</i> - Schoolmaster	2
<i>Mycteroperca phenax</i> - Scamp	1
<i>Mycteroperca tigris</i> - tiger grouper	1
<i>Mycteroperca venenosa</i> - yellowfin Grouper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	45
Scorpaeniformes	3
<i>Pterois volitans</i> - Lionfish	3
Other	
Actinopterygii	
-	X
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus</i> sp. - Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Anisotremus virginicus</i> - Porkfish	X
<i>Bodianus rufus</i> - Spanish Hogfish	X
<i>Calamus calamus</i> - Saucereye Porgy	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Grama loreto</i> - Fairy Basslet	X
<i>Grama melacara</i> - Blackcap Basslet	X
<i>Haemulon aurolineatum</i> - Tomtate	X
<i>Haemulon flavolineatum</i> - French Grunt	X

Dive Site: Cuba, S coast, Archipiélago de Los Canarreos, Cayo Largo del Sur MPA, Station C-29; ROV 17-20; 27-V-17-3

<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon sciurus</i> - Bluestriped Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus unicolor</i> - Butter Hamlet	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Mulloidichthys martinicus</i> - Yellow goatfish	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Pomacanthus paru</i> - French Angelfish	X
<i>Prognathodes aya</i> - Bank Butterflyfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X

Dive Site: Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A; ROV 17-21; 28-V-17-1

General Location and Dive Track:

Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A; ROV 17-21; 28-V-17-1

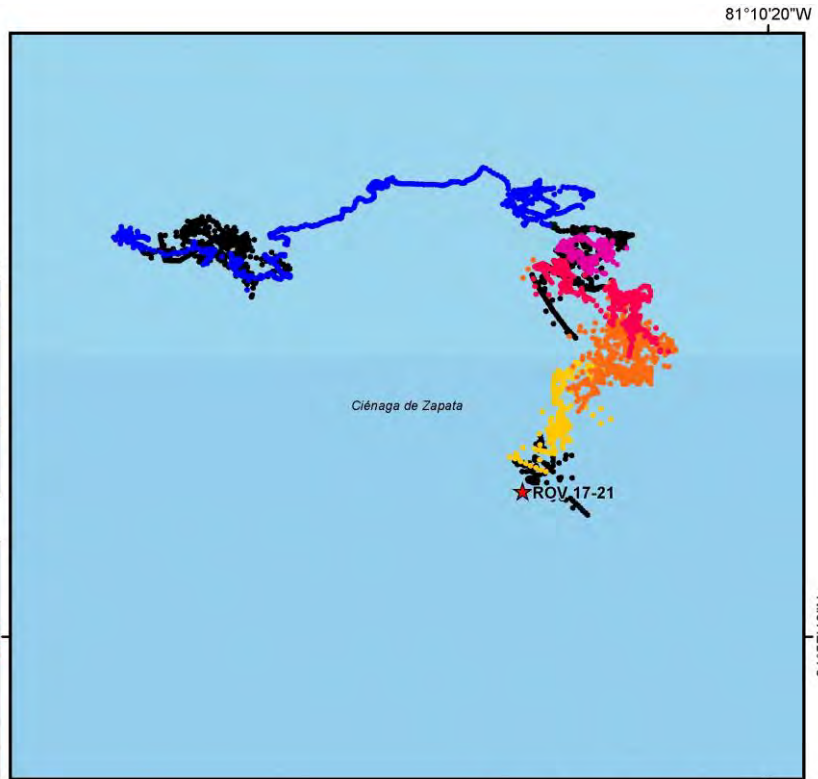
- ★ ROV 17-21
- ★ Mohawk ROV
- Transect_Name
- 201705281 - Transect 01
- 201705281 - Transect 02
- 201705281 - Transect 03
- 201705281 - Transect 04
- 201705281 - Transect 05
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



0 130 260 520 Kilometers



0 12.5 25 50 Kilometers



0 25 50 100 Meters

Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/28/2017

Specimens: 3

Digital Photos: 594

No. DVD: 3

Hard Drive No.: 1

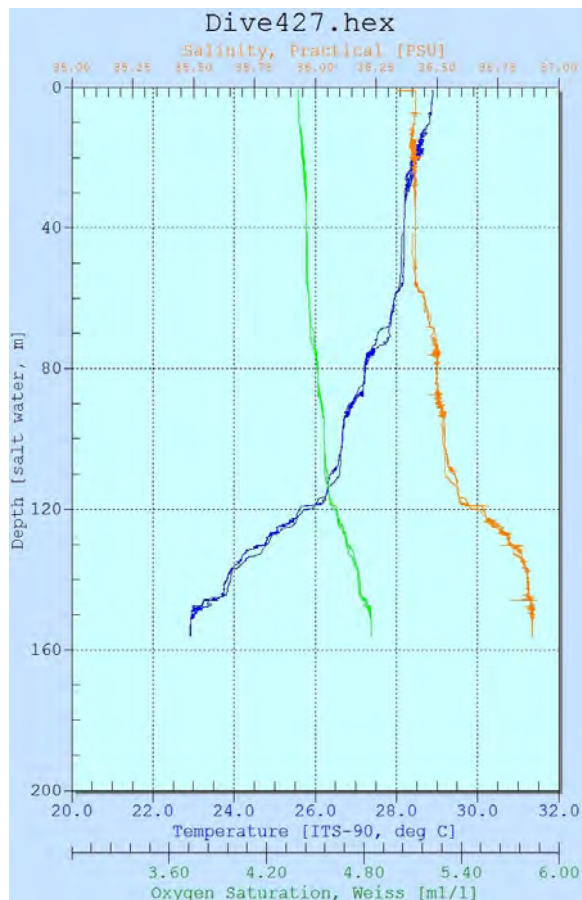
Dive Site: Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A; ROV 17-21; 28-V-17-1

Dive Data:

Minimum Bottom Depth (m): 18	Total Transect Length (km): 0.785
Maximum Bottom Depth (m): 150	Surface Current (kn): 0.1
On Bottom (Time- GMT): 8:49	On Bottom (Lat/Long): 21.9616°N; -81.173°W
Off Bottom (Time- GMT): 11:17	Off Bottom (Lat/Long): 21.9623°N; -81.174°W
Physical (bottom); Temp (°C): 23.2	Salinity: 36.89 Visibility 30 Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-21 are as follows: Depth Maximum: 156.1 m, Temperature: 22.9-28.9 °C, Salinity: 36.4-36.9 PSU, and Oxygen Saturation: 4.4-4.8 ml/l.

Dive Site: Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A; ROV 17-21; 28-V-17-1

Dive Imagery:

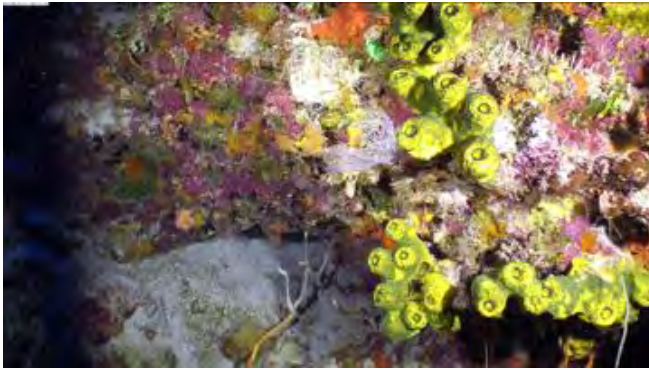


Figure 1: 21°57.7263'N;81°10.3597'W: -91.1 m
Aggregates of *Verongula rigida*, and white rope demosponges on deep wall



Figure 2: 21°57.7233'N;81°10.3641'W: -105.2 m
Tube sponge- *Aplysina cf. lacunosa*, *Villogorgia* octocoral, and encrusting coralline algae



Figure 3: 21°57.7452'N;81°10.3639'W: -27.1 m
Pseudodiploria strigosa (10 cm lasers)

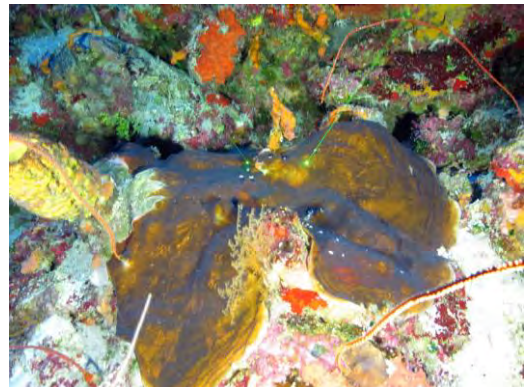


Figure 4: 21°57.7271'N;81°10.3587'W: -82.1 m
Agaricia sp. encrusted on wall



Figure 5: 21°57.7407'N;81°10.3641'W: -35.7 m
Plate corals- *Agaricia* sp., purple plate sponge- *Petrosiidae*, and rope sponge- *Aplysina* sp. on deep fore reef slope

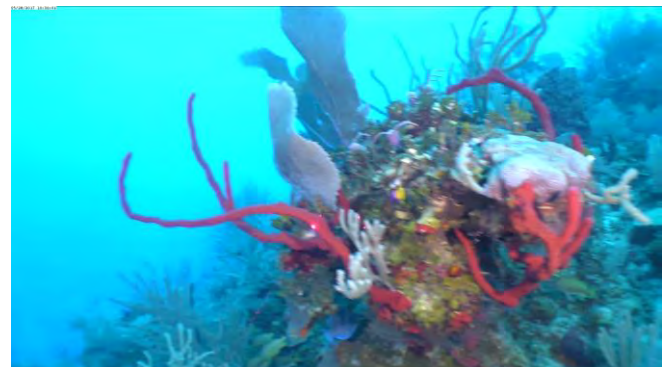


Figure 6: 21°57.7545'N;81°10.4104'W: -20.6 m
Old coral pillar with rope sponges- *Amphimedon* sp., and seafan- *Gorgonia ventalina*

Dive Site: Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A; ROV 17-21; 28-V-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 28-V-17-1; ROV 17-21, UNCW Dive 427; Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 150- 18 m.

Transect up slope heading 030°.

08:37- Launch. Wind- 16-19 kn from 118°, current- 0.1 kn to 270°, seas- 1 m from SE, water temperature- 29.14 °C, salinity- 36.36.

08:50- On bottom; 150 m, visibility- 30 m.

11:18- End dive.

150 m, deep island slope zone: 45° slope, coral rubble, 50 cm boulders, 50% cover sediment. Biota: fairly barren; algae- CCA, thin encrusting Chlorophyta; sponges- thin encrusting yellow Verongiida sponges; black coral- *Stichopathes*; Gorgonacea- *Ellisella* whips, 10 cm gorgonians, 50 cm *Nicella* fans.

Vertical photo transect upslope, 150- 130 m, 8:53- 9:01; deep island slope zone

144 m: dense CCA, dense *Nicella* fans.

130 m, lower mesophotic zone: 80° slope, eroded rock wall, ledges, caves. Biota: sponges- diverse, sclerosponges, *Cinachyrella*, *Agelas sceptrum*, *Agelas archeri*, *Xestospongia*; Gorgonacea- *Ellisella* whips; dense CCA, Chlorophyta.

Vertical photo transect upslope, 130- 70 m, 9:01- 9:34; lower mesophotic zone

115 m: sand chutes.

110 m: ledges, undercut

105 m: vertical eroded, karst-like wall, ledges, caves; dense sponges.

101 m: first *Solenastrea* (25 cm); first lionfish; ledges, caves.

99 m: first *Halimeda*.

94 m: 50 cm *Antipatharia* fans; very dense sponges.

88 m: another *Solenastrea*; first *Agaricia* (10 cm).

87 m: brow of overhanging rock buttresses.

80 m: *Agaricia* common, 30- 100 cm diameter.

Quantitative horizontal photo transect, 78- 75 m, 9:34- 9:50 (30 photos); upper brow of buttresses, dense *Agaricia* 10- > 1 m diameter.

76 m: first *Montastraea cavernosa*.

64 m: *Agaricia* with disease; 80° slope, ledges, caves, sand chutes.

60 m: upper buttresses, sand chutes.

55 m: dense *Lobophora*.

Dive Site: Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A; ROV 17-21; 28-V-17-1

47 m, upper mesophotic zone: 50 cm *Agaricia* with *Cliona delitrix* boring sponge; *Eunicea gorgonians*.

Vertical photo transect upslope, 47- 30 m, 9:59- 10:10; upper mesophotic zone.

42- 35 m: deep fringing reef, 80° fore reef slope, old dead coral shingles (*Orbicella?*), live *Orbicella faveolata*, live *Agaricia*; *Eunicea* and *Pseudopterogorgia* gorgonians.

42 m: first *Orbicella faveolata*.

18 m: shallow water reef crest, spur and groove. Biota: dense cover, fields of *Gorgonia ventalina*, *Pseudopterogorgia*, *Eunicea*, *Pseudoplexaura*; dense, diverse sponges, algae.

Fish video transect, 18- 20 m, 10:17- 10:48; reef crest, and fringing reef.

Maximum Depth Occurrences:

Crustose coralline algae (CCA)- 150 m

Chlorophyta, thin encrusting- 150 m

Stephanocoenia intersepta- 101 m

Lionfish- 101 m

Halimeda- 99 m

Agaricia- 88 m

Montastraea cavernosa- 76 m

Lobophora- 65 m

Orbicella faveolata- 42 m

Number of Samples- 3

Disease and Human Impacts:

None

Dive Site: Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A; ROV 17-21; 28-V-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-21. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Southwest Coast ROV 17-21 C-31A Notes	Samples
Algae		1
Chlorophyta		1
<i>Avrainvillea</i> sp.	X	
Chlorophyta	X	
<i>Halimeda copiosa</i>	X	
<i>Halimeda goreau</i>	X	
<i>Halimeda tuna</i>	X	1
<i>Rhipocephalus phoenix</i>	X	
<i>Udotea</i> sp.	X	
Ochrophyta		
<i>Dictyota</i> sp.	X	
<i>Lobophora variegata</i>	X	
<i>Sargassum hystrix</i>	X	
Rhodophyta		
Crustose coralline (CCA)	X	
<i>Peyssonnelia</i> sp.	X	
Rose Petal CCA	X	
Cnidaria		
Alcyonacea - gorgonian		
<i>Acanthogorgia</i> sp.	X	
<i>Ellisella</i> sp.	X	
<i>Eunicea</i> sp.	X	
<i>Gorgonia ventalina</i>	X	
Gorgoniidae	X	
<i>Nicella goreau</i>	X	
<i>Nicella</i> sp.	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		
<i>Antipathes</i> sp.	X	
Antipathidae	X	
<i>Stichopathes</i> sp.	X	
Cnidaria - Non Coral		

Dive Site: Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A; ROV 17-21; 28-V-17-1

<i>Condylactis gigantea</i>	X	
Hyroidolina	X	
Hydrozoa	X	
<i>Millepora alcornis</i>	X	
Stylasteridae	X	
Scleractinia		
<i>Acropora cervicornis</i>	X	
<i>Agaricia</i> sp.	X	
<i>Colpophyllia natans</i>	X	
<i>Diploria labyrinthiformis</i>	X	
<i>Helioseris cucullata</i>	X	
<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Mycetophyllia</i> sp.	X	
<i>Orbicella annularis</i>	X	
<i>Orbicella faveolata</i>	X	
<i>Orbicella franksi</i>	X	
<i>Porites astreoides</i>	X	
<i>Porites divaricata</i>	X	
<i>Scolymia cubensis</i>	X	
<i>Scolymia</i> sp.	X	
<i>Siderastrea siderea</i>	X	
<i>Solenastrea bournoni</i>	X	
Porifera		2
Demospongiae		2
<i>Agelas citrina</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas</i> sp. Cu-06	X	
<i>Aiolochoia crassa</i>	X	
<i>Aiolochoia crassa</i> var. purple-blue	X	
<i>Amphimedon compressa</i>	X	
<i>Amphimedon</i> sp. Cu-01	X	
<i>Amphimedon</i> sp. Cu-02	X	
<i>Aplysina archeri</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina fistularis</i>	X	1
<i>Aplysina lacunosa</i>	X	
<i>Aplysina</i> sp. Cu-04	X	
<i>Callyspongia plicifera</i>	X	
<i>Ceratoporella nicholsoni</i>	X	
<i>Clathria venosa</i>	X	
<i>Cliona delitrix</i>	X	

Dive Site: Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A; ROV 17-21; 28-V-17-1

<i>Cribrochalina vasculum</i>	X	
Demospongiae	X	
Demospongiae sp. Cu-02	X	
Demospongiae sp. Cu-11	X	
Demospongiae sp. Cu-22	X	
<i>Geodia neptuni</i>	X	
<i>Geodia</i> sp. Cu-02	X	
Heteroscleromorpha Cu-02	X	
<i>Mycale laevis</i>	X	
<i>Mycale laxissima</i>	X	
<i>Myrmekioderma</i> sp. Cu-02	X	
<i>Neopetrosia cf. dutchi</i>	X	
<i>Niphates arenata</i>	X	
<i>Niphates digitalis</i>	X	
<i>Oceanapia</i> sp. Cu-01	X	
<i>Oceanapia</i> sp. Cu-02	X	
<i>Petrosia weinbergi</i>	X	
Petrosiidae Cu-10	X	
<i>Phakellia folium</i>	X	
<i>Polymastia</i> sp. Cu-01	X	
<i>Siphonodictyon</i> sp. Cu-01	X	
<i>Smenospongia aurea</i>		1
<i>Sphaciospongia vesparium</i>	X	
<i>Spirastrella coccinea</i>	X	
<i>Spirastrella hartmani</i>	X	
Spirastrellidae	X	
<i>Svenzea zeai</i>	X	
<i>Terpios belindae</i>	X	
<i>Theonella atlantica</i>	X	
Verongiida Cu-01	X	
Verongiida Cu-05	X	
<i>Verongula reiswigi</i>	X	
<i>Verongula rigida</i>	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia purpurea</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
<i>Plakortis dariae</i>	X	
<i>Plakortis</i> sp. Cu-01	X	
Other		
Mollusca		
<i>Strombus (syn. Lobatus) gigas</i>	X	

Dive Site: Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A; ROV 17-21; 28-V-17-1

Grand Total

3

Dive Site: Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A; ROV 17-21; 28-V-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-21. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Southwest Coast ROV 17-21 C-31A Notes
Target Species	30
Actinopterygii	30
Perciformes	26
<i>Lutjanus apodus</i> - Schoolmaster	2
<i>Lutjanus buccanella</i> - Blackfin Snapper	1
<i>Lutjanus jocu</i> - Dog Snapper	1
<i>Mycteroperca bonaci</i> - Black Grouper	1
<i>Mycteroperca tigris</i> - tiger grouper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	20
Scorpaeniformes	4
<i>Pterois volitans</i> - Lionfish	4
Other Fish Species	
Actinopterygii	
Actinopterygii - Unid Fish	X
Anguilliformes	
<i>Gymnothorax</i> sp. - Moray Eel	X
Beryciformes	
<i>Holocentrus</i> sp. - Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Bodianus rufus</i> - Spanish Hogfish	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Grama loreto</i> - Fairy Basslet	X
<i>Grama melacara</i> - Blackcap Basslet	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon sciurus</i> - Bluestriped Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Kyphosus</i> sp. - Chub	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X

Dive Site: Cuba, S coast, Golfo de Cazones, Punta Brava, Sur Ciénaga de Zapata, no MPA, Station C-31A; ROV 17-21; 28-V-17-1

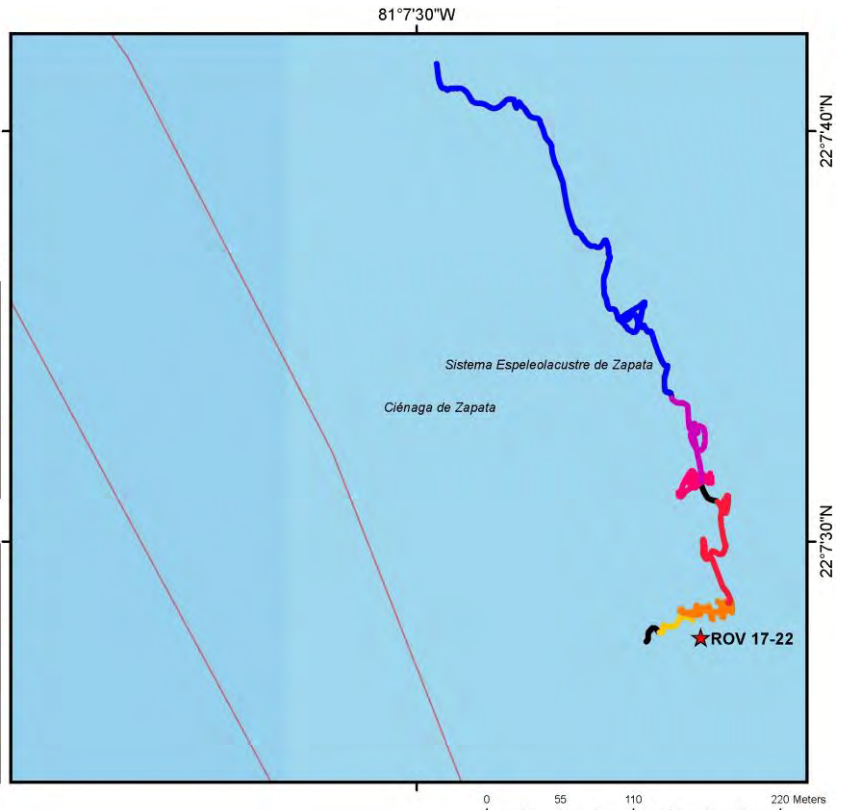
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacentrus</i> sp. - Damselfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scomberomorus regalis</i> - Cero	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X

Dive Site: Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A; ROV 17-22; 28-V-17-3

General Location and Dive Track:

Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A; ROV 17-22; 28-V-17-3

- ★ ROV 17-22
- ★ Mohawk ROV
- Transect_Name
- 201705283 - Transect 01
- 201705283 - Transect 02
- 201705283 - Transect 03
- 201705283 - Transect 04
- 201705283 - Transect 05
- 201705283 - Transect 06
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investigator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, A. W. David, L. Horn, J. White, M. Studivan, M. Jiang, S. P. González-Díaz, B. Martínez-Daranas, D. Cobián Rojas, L. Busutil López, J. L. Viamontes Fernández, C. Diaz

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/28/2017

Specimens: 1

Digital Photos: 586

No. DVD: 3

Hard Drive No.: 1

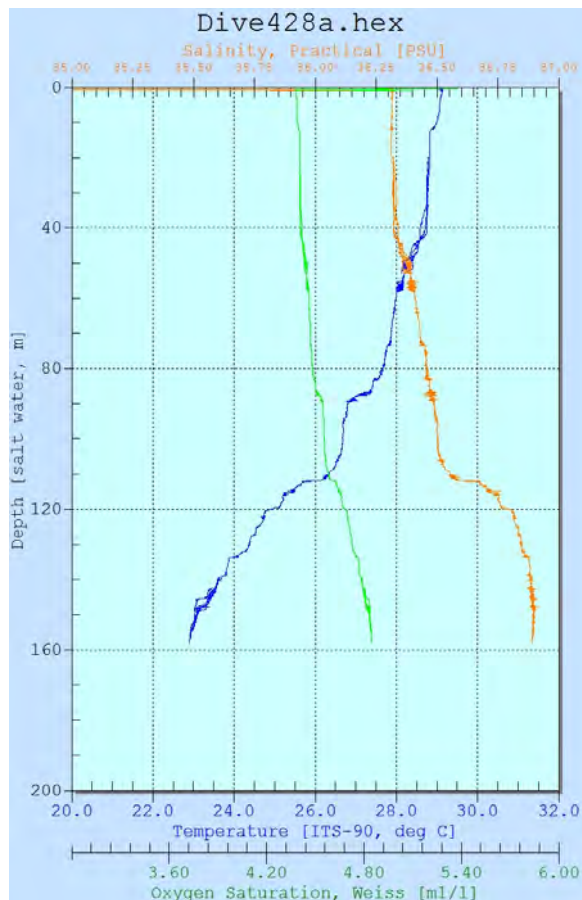
Dive Site: Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A; ROV 17-22; 28-V-17-3

Dive Data:

Minimum Bottom Depth (m): 30	Total Transect Length (km): 0.787
Maximum Bottom Depth (m): 150	Surface Current (kn): 0.3
On Bottom (Time- GMT): 15:21	On Bottom (Lat/Long): 22.1244°N; -81.1231°W
Off Bottom (Time- GMT): 17:33	Off Bottom (Lat/Long): 22.1284°N; -81.1248°W
Physical (bottom); Temp (°C): 23.6	Salinity: 36.89 Visibility 50 Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-22 are as follows: Depth Maximum: 157.9 m, Temperature: 22.9-29.2 °C, Salinity: 36.3-36.9 PSU, and Oxygen Saturation: 4.4-4.8 ml/l.

Dive Site: Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A; ROV 17-22; 28-V-17-3

Dive Imagery:



Figure 1: 22°7.4704'N;81°7.3888'W: -123.2 m
Ledge on lower 'Wall' (10 cm lasers)



Figure 2: 22°7.4693'N;81°7.3803'W: -100.9 m
Several species of rope sponges- *Aplysina* sp., *Agelas* sp, and patches of the yellow Verongida crust on the 'Wall'



Figure 3: 22°7.4718'N;81°7.3753'W: -84 m
Nicella sp. octocoral on the 'Wall'

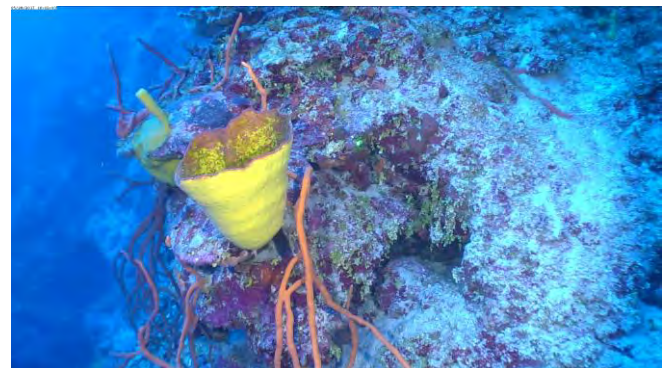


Figure 4: 22°7.475'N;81°7.3749'W: -57.9 m
Vase sponge- *Verongula gigantea*, and rope sponges- *Aplysina* sp.



Figure 5: 22°7.5267'N;81°7.3852'W: -27.7 m
Deep fore reef slope with sheets of plate corals- *Agaricia* sp., *Orbicella* sp.; and *Montastraea cavernosa*



Figure 6: 22°7.5264'N;81°7.3863'W: -28.3 m
Giant mass of thin (<5 mm diameter) rope sponge- *Clathria* sp., and *Aplysina archeri* tube sponge on fringing reef

Dive Site: Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A; ROV 17-22; 28-V-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 28-V-17-3; ROV 17-22, UNCW Dive 428; Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 150- 30 m.

Transect up slope heading 041°, 150 m from end of transect (depth 45 m) to shore, beach rock.

14:49- Launch. Wind- 9 kn from 169°, current- 0.3 kn to 360°, seas- calm, water temperature- 29.36 °C, salinity- 36.27.

15:20- On bottom; 150 m, visibility- 50 m.

17:35- End dive. End Leg 1.

150 m, deep island slope zone: 60° rock slope, rock outcrops, cobble, 50 cm boulders, sand chutes. Biota: relatively barren; thin encrusting yellow Verongiida sponges, CCA, Stichopathes, *Nicella* fans, fishing line.

Vertical photo transect upslope, 150- 125 m, 15:23- 15:31; deep island slope zone.

140 m: 45° slope.

130 m: old dead coral plates; tumbled sponges.

125 m, lower mesophotic zone: base of wall, 70-80° eroded wall, scalloped surface. Biota: *Aplysina* rope sponges, sclerosponges, *Agelas*.

Vertical photo transect upslope, 125- 60 m; 15:31- 16:02; lower mesophotic zone.

98 m: first *Swiftia exserta*. *Xestospongia*.

90 m: 80° rock slope, 1 m wide ledges; Gorgonacea- 30 cm gorgonian fans, *Nicella* fan, Primnoidae.

85 m: 90° wall, eroded buttresses with sand chutes; 1 m *Nicella* fans, dense *Halimeda*, dense sponges.

78 m: first *Peyssonnelia*, *Holothuria* sp., *Holothuria lentiginosa enodis*.

74 m: first *Agaricia grahamae* (75 cm).

67 m: 1-2 m wide ledges, caves; dense rope sponges, *Agelas*, CCA, *Halimeda*.

63 m: abundant *Agaricia*, vertical buttresses, 10 m wide, intersected by sand chutes.

58 m: first *M. cavernosa* (10 cm).

Quantitative horizontal photo transect, 55- 56 m, 16:02- 16:17 (30 photos); across series of buttresses, about 10 m wide, and sand chutes; abundant *Agaricia*, dense rope sponges.

50 m: still on vertical buttresses; *Pseudopterogorgia*.

Vertical photo transect upslope, 50- 30, 16:19- 16:41, upper mesophotic zone.

44- 30 m, upper mesophotic zone: upper brow of buttresses, 60° slope; dense *Agaricia*, *M. cavernosa* common.

35 m: dense *Agaricia*, shingles of *Agaricia*, lionfish.

Quantitative horizontal photo transect, 35- 31 m, 16:40- 16:53 (30 photos); across deep fore reef slope.

Dive Site: Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A; ROV 17-22; 28-V-17-3

Fish video transect, 30- 40 m, 16:53- 17:33; across deep fore reef slope and crest.

33 m: first *Orbicella faveolata*.

30- 20 m: fringing reef, 60-45° slope; fore reef slope covered with dense overlapping, shingle-like *Agaricia* and *Orbicella* corals (10-50 cm diameter), 80% cover. End vertical transect at 30 m, but reef still going up.

Maximum Depth Occurrences:

Crustose coralline algae (CCA)- 150 m

Chlorophyta, thin encrusting- 150 m

Halimeda- 101 m

Swiftia exserta- 98 m

Peyssonnelia- 78 m

Agaricia grahamae- 74 m

Montastraea cavernosa- 53 m

Lionfish- 35 m

Orbicella faveolata- 33 m

Number of Samples- 1

Disease and Human Impacts:

Fishing line- 1

Dive Site: Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A; ROV 17-22; 28-V-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-22. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Southwest Coast ROV 17-22 C-33A		
Phylum/Class/Scientific Name	Notes	Sum of samplecount
Algae	14	
Cyanobacteria	1	
Chlorophyta	8	
Chlorophyta	1	
Chlorophyta- Filamentous Green	1	
<i>Halimeda copiosa</i>	1	
<i>Halimeda discoidea</i>	1	
<i>Halimeda goreau</i>	1	
<i>Halimeda tuna</i>	1	
<i>Rhipocephalus phoenix</i>	1	
<i>Udotea cyathiformis</i>	1	
Ochrophyta	2	
<i>Dictyota</i> sp.	1	
<i>Lobophora</i> sp.	1	
Rhodophyta	3	
Crustose coralline (CCA)	1	
<i>Peyssonnelia</i> sp.	1	
Rose Petal CCA	1	
Porifera	61	1
Demospongiae	60	1
<i>Agelas citrina</i>	1	
<i>Agelas dispar</i>	1	
<i>Agelas flabelliformis</i>	1	
<i>Agelas sceptrum</i>	1	
<i>Agelas tubulata</i>	1	
<i>Aiolochoxia crassa</i>	1	
<i>Amphimedon</i> sp. Cu-01	1	
<i>Amphimedon</i> sp. Cu-02	1	
<i>Amphimedon</i> sp. Cu-03	1	
<i>Aplysina archeri</i>	1	
<i>Aplysina cauliformis</i>	1	
<i>Aplysina fistularis</i>	1	

Dive Site: Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A; ROV 17-22; 28-V-17-3

<i>Aplysina lacunosa</i>	1
<i>Aplysina</i> sp. Cu-04	1
<i>Callyspongia</i> sp. Cu-06	1
<i>Callyspongia vaginalis</i>	1
<i>Ceratoporella nicholsoni</i>	1
<i>Cinachyrella kuekenthali</i>	1
<i>Clathria</i> sp.	1
<i>Cliona delitrix</i>	1
<i>Cliona</i> sp.	1
Demospongiae sp. Cu-05	1
Demospongiae sp. Cu-06	1
Demospongiae sp. Cu-10	1
Demospongiae sp. Cu-11	1
Demospongiae sp. Cu-14	1
Demospongiae sp. Cu-21	1
Demospongiae unid. sp.	1
<i>Geodia</i> sp. Cu-02	1
<i>Geodia</i> sp. Cu-03	1
Heteroscleromorpha Cu-02	1
<i>Igernella</i> sp.	1
<i>Iotrochota birotulata</i>	1
<i>Ircinia campana</i>	1
<i>Ircinia</i> sp. Cu-03	1
<i>Ircinia strobilina</i>	1
<i>Niphates alba</i>	1
<i>Niphates digitalis</i>	1
<i>Niphates erecta</i>	1
<i>Oceanapia</i> sp. Cu-01	1
<i>Oceanapia</i> sp. Cu-02	1
<i>Petrosia weinbergi</i>	1
Petrosiidae Cu-06	1
Petrosiidae Cu-09	1
Petrosiidae Cu-10	1
Petrosiidae Cu-11	1
Petrosiidae Cu-12	1
Petrosiidae unid. sp.	1
<i>Ptilocaulis walpersi</i>	1
<i>Siphonodictyon coralliphagum</i>	1
<i>Spirastrella coccinea</i>	1
<i>Spirastrella hartmani</i>	1
<i>Svenzea zeai</i>	1
<i>Vansoestia caribensis</i>	1

Dive Site: Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A; ROV 17-22; 28-V-17-3

Verongiida Cu-01	1
Verongiida Cu-05	1
<i>Verongula gigantea</i>	1
<i>Verongula reisiwigi</i>	1
<i>Verongula rigida</i>	1
<i>Xestospongia muta</i>	1
<i>Xestospongia</i> sp. Cu-01	1
Homoscleromorpha	1
Plakortis sp. Cu-01	1
Cnidaria	25
Hydrozoa	1
Hydroidolina	1
Alcyonacea - gorgonian	6
<i>Ellisella</i> sp.	1
Gorgoniidae	1
<i>Nicella</i> sp.	1
Plexauridae	1
<i>Pseudopterogorgia</i> sp.	1
<i>Swiftia exserta</i>	1
Antipatharia	2
Antipathidae	1
<i>Stichopathes</i> sp.	1
Scleractinia	16
<i>Agaricia agaricites</i>	1
<i>Agaricia</i> sp.	1
<i>Colpophyllia natans</i>	1
<i>Helioseris cucullata</i>	1
<i>Meandrina meandrites</i>	1
<i>Montastraea cavernosa</i>	1
<i>Mussa angulosa</i>	1
Mycetophyllia sp.	1
<i>Orbicella faveolata</i>	1
<i>Orbicella franksi</i>	1
<i>Porites astreoides</i>	1
<i>Porites porites</i>	1
<i>Porites</i> sp.	1
<i>Scolymia cubensis</i>	1
<i>Scolymia</i> sp.	1
<i>Stephanocoenia intersepta</i>	1

Dive Site: Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A; ROV 17-22; 28-V-17-3

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-22. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Class/Order/Scientific Name- Common Name	ROV 17-22 Notes
Target Species	9
Actinopterygii	9
Perciformes	7
<i>Apsilus dentatus</i> - black snapper	1
<i>Cephalopholis cruentata</i> - Graysby	1
<i>Lutjanus buccanella</i> - Blackfin Snapper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	4
Scorpaeniformes	2
<i>Pterois volitans</i> - Lionfish	2
Other Fish Species	
Actinopterygii	
Beryciformes	
<i>Holocentrus</i> sp. - Squirrelfish	X
Perciformes	
<i>Abudefduf saxatilis</i> - Sergeant major	X
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Coryphopterus personatus</i> - Masked/Glass Goby	X
<i>Elacatinus genie</i> - Cleaning goby	X
Gobiidae - Goby	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus guttavarius</i> - Shy hamlet	X
<i>Hypoplectrus indigo</i> - Indigo hamlet	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
<i>Hypoplectrus unicolor</i> - Butter Hamlet	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X

Dive Site: Cuba, S coast, Bahía de Cochinos, east wall, Zapata National Park, Station C-33A; ROV 17-22; 28-V-17-3

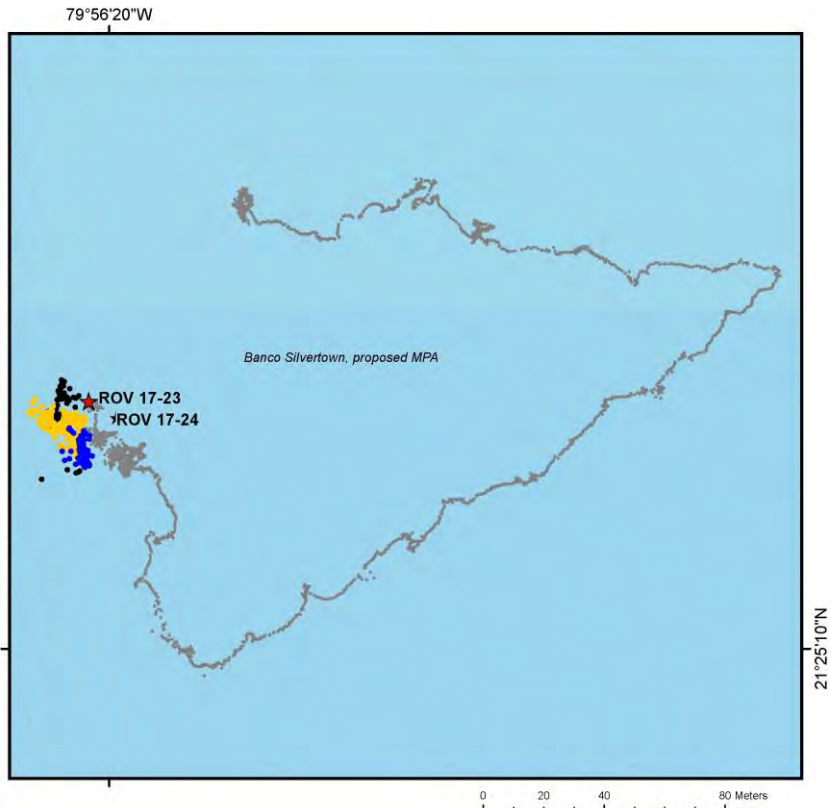
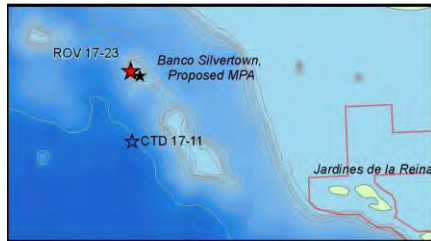
<i>Pomacentrus</i> sp. - Damselfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
<i>Ptereleotris calliura</i> - Blue Dartfish	X
<i>Rypticus maculatus</i> - Whitespotted Soapfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Serranus tortugarum</i> - Chalk Bass	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes leucostictus</i> - Beaugregory	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-23; 31-V-17-1

General Location and Dive Track:

Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-23; 31-V-17-1

- ★ ROV 17-23
- ★ Mohawk ROV
- Transect_Name
- 201705311 - Transect 01
- 201705311 - Transect 02
- ROV 17-23
- ROV 17-24
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investigator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/31/2017

Specimens: 0

Digital Photos: 80

No. DVD: 1

Hard Drive No.: 1

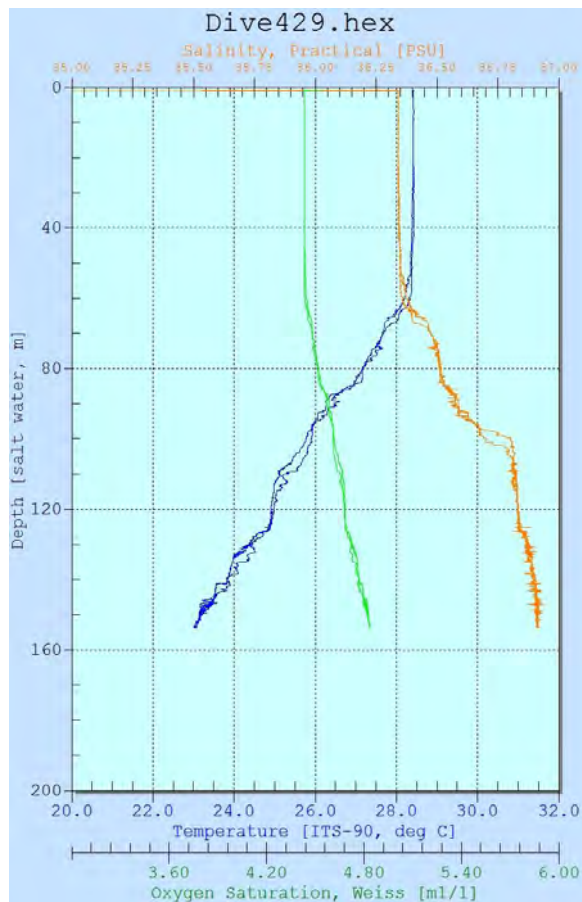
Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-23; 31-V-17-1

Dive Data:

Minimum Bottom Depth (m):	121	Total Transect Length (km):	0.047
Maximum Bottom Depth (m):	150	Surface Current (kn):	0.6
On Bottom (Time- GMT):	8:48	On Bottom (Lat/Long):	21.4202°N; -79.939°W
Off Bottom (Time- GMT):	9:05	Off Bottom (Lat/Long):	21.4199°N; -79.939°W
Physical (bottom); Temp (°C):	23.2	Salinity: 36.91	Visibility 40 Current (kn): 0.25

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-23 are as follows: Depth Maximum: 153.7 m, Temperature: 23-28.4 °C, Salinity: 36.3-36.9 PSU, and Oxygen Saturation: 4.4-4.8 ml/l.

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-23; 31-V-17-1

Dive Imagery:



Figure 1: 21°25.2043'N;79°56.3369'W: -125.9 m
Unidentified demosponge on deep wall

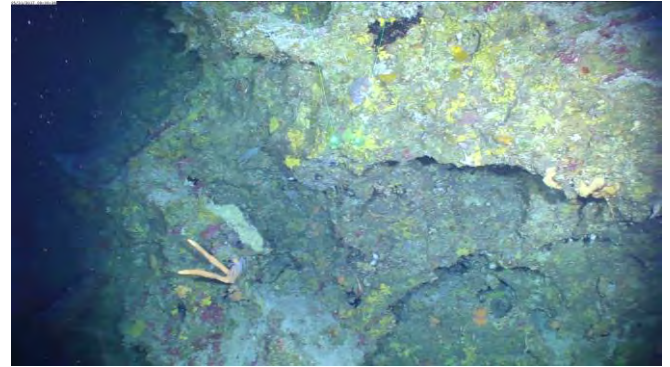


Figure 2: 21°25.2008'N;79°56.3373'W: -125.8 m
Rugged, eroded deep fore reef escarpment, with yellow and black crust sponges, and a branching *Agelas* sp.



Figure 3: 21°25.2085'N;79°56.3401'W: -142.5 m
Unidentified orange massive demosponge and yellow *Verongida* crust on deep wall

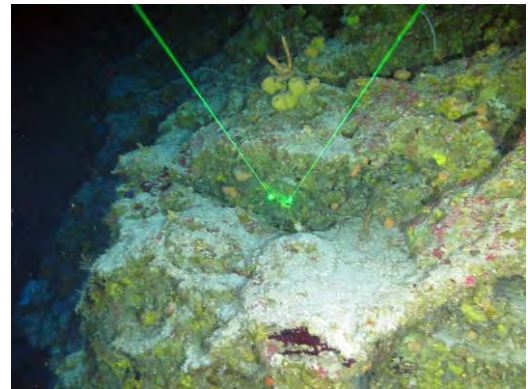


Figure 4: 21°25.202'N;79°56.3378'W: -123.8 m
Sediment on ledges of lower wall (10 cm lasers)

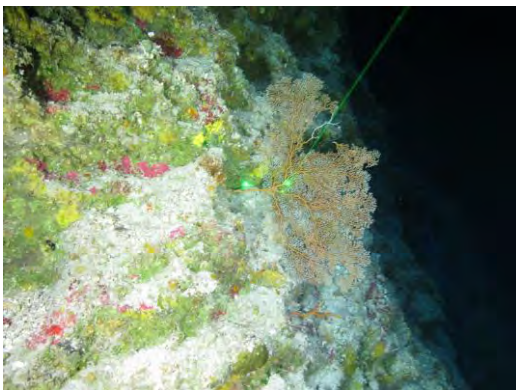


Figure 5: 21°25.2066'N;79°56.3384'W: -134.6 m
Nicella goreauii octocoral on the 'Wall'

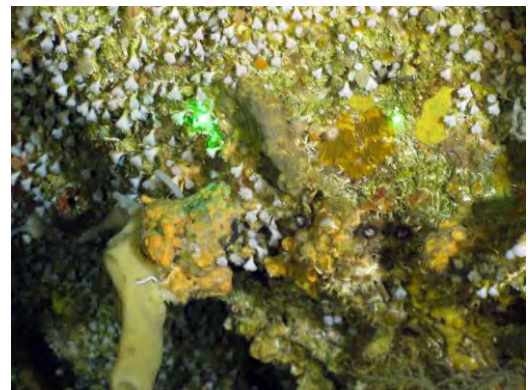


Figure 6: 21°25.2005'N;79°56.3379'W: -122 m
Solitary cup corals on the 'Wall'

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-23; 31-V-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 31-V-17-1; ROV 17-23, UNCW Dive 429; Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Dive aborted early; ship's generator failed.

Site Description/Habitat:

Depth range: 150- 121 m.

Transect up slope heading E, at northern west edge of seamount.

08:32- Launch. Wind- 16 kn from 072°, current- 0.6 kn to 180°, seas- 1 m from E, water temperature- 28.71 °C, salinity- 36.30.

8:49 - On bottom; 150 m, visibility- 35 m, current 0.2 to S.

9:05- End dive. Dive aborted, ship's generator failed.

150 m, deep island slope zone: 80° slope, rock pavement, scalloped surface, cobble/rubble on flat surfaces, sand chutes. Biota: sponges- thin encrusting yellow Verongiida sponges, *Xestospongia*; CCA, *Stichopathes*, *Nicella goreau*.

Vertical photo transect upslope, 150- 125 m; deep island slope zone.

130 m: sponges more common.

125 m, lower mesophotic zone: start 90° vertical wall, eroded surface; dense and diverse sponges, *Agelas sceptrum*; white cup coral; Gorgonacea.

Vertical photo transect upslope, 125- 121, 9:01- 9:05, lower mesophotic zone.

121 m: dive aborted; failed generator.

Maximum Depth Occurrences:

Crustose coralline algae (CCA)- 150 m

Number of Samples- 0

Disease and Human Impacts:

None

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-23; 31-V-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video at dive site ROV 17-23. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Notes
Southeast Coast ROV 17-23 C-38	
Algae	
Chlorophyta	
Chlorophyta- bright	X
Chlorophyta- palida	X
Rhodophyta	
Crustose coralline (CCA)	X
Porifera	
Calcarea	
Leucetta sp. Cu-01	X
Demospongiae	
<i>Agelas sceptrum</i>	X
Aiolochoiria sp. Cu-01	X
<i>Ceratoporella nicholsoni</i>	X
Demospongiae sp. Cu-09	X
Demospongiae sp. Cu-12	X
Demospongiae sp. Cu-14	X
Demospongiae sp. Cu-22	X
Petrosiidae Cu-05	X
<i>Siphonodictyon coralliphagum</i>	X
Verongiida Cu-01	X
Xestospongia sp. Cu-01	X
Cnidaria	
Hydrozoa	
Stylasteridae	X
Alcyonacea - gorgonian	
Ellisella sp.	X
Gorgoniidae	X
Nicella sp.	X
Primnoidae	X
Antipatharia	
Antipathes sp.	X
Antipathidae	X
Stichopathes sp.	X
Tanacetipathes sp.	X

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-23; 31-V-17-1

Scleractinia	
Madrepora sp.	X
Scleractinia- unid cup	X

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-23; 31-V-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-23. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

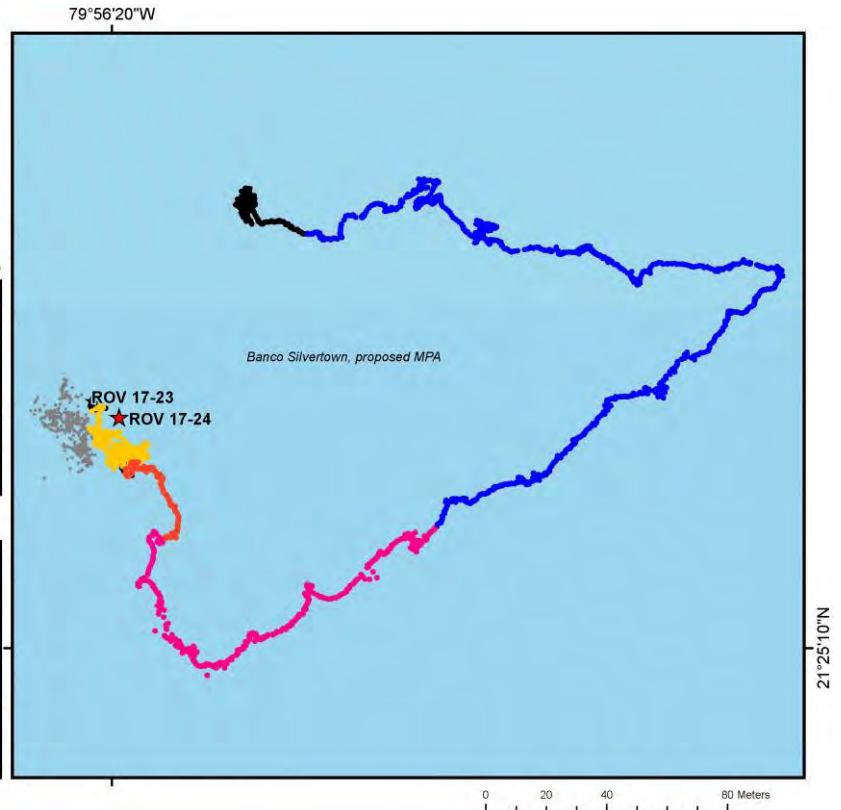
Phylum/Class/Order/Scientific Name - Common Name	Notes
Southeast Coast ROV 17-23 C-38	
Other	
Actinopterygii	
Beryciformes	
<i>Holocentrus</i> sp. - Squirrelfish	X
Perciformes	
Gobiidae - Goby	X
<i>Gramma melacara</i> - Blackcap Basslet	X

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-24; 31-V-17-2

General Location and Dive Track:

Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-24; 31-V-17-2

- ★ ROV 17-24
- ★ Mohawk ROV
- Transect_Name
- 201705312 - Transect 01
- 201705312 - Transect 02
- 201705312 - Transect 03
- 201705312 - Transect 04
- ROV 17-24
- ROV 17-23
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/31/2017

Specimens: 3

Digital Photos: 305

No. DVD: 2

Hard Drive No.: 1

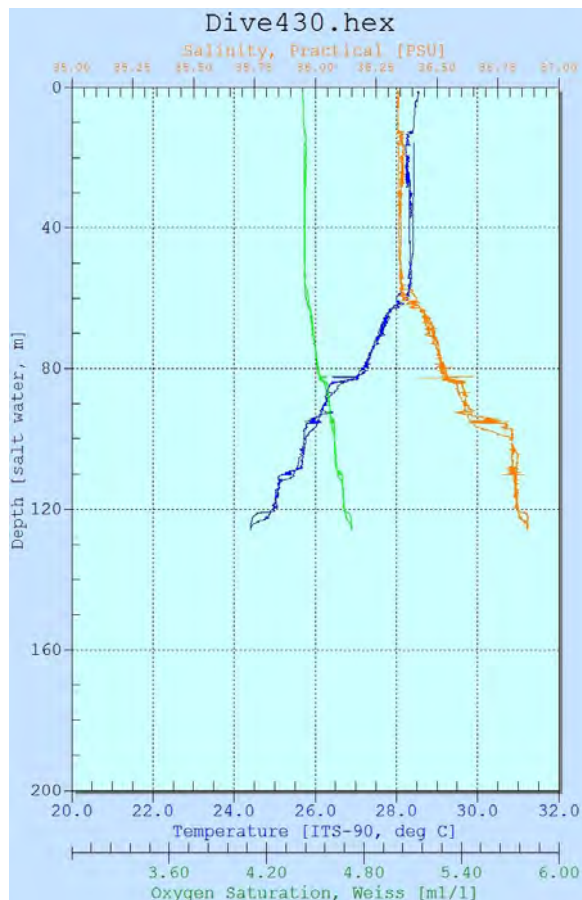
Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-24; 31-V-17-2

Dive Data:

Minimum Bottom Depth (m): 24	Total Transect Length (km): 0.592
Maximum Bottom Depth (m): 117	Surface Current (kn): 0.7
On Bottom (Time- GMT): 10:01	On Bottom (Lat/Long): 21.4201°N; -79.9389°W
Off Bottom (Time- GMT): 11:40	Off Bottom (Lat/Long): 21.4207°N; -79.9384°W
Physical (bottom); Temp (°C): 25	Salinity: 36.83 Visibility 35 Current (kn): 0.2

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-24 are as follows: Depth Maximum: 125.9 m, Temperature: 24.4-28.6 °C, Salinity: 36.3-36.9 PSU, and Oxygen Saturation: 4.4-4.7 ml/l.

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-24; 31-V-17-2

Dive Imagery:



Figure 1: 21°25.2027'N;79°56.3318'W: -96.4 m
Unidentified tube sponge- *Calcareia*, and pink crustose coralline algae on the 'Wall'



Figure 2: 21°25.2051'N;79°56.335'W: -104.2 m
Green algae- *Halimeda copiosa*, tube sponge- *Leucetta cf. floridiana*, and *Agaricia sp.* coral



Figure 3: 21°25.2047'N;79°56.3344'W: -100.1 m
Swiftia exserta octocoral on the lower wall



Figure 4: 21°25.2052'N;79°56.3339'W: -97.9 m
Ledge and overhang on the lower wall with diverse demosponges



Figure 5: 21°25.2048'N;79°56.333'W: -96.9 m
Tube sponge- *Agelas sp.*, fan octocorals, and whip corals- *Ellisella elongata*



Figure 6: 21°25.1636'N;79°56.3164'W: -31.4 m
Dense and diverse octocorals and sponges on deep fringing reef

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-24; 31-V-17-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 31-V-17-2; ROV 17-24, UNCW Dive 430; Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Same site as previous dive, starting at base of wall, 125 m.

Proposed MPA site- Dense *Agaricia* plates at 70-75 m depth. ROV dives on NW and S sides.

Site Description/Habitat:

Depth range: 117- 24 m.

Chart shows flat topped seamount, approx. 2.5 nmi x 1.5 nmi.

Transect up slope heading E at northern west edge of seamount.

09:47- Launch. Wind- 14 kn from 070°, current- 0.7 kn to 180°, seas- 0.3 m from E, water temperature- 28.73 °C, salinity- 36.299.

10:01 - On bottom; 117 m, visibility- 35 m, current- 0.2 to S.

11:41- End dive.

117 m, lower mesophotic zone: 90° wall, eroded, karst-like topography. Biota: dense sponges- *Xestospongia*; dense CCA; Gorgonacea- *Ellisella* whip coral, *Nicella* fans.

Vertical photo transect upslope, 117- 58. 10:01- 10:23; lower mesophotic zone.

104 m: first *Agaricia* (5 cm).

102 m: first *Halimeda*

100 m: first *Swiftia exserta*, sclerosponges.

96 m: first *Solenastrea*.

90 m: *Agaricia* common, 10-15 cm.

80 m: 50 cm *Agaricia grahamae*, 50% dead.

75 m: dense *Agaricia*.

70 m: rope sponge zone.

64 m: buttresses with sand chutes; dense rope sponges, 50 cm *Antipatharia* fans.

50 m, upper mesophotic zone: upper brow of buttresses, fishing line.

Vertical photo transect upslope, 48- 30, 10:24- 10:29; upper mesophotic zone.

48 m: first *M. cavernosa* (5 cm); dense *Agaricia* to 1 m diameter.

45 m: upper brow, 45° slope; *Pseudopterogorgia*.

35 m: first *Orbicella faveolata*.

30- 25 m: top of buttresses, fringing reef. Biota: dense gorgonians, *Pseudopterogorgia*, *Eunicea Plexaurella*; diverse shallow water corals- *Mycetophyllia*, *Scolymia*, *Pseudodiploria*, *Agaricia agaricites*. Landward of fringing reef, 25 m, sediment, rubble.

Quantitative horizontal photo transect, 30- 28 m, 10:30- 10:45; fringing reef along edge of seamount.

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-24; 31-V-17-2

Fish video survey, 24- 30 m, 10:47- 11:21; fringing reef.

Maximum Depth Occurrences:

Agaricia- 107 m (dense *Agaricia*- 75- 70 m)

Halimeda- 102 m

Swiftia exserta- 100 m

Solenastrea?- 96 m (check- *Stephanocoenia?*)

Montastraea cavernosa- 48 m

Orbicella faveolata- 35 m

Number of Samples- 3

Disease and Human Impacts:

50 cm diameter *Agaricia grahamae*, 50% dead- 80 m

Fishing line

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-24; 31-V-17-2

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-24. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Notes	Samples
Southeast Coast ROV 17-24 C-38		
Algae	13	2
Chlorophyta	8	
Chlorophyta	1	
Chlorophyta- bright	1	
Chlorophyta- palida	1	
<i>Halimeda copiosa</i>	1	
<i>Halimeda goreau</i>	1	
<i>Halimeda opuntia</i>	1	
<i>Halimeda</i> sp.	1	
<i>Udotea</i> sp.	1	
Ochrophyta	3	2
<i>Dictyota pulchella</i>		1
<i>Dictyota</i> sp.	1	
<i>Lobophora</i> sp.	1	1
<i>Sargassum hystrix</i>	1	
Rhodophyta	2	
Crustose coralline (CCA)	1	
<i>Peyssonnelia</i> sp.	1	
Porifera	49	1
Calcarea	2	
<i>Leucetta cf. floridiana</i>	1	
<i>Leucetta</i> sp. Cu-01	1	
Demospongiae	46	1
<i>Agelas cerebrum</i>	1	
<i>Agelas citrina</i>	1	
<i>Agelas clathrodes</i>	1	
<i>Agelas conifera</i>	1	
<i>Agelas dispar</i>	1	
<i>Agelas flabelliformis</i>	1	
<i>Agelas repens</i>	1	
<i>Agelas sceptrum</i>	1	
<i>Aiolochoia crassa</i>	1	
<i>Aiolochoia</i> sp. Cu-01	1	

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-24; 31-V-17-2

<i>Amphimedon compressa</i>	1	
Amphimedon sp.		1
<i>Aplysina archeri</i>	1	
<i>Aplysina cauliformis</i>	1	
<i>Aplysina fistularis</i>	1	
<i>Callyspongia vaginalis</i>	1	
<i>Cinachyrella kuekenthali</i>	1	
<i>Cliona delitrix</i>	1	
<i>Cribrochalina vasculum</i>	1	
Demospongiae unid. sp.	1	
<i>Dragmacidon cf. alvarezae</i>	1	
<i>Ectyoplasia ferox</i>	1	
<i>Geodia neptuni</i>	1	
<i>Geodia</i> sp. Cu-01	1	
<i>Iotrochota birotulata</i>	1	
<i>Ircinia strobilina</i>	1	
<i>Mycale laxissima</i>	1	
<i>Neofibularia nolitangere</i>	1	
<i>Neopetrosia subtriangularis</i>	1	
<i>Niphates digitalis</i>	1	
<i>Niphates</i> sp. Cu-02	1	
<i>Oceanapia</i> sp. Cu-02	1	
<i>Petrosia weinbergi</i>	1	
Petrosiidae Cu-08	1	
<i>Ptilocaulis walpersi</i>	1	
<i>Siphonodictyon brevitubulatum</i>	1	
<i>Siphonodictyon coralliphagum</i>	1	
<i>Smenospongia aurea</i>	1	
Spirastrellidae unid. sp.	1	
<i>Svenzea zeai</i>	1	
Tetractinellida Cu-02	1	
Verongiida Cu-01	1	
<i>Verongula gigantea</i>	1	
<i>Verongula reiswigi</i>	1	
<i>Verongula rigida</i>	1	
<i>Xestospongia muta</i>	1	
<i>Xestospongia</i> sp. Cu-01	1	
Homoscleromorpha	1	
<i>Plakortis</i> sp. Cu-01	1	
Cnidaria	39	
Hydrozoa	2	
<i>Millepora alcicornis</i>	1	

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-24; 31-V-17-2

Stylasteridae	1
Anthozoa- non coral	1
Zoanthidae	1
Alcyonacea - gorgonian	14
<i>Ellisella barbadensis</i> (syn. <i>elongata</i>)	1
<i>Ellisella</i> sp.	1
<i>Eunicea</i> sp.	1
<i>Gorgonia ventalina</i>	1
Gorgoniidae	1
<i>Iciligorgia schrammi</i>	1
<i>Nicella</i> sp.	1
<i>Plexaura</i> sp.	1
<i>Plexaurella</i> sp.	1
Plexauridae	1
Primnoidae	1
<i>Pseudoplexaura</i> sp.	1
<i>Pseudopterogorgia</i> sp.	1
<i>Swiftia exserta</i>	1
Antipatharia	4
Antipathidae	1
<i>Elatopathes</i> sp.	1
<i>Stichopathes</i> sp.	1
<i>Tanacetipathes</i> sp.	1
Scleractinia	18
<i>Acropora cervicornis</i>	1
<i>Agaricia agaricites</i>	1
<i>Agaricia</i> sp.	1
<i>Diploria labyrinthiformis</i>	1
<i>Eusmilia fastigiata</i>	1
<i>Madracis formosa</i>	1
<i>Montastraea cavernosa</i>	1
<i>Mycetophyllia lamarkiana</i>	1
<i>Mycetophyllia</i> sp.	1
<i>Orbicella faveolata</i>	1
<i>Porites astreoides</i>	1
<i>Porites furcata</i>	1
<i>Porites porites</i>	1
<i>Porites</i> sp.	1
<i>Pseudodiploria strigosa</i>	1
Scleractinia- unid cup	1
<i>Scolymia cubensis</i>	1
<i>Siderastrea siderea</i>	1

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-24; 31-V-17-2

Non-Fauna	3
Human debris	1
Human debris- fishing line	1
Disease	2
Dead Coral	1
Disease- unid.	1

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-24; 31-V-17-2

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-24. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

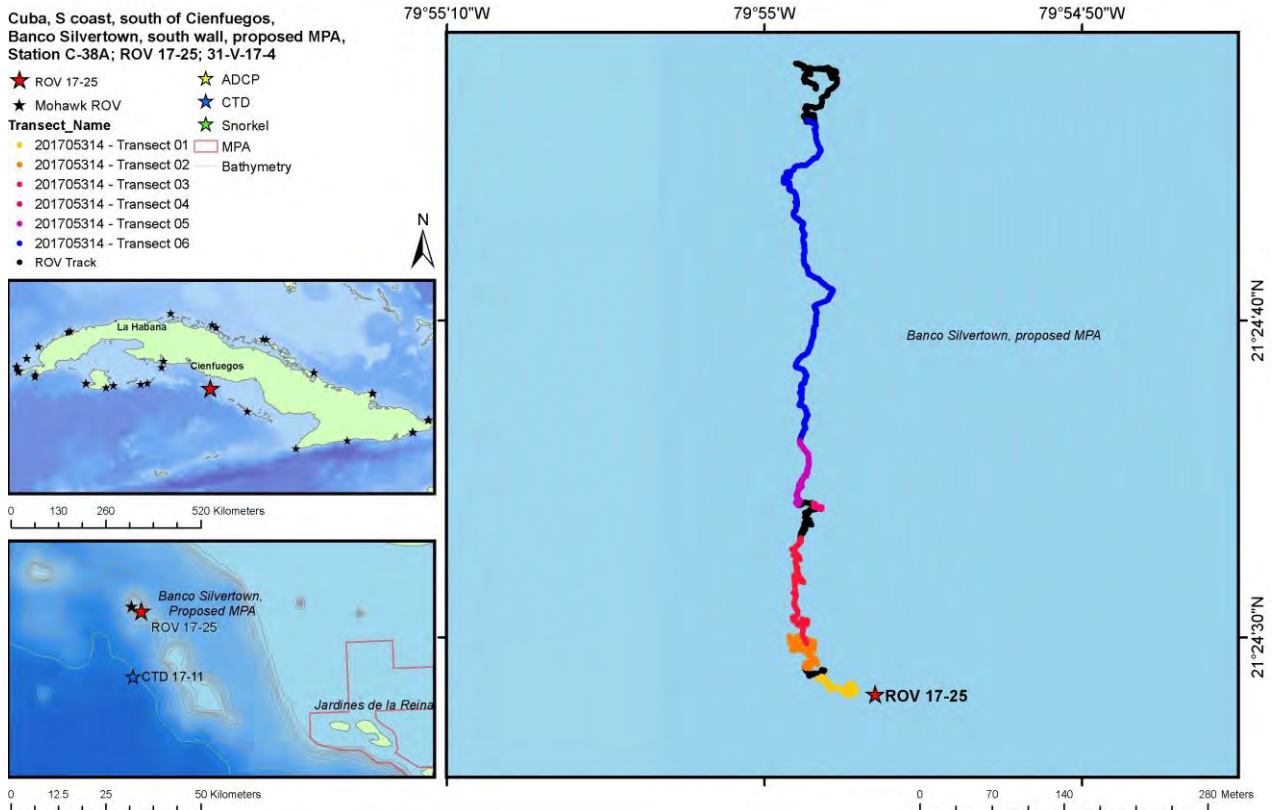
Class/Order/Scientific Name- Common Name	ROV 17-24 Notes
Target Species	11
Actinopterygii	11
Perciformes	7
<i>Epinephelus guttatus</i> - Red Hind	1
<i>Epinephelus striatus</i> - Nassau Grouper	1
<i>Lutjanus analis</i> - Mutton Snapper	1
<i>Mycteroperca tigris</i> - tiger grouper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	3
Scorpaeniformes	4
<i>Pterois volitans</i> - Lionfish	4
Other Fish Species	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Holocentrus</i> sp. - Squirrelfish	X
Perciformes	
<i>Acanthurus chirurgus</i> - Doctorfish	X
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon striatus</i> - Banded Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Chromis scotti</i> - Purple Reefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Diplectrum formosum</i> - Sand Perch	X
Gobiidae - Goby	X
<i>Grama melacara</i> - Blackcap Basslet	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Halichoeres maculipinna</i> - Clown wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus</i> sp. - hamlet	X
<i>Lutjanus</i> sp. - Snapper	X

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, west wall, proposed MPA, Station C-38; ROV 17-24; 31-V-17-2

<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus vetula</i> - Queen Parrotfish	X
<i>Serranus tigrinus</i> - Harlequin Bass	X
<i>Sparisoma atomarium</i> - Greenblotch Parrotfish	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyræna barracuda</i> - Great Barracuda	X
<i>Stegastes adustus</i> - dusky damselfish	X
<i>Stegastes diencaeus</i> - Longfin Damselfish	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
Balistidae - Triggerfish	X
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Melichthys niger</i> - Black Durgon	X

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A; ROV 17-25; 31-V-17-4

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investor: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 5/31/2017

Specimens: 22

Digital Photos: 595

No. DVD: 3

Hard Drive No.: 1

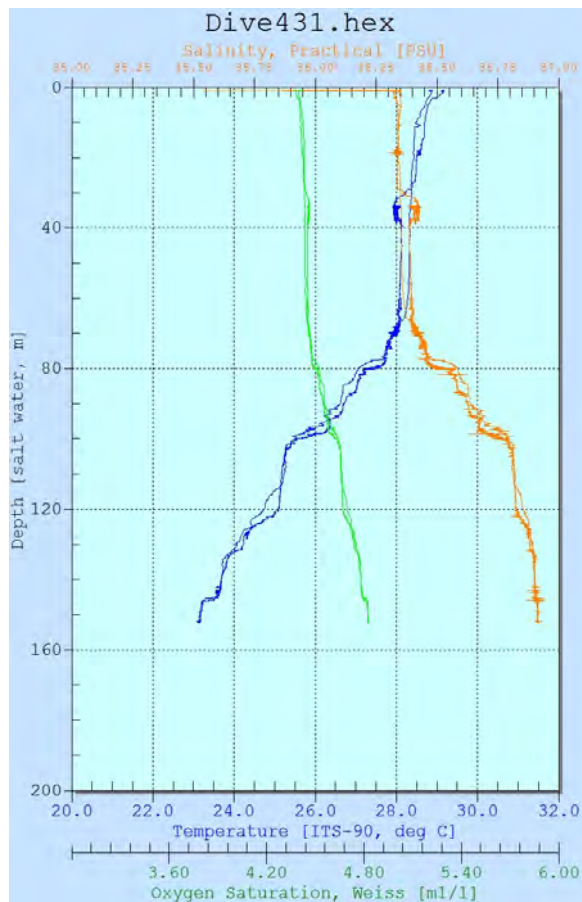
Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A; ROV 17-25; 31-V-17-4

Dive Data:

Minimum Bottom Depth (m): 40	Total Transect Length (km): 1.029
Maximum Bottom Depth (m): 153	Surface Current (kn): 0.6
On Bottom (Time- GMT): 14:36	On Bottom (Lat/Long): 21.4078°N; -79.9157°W
Off Bottom (Time- GMT): 17:40	Off Bottom (Lat/Long): 21.4131°N; -79.9162°W
Physical (bottom); Temp (°C): 23.3	Salinity: 36.91 Visibility 40 Current (kn): 0

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-25 are as follows: Depth Maximum: 152.3 m, Temperature: 23.1-29.2 °C, Salinity: 36.3-36.9 PSU, and Oxygen Saturation: 4.4-4.8 ml/l.

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A; ROV 17-25; 31-V-17-4

Dive Imagery:



Figure 1: 21°24.4944'N;79°54.9799'W: -101.4 m
Agaricia grahamae, encrusting sponges and algae, and rope sponge- *Agelas cf. cervicornis*



Figure 2: 21°24.4938'N;79°54.9799'W: -100.9 m
Lower wall with rope sponge- *Agelas cf. cervicornis*, spherical- *Cinachyrella sp.*, encrusting sponges; and wire coral- *Stichopathes lutkeni*



Figure 3: 21°24.4992'N;79°54.9865'W: -76.6 m
Hummingbird nest, an unknown calcareous sponge- *Leucetta sp.*, *Agelas sceptrum* (left), and many sponge crusts

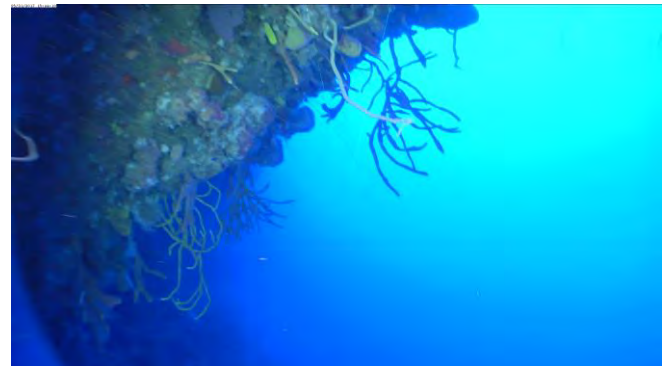


Figure 4: 21°24.5151'N;79°54.9833'W: -69.3 m
Overhanging buttress

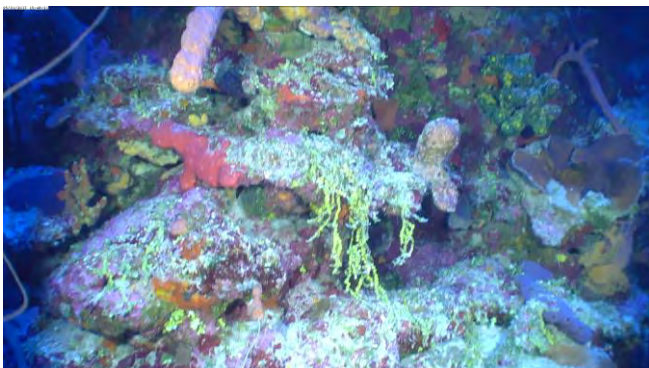


Figure 5: 21°24.5375'N;79°54.983'W: -70 m
Chain algae- *Halimeda copiosa*, encrusting algae, and various demosponges on upper wall



Figure 6: 21°24.7076'N;79°54.9796'W: -35.5 m
Mesophotic community of deep fringing reef

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A; ROV 17-25; 31-V-17-4

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 31-V-17-4; ROV 17-25, UNCW Dive 431; Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Proposed MPA site-Dense *Agaricia* plates at 70-75 m depth. ROV dives on NW and S sides.

Site Description/Habitat:

Depth range: 153- 40 m.

Chart shows flat topped seamount, approx. 2.5 nmi x 1.5 nmi.

Transect up slope heading N at southern wall of seamount.

14:27- Launch. Wind- 8 kn from 133°, current- 0.6 kn to 180°, seas- 0.3 m from SE, water temperature- 29.01 °C, salinity- 36.30.

14:36 - On bottom; 117 m, visibility- 40 m, current- 0.

16:15- End dive.

153 m, deep island slope zone: 40° slope, sand, cobble, 3 m (buttress slumped?).

Vertical photo transect upslope, 150- 130 m; deep island slope.

144 m: 50% cover sediment, 30-50 cm boulders; 50 cm *Madracis myriaster*, *Nicella* fans, CCA, thin encrusting Chlorophyta, *Stichopathes*, *Stylaster*, yellow encrusting Verongiida sponges, *Tanacetipathes*, *Antipathes* fans.

130 m: 45° slope, 80% cover of 30-50 cm boulders.

120 m, lower mesophotic zone: 70° rock pavement slope, scalloped surface. Biota: dense sponges, CCA; black coral- *Stichopathes*, 30 cm *Antipathes*, *Tanacetipathes*; *Ellisella* whip coral.

Vertical photo transect upslope, 120- 71, 15:06- 15:36; lower mesophotic zone.

108 m: vertical wall, eroded rock, karst-like topography; dense sponges, rope sponges, *Agelas*, *Aplysina*.

106 m: first *Agaricia*, 20 cm.

104 m: *Agaricia*, 50 cm.

98 m: first *Halimeda*, *Antipathes* fans.

95 m: first *Swiftia exserta*.

94 m: ledges, caves on vertical wall.

86 m: start overhanging buttresses, no sand chutes, ledges, caves; 1 m *Antipatharia* bush.

79 m: under overhanging buttress; 70 very dense sponges, rope sponges.

Quantitative horizontal photo transect, 70- 68 m, 15:35- 15:51 (30 photos); along face of buttresses.

60 m: *Agaricia* common but not abundant.

58 m: first *M. cavernosa*, 10 cm.

56 m: 50 cm *Agaricia*, 50% bleached.

54 m: first *Lobophora*.

50 m, upper mesophotic zone: upper brow, 60- 45° slope, sediment veneer; no sand chutes.

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A; ROV 17-25; 31-V-17-4

Vertical photo transect upslope, 50- 40 m, 15:50- 16:04; upper mesophotic zone.

45 m: 45° slope, upper brow more sediment; fewer sponges, few coral; gorgonians- *Pseudopterogorgia*, *Eunicea*.

Quantitative horizontal photo transect, 40 m, 16:07- 16:15 (30 photos); along upper brow of wall.

40- 35 m: top of fringing reef. Biota: dense shallow gorgonians; diverse corals- *Pseudodiploria*, *Eusmilia fastigiata*, *Porites porites*, *Orbicella faveolata*; algae- Chlorophyta, Rhodophyta, Phaeophyceae, *Halimeda*.

Fish video transect, 40- 35 m, 16:15- 16:45; along deep fringing reef.

Maximum Depth Occurrences:

Crustose coralline algae (CCA)- 144 m

Chlorophyta, thin encrusting- 144 m

Madracis myriaster- 144 m (first report in Cuba)

Agaricia- 106 m

Halimeda- 98 m

Swiftia exserta- 95 m

Montastraea cavernosa- 58 m

Lobophora- 54 m

Orbicella faveolata- 40 m

Number of Samples- 22

Disease and Human Impacts:

50 cm diameter *Agaricia*, 50% bleached- 5

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A; ROV 17-25; 31-V-17-4

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-25. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Southeast Coast ROV 17-25 C-38A		
Phylum/Class/Scientific Name	Notes	Samples
Algae		15
Chlorophyta		6
<i>Anadyomene stellata</i>		1
Chlorophyta		1
Chlorophyta- bright	X	
Chlorophyta- palida	X	
<i>Cladophora fuliginosa</i>		1
<i>Halimeda copiosa</i>	X	
<i>Halimeda discoidea</i>	X	
<i>Halimeda</i> sp.	X	1
<i>Microdictyon marinum</i>		1
<i>Penicillus</i> sp.	X	
<i>Valonia macrophysa</i>		1
Ochrophyta		4
<i>Dictyota</i> sp.	X	2
<i>Lobophora</i> sp.	X	1
<i>Sargassum hystrix</i>		1
Rhodophyta		5
Corallinophycidae		1
Crustose coralline (CCA)	X	
<i>Dichotomaria obtusata</i>		2
<i>Laurencia</i> sp.		1
Rhodophyta		1
Porifera		4
Calcarea		
<i>Leucetta cf. floridiana</i>	X	
<i>Leucetta floridana</i>	X	
Demospongiae		4
<i>Agelas cerebrum</i>	X	
<i>Agelas cervicornis</i>	X	
<i>Agelas citrina</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas sceptrum</i>	X	

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A; ROV 17-25; 31-V-17-4

<i>Aiolochoira crassa</i>	X	
<i>Aiolochoira</i> sp. Cu-01	X	
<i>Amphimedon compressa</i>	X	
<i>Aplysina archeri</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina fistularis</i>	X	
<i>Aplysina sciophila</i>	X	
<i>Aplysina</i> sp. Cu-04	X	
<i>Axinella corrugata</i>	X	
Axinellidae Cu-01	X	
<i>Callyspongia plicifera</i>	X	
<i>Cinachyrella kuekenthali</i>	X	
Cinachyrella sp. Cu-03	X	
<i>Clathria echinata</i>	X	
<i>Clathria venosa</i>	X	
<i>Cliona delitrix</i>	X	
<i>Corallistes</i> sp.	X	
<i>Cribrochalina vasculum</i>	X	
Demospongiae sp. Cu-11	X	
Demospongiae sp. Cu-22	X	
Demospongiae unid. sp.		1
<i>Geodia neptuni</i>	X	
<i>Geodia</i> sp. Cu-01	X	
<i>Geodia</i> sp. Cu-02	X	
<i>Iotrochota birotulata</i>	X	
<i>Iotrochota</i> sp.		1
<i>Ircinia felix</i>	X	
<i>Ircinia</i> sp. Cu-03	X	
<i>Mycale laxissima</i>	X	
<i>Neofibularia nolitangere</i>	X	
<i>Niphates arenata</i>	X	
<i>Niphates digitalis</i>	X	
<i>Oceanapia</i> sp. Cu-02	X	
<i>Petrosia weinbergi</i>	X	
Petrosiidae Cu-06	X	
Petrosiidae Cu-12	X	
Petrosiidae Cu-18	X	
<i>Ptilocaulis walpersi</i>	X	
<i>Siphonodictyon brevitubulatum</i>	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Smenospongia aurea</i>	X	
<i>Smenospongia conulosa</i>	X	

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A; ROV 17-25; 31-V-17-4

<i>Spirastrella coccinea</i>	X	
<i>Spirastrella hartmani</i>	X	
<i>Spirastrella</i> sp. Cu-02	X	
Verongiida		1
Verongiida Cu-01	X	
Verongiida Cu-02	X	
<i>Verongula gigantea</i>	X	1
<i>Verongula reiswigi</i>	X	
<i>Verongula rigida</i>	X	
<i>Verongula</i> sp. Cu-01	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia purpurea</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
Plakinidae unid. sp.	X	
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		1
Hydrozoa		
<i>Millepora alcicornis</i>	X	
Stylasteridae	X	
Alcyonacea - gorgonian		
<i>Briareum</i> sp.	X	
<i>Ellisella</i> sp.	X	
<i>Gorgonia ventalina</i>	X	
<i>Iciligorgia schrammi</i>	X	
<i>Nicella</i> sp.	X	
Paramuricea sp.	X	
Plexauridae	X	
Primnoidae	X	
Pseudopterogorgia sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		
<i>Antipathes atlantica</i>	X	
<i>Antipathes furcata</i>	X	
<i>Antipathes</i> sp.	X	
Antipathidae	X	
<i>Elatopathes</i> sp.	X	
<i>Plumapathes pennacea</i>	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		1
<i>Acropora cervicornis</i>	X	

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A; ROV 17-25; 31-V-17-4

<i>Agaricia agaricites</i>	X	
<i>Agaricia lamarcki</i>	X	
<i>Agaricia</i> sp.	X	
<i>Eusmilia fastigiata</i>	X	
<i>Madracis asperula</i>		1
<i>Madracis</i> sp.	X	
<i>Madrepora</i> sp.	X	
<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Mycetophyllia</i> sp.	X	
<i>Orbicella annularis</i>	X	
<i>Orbicella faveolata</i>	X	
<i>Porites astreoides</i>	X	
<i>Porites furcata</i>	X	
<i>Porites porites</i>	X	
<i>Pseudodiploria strigosa</i>	X	
Scleractinia- unid cup	X	
<i>Scolymia cubensis</i>	X	
<i>Siderastrea siderea</i>	X	
Other		1
Chordata - Invertebrate		1
Ascidiacea		1
Non-Fauna		
Disease		
Bleaching	X	

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A; ROV 17-25; 31-V-17-4

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-25. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

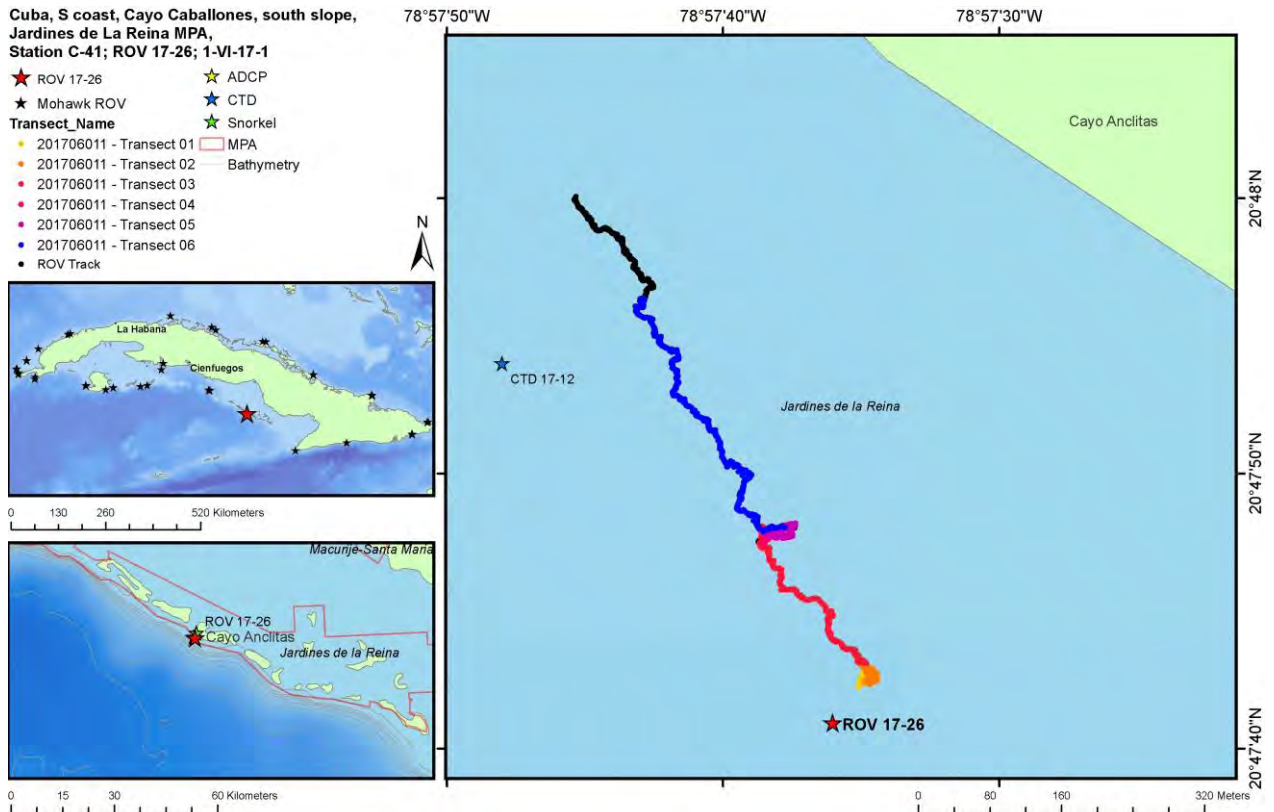
Southeast Coast ROV 17-25 C-38A		Notes	Samples
Phylum/Class/Order/Scientific Name - Common Name			
Commercially Important Species		12	
Actinopterygii		12	
Perciformes		12	
<i>Cephalopholis cruentata</i> - Graysby		1	
<i>Epinephelus guttatus</i> - Red Hind		1	
<i>Epinephelus striatus</i> - Nassau Grouper		1	
<i>Mycteroperca bonaci</i> - Black Grouper		1	
<i>Mycteroperca tigris</i> - tiger grouper		2	
<i>Mycteroperca venenosa</i> - yellowfin Grouper		1	
<i>Ocyurus chrysurus</i> - Yellowtail Snapper		4	
Serranidae - Grouper		1	
Other			1
Actinopterygii			1
Actinopterygii - Unid Fish			1
Beryciformes			
<i>Holocentrus rufus</i> - Longspine Squirrelfish		X	
<i>Holocentrus</i> sp. - Squirrelfish		X	
<i>Myripristis jacobus</i> - Blackbar Soldierfish		X	
<i>Neoniphon marianus</i> - Longjaw Squirrelfish		X	
Perciformes			
<i>Acanthurus chirurgus</i> - Doctorfish		X	
<i>Acanthurus coeruleus</i> - Blue Tang		X	
<i>Acanthurus</i> sp. - Surgeonfish		X	
<i>Carangoides bartholomaei</i> - Yellow Jack		X	
<i>Caranx lugubris</i> - Black Jack		X	
<i>Caranx ruber</i> - Bar Jack		X	
<i>Chaetodon capistratus</i> - Foureye Butterflyfish		X	
<i>Chaetodon striatus</i> - Banded Butterflyfish		X	
<i>Chromis cyanea</i> - Blue Chromis		X	
<i>Chromis insolata</i> - Sunshinefish		X	
<i>Chromis multilineata</i> - Brown chromis		X	
<i>Clepticus parrae</i> - creole wrasse		X	
<i>Coryphopterus personatus</i> - Masked/Glass Goby		X	

Dive Site: Cuba, S coast, south of Cienfuegos, Banco Silvertown, south wall, proposed MPA, Station C-38A; ROV 17-25; 31-V-17-4

<i>Elacatinus genie</i> - Cleaning goby	X
Gobiidae - Goby	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Halichoeres bivittatus</i> - Slippery Dick	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
<i>Lachnolaimus maximus</i> - Hogfish	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Mulloidichthys martinicus</i> - Yellow goatfish	X
<i>Pagrus</i> sp. - Porgy	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Serranus tigrinus</i> - Harlequin Bass	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes leucostictus</i> - Beaugregory	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Aluterus scriptus</i> - Scrawled Filefish	X
<i>Balistes vetula</i> - Queen Triggerfish	X
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Melichthys niger</i> - Black Durgon	X
<i>Sphoeroides spengleri</i> - Bandtail Puffer	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41; ROV 17-26; 1-VI-17-1

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/1/2017

Specimens: 9

Digital Photos: 306

No. DVD: 3

Hard Drive No.: 1

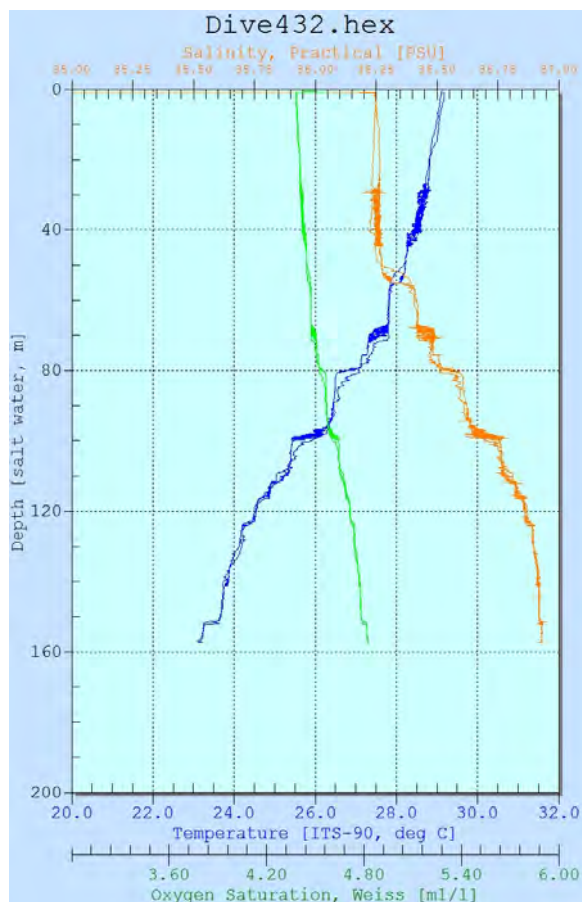
Dive Site: Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41; ROV 17-26; 1-VI-17-1

Dive Data:

Minimum Bottom Depth (m): 30	Total Transect Length (km): 0.927
Maximum Bottom Depth (m): 150	Surface Current (kn): 0.4
On Bottom (Time- GMT): 8:31	On Bottom (Lat/Long): 20.7947°N; -78.96°W
Off Bottom (Time- GMT): 11:20	Off Bottom (Lat/Long): 20.8°N; -78.9626°W
Physical (bottom); Temp (°C): 23.6	Salinity: 36.92 Visibility: N/A Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-26 are as follows: Depth Maximum: 157.3 m, Temperature: 23.1-29.2 °C, Salinity: 36.2-36.9 PSU, and Oxygen Saturation: 4.4-4.8 ml/l.

Dive Site: Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41; ROV 17-26; 1-VI-17-1

Dive Imagery:



Figure 1: 20°47.7093'N;78°57.581'W: -125 m
Vertical rock wall with *Agelas* sp. fan sponge (10 cm lasers)



Figure 2: 20°47.7185'N;78°57.5815'W: -72.1 m
Agaricia coral in lower mesophotic zone



Figure 3: 20°47.7193'N;78°57.5815'W: -71.8 m
Tube sponge- *Callyspongia plicifera*, and *Agaricia* sp.



Figure 4: 20°47.7135'N;78°57.58'W: -74.2 m
Several species of rope sponges- *Alysina* sp., *Aiolochoiria* sp., *Agelas* sp.; and *Niphates* sp.

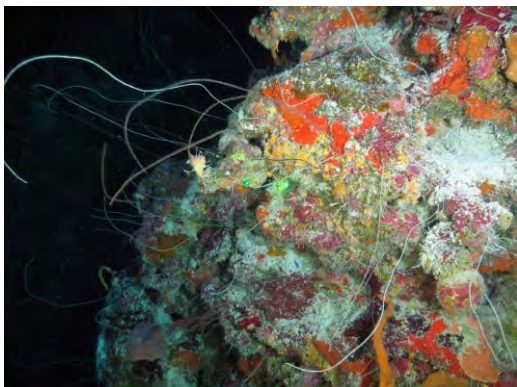


Figure 5: 20°47.7959'N;78°57.6386'W: -60.4 m
Whip corals- *Ellisella elongata*, and encrusting sponges on the 'Wall'



Figure 6: 20°47.7961'N;78°57.6247'W: -30.2 m
Crest of deep fringing reef

Dive Site: Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41; ROV 17-26; 1-VI-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 1-VI-17-1; ROV 17-26, UNCW Dive 432; Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 150- 30 m.

Transect up slope heading 085°, ½ mile to shore.

8:22- Launch. Wind- 7 kn from 101°, current- 0.4 kn to NW, seas- 0.3 m from SE, water temperature- 29.44 °C, salinity- 36.20.

8:32 - On bottom; 150 m.

11:21- End dive.

150 m, deep island slope zone: 80-90° rock pavement, scalloped surface, horizontal layering, sand chutes.

Biota: sponges- thin encrusting yellow Verongiida sponges

Vertical photo transect upslope, 150- 115 m, 8:31- 8:43; deep island slope zone.

130 m: *Agelas*, CCA.

120 m: 90° wall, horizontal layering; few sponges, no black coral.

115 m, lower mesophotic zone: start vertical wall, eroded, karst-like rock, caves; *Stichopathes*, *Ellisella* whip coral.

Vertical photo transect upslope, 115- 70 m; 8:43- 9:04; lower mesophotic zone.

108 m: thin encrusting Chlorophyta, large demosponges.

100 m; diverse macro sponges, encrusting sponges, rope sponges.

94 m: lionfish, *Xestospongia*, dense sponges, dense CCA, *Nicella goreau*.

72 m: first *Agaricia*, several 30-50 cm.

Quantitative horizontal photo transect, 70 m, 9:04- 9:25 (30 photos); lower buttress zone, abundant 1-2 m wide ledges, caves, dense rope sponges.

Vertical photo transect upslope, 70- 50 m, 9:26- 9:28; continue lower mesophotic zone.

60- 55 m: 1 m *Agaricia*, abundant *Agaricia*.

53 m: first *Peyssonnelia*, first *Lobophora*.

45 m, upper mesophotic zone: 60-45° slope, upper brow of buttresses; *Agaricia*, shallow Gorgonacea.

Vertical photo transect upslope, 48- 30 m, 9:32- 10:24; upper mesophotic zone.

45 m: *Mycetophyllia*, *Dictyota*.

37 m: first *Orbicella*.

35- 30 m: top of buttresses, deep fringing reef, with sand chutes. Rugged fore reef slope, 45-90° slope, deep spur and groove sand chutes. Reef flattens out at 28 m. Biota: diverse sponges; dense Gorgonacea; algae- *Lobophora*, *Dictyota*, *Halimeda*; diverse coral- 30% cover of coral- *Agaricia*, *Orbicella faveolata*,

Dive Site: Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41; ROV 17-26; 1-VI-17-1

Mycetophyllia, *Porites*.

30 m: dead *Acropora cervicornis*, 1 m, encrusted with turf algae.

Fish video transect, 35- 40 m, 10:25- 11:02; along deep fore reef slope.

Maximum Depth Occurrences:

Crustose coralline algae (CCA)- 130 m

Chlorophyta, thin encrusting green-108 m

Lionfish- 94 m

Agaricia- 72 m

Lobophora- 53 m

Peyssonnelia- 53 m

Orbicella- 37 m

Number of Samples- 9

Disease and Human Impacts:

None

Dive Site: Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41;
ROV 17-26; 1-VI-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-26. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Southeast Coast ROV 17-26 C-41		
Phylum/Class/Scientific Name	Notes	Samples
Algae		5
Chlorophyta		2
Chlorophyta- bright	X	
Chlorophyta- palida	X	
Chlorophyta- Turf Algae		1
<i>Halimeda copiosa</i>	X	
<i>Halimeda discoidea</i>		1
<i>Halimeda</i> sp.	X	
Ochrophyta		3
Dictyota sp.	X	1
Lobophora sp.	X	1
Sargassum sp.		1
Rhodophyta		
Crustose coralline (CCA)	X	
Porifera		2
Calcarea		
<i>Leucetta cf. floridiana</i>	X	
<i>Leucetta floridana</i>	X	
Demospongiae		2
<i>Agelas cervicornis</i>	X	
<i>Agelas cf. tubulata</i>	X	
<i>Agelas citrina</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas flabelliformis</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas</i> sp. Cu-05	X	
<i>Agelas</i> sp. Cu-08	X	
<i>Aiolochoiria crassa</i>	X	
<i>Aiolochoiria</i> sp. Cu-01	X	
<i>Amphimedon compressa</i>	X	
<i>Amphimedon</i> sp. Cu-02	X	
<i>Aplysina archeri</i>	X	

Dive Site: Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41;
ROV 17-26; 1-VI-17-1

<i>Aplysina bathyphila</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina fistularis</i>	X	
<i>Aplysina sciophila</i>	X	
<i>Aplysina</i> sp. Cu-03	X	
<i>Aplysina</i> sp. Cu-04	X	
<i>Callyspongia cf. plicifera</i>	X	
<i>Callyspongia plicifera</i>	X	
<i>Callyspongia</i> sp. Cu-02	X	
<i>Cinachyrella kuekenthali</i>	X	
<i>Cliona delitrix</i>	X	
<i>Cribrochalina vasculum</i>	X	
<i>Demospongiae</i> sp. Cu-03	X	
<i>Demospongiae</i> sp. Cu-06	X	
<i>Demospongiae</i> sp. Cu-09	X	
<i>Demospongiae</i> sp. Cu-11	X	
<i>Demospongiae</i> sp. Cu-14	X	
<i>Demospongiae</i> sp. Cu-15	X	
<i>Demospongiae</i> sp. Cu-19	X	
<i>Demospongiae</i> unid. sp.	X	
Dictyoceratida unid. sp.		1
<i>Discodermia</i> sp. Cu-01	X	
<i>Dysidea</i> sp.	X	
<i>Ectyoplasia ferox</i>	X	
<i>Geodia cf. criбата</i>	X	
<i>Geodia neptuni</i>	X	
<i>Geodia</i> sp. Cu-06	X	
<i>Ircinia</i> sp.		1
<i>Ircinia strobilina</i>	X	
<i>Niphates arenata</i>	X	
<i>Oceanapia</i> sp. Cu-01	X	
<i>Oceanapia</i> sp. Cu-02	X	
Petrosiidae Cu-06	X	
Petrosiidae Cu-10	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Smenospongia echina</i>	X	
<i>Spirastrella coccinea</i>	X	
Spirastrellidae unid. sp.	X	
<i>Svenzea zeai</i>	X	
Verongiida Cu-01	X	
Verongiida Cu-05	X	
Verongiida Cu-07	X	

Dive Site: Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41;
ROV 17-26; 1-VI-17-1

<i>Verongula gigantea</i>	X
<i>Verongula reiswigi</i>	X
<i>Verongula rigida</i>	X
<i>Xestospongia muta</i>	X
<i>Xestospongia</i> sp. Cu-01	X
Homoscleromorpha	X
<i>Oscarella</i> sp. Cu-02	X
<i>Plakortis</i> sp. Cu-01	X
Cnidaria	
Hydrozoa	X
Hydroidolina	X
<i>Millepora alcicornis</i>	X
Stylasteridae	X
Alcyonacea - gorgonian	X
<i>Ellisella</i> sp.	X
<i>Gorgonia ventalina</i>	X
Gorgoniidae	X
<i>Nicella</i> sp.	X
Plexauridae	X
<i>Pseudopterogorgia</i> sp.	X
Antipatharia	X
<i>Aphanipathes</i> sp.	X
<i>Plumapathes pennacea</i>	X
<i>Stichopathes</i> sp.	X
Scleractinia	XX
<i>Acropora cervicornis</i>	X
<i>Agaricia agaricites</i>	X
<i>Agaricia grahamae</i>	X
<i>Agaricia lamarcki</i>	X
<i>Agaricia</i> sp.	X
<i>Colpophyllia natans</i>	X
<i>Madracis formosa</i>	X
<i>Meandrina meandrites</i>	X
<i>Montastraea cavernosa</i>	X
<i>Mycetophyllia aliciae</i>	X
<i>Mycetophyllia lamarkiana</i>	X
<i>Mycetophyllia</i> sp.	X
<i>Orbicella faveolata</i>	X
<i>Porites astreoides</i>	X
<i>Porites furcata</i>	X
<i>Porites porites</i>	X
<i>Porites</i> sp.	X

Dive Site: Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41;
ROV 17-26; 1-VI-17-1

Scleractinia- unid colonial	X
Scleractinia- unid cup	X
<i>Scolymia cubensis</i>	X
<i>Siderastrea siderea</i>	X
<i>Stephanocoenia intersepta</i>	X
Other	2
Echinodermata	1
Ophiuroidea	1
Chordata - Invertebrate	1
Ascidiacea	1

Dive Site: Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41;
ROV 17-26; 1-VI-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-26. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Southeast Coast ROV 17-26 C-41 Notes
Commercially Important Species	41
Actinopterygii	41
Perciformes	27
<i>Epinephelus guttatus</i> - Red Hind	1
<i>Epinephelus striatus</i> - Nassau Grouper	1
<i>Lutjanus mahogoni</i> - Mahogany Snapper	1
<i>Mycteroperca bonaci</i> - Black Grouper	1
<i>Mycteroperca tigris</i> - tiger grouper	4
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	17
Serranidae - Grouper	2
Scorpaeniformes	14
<i>Pterois volitans</i> - Lionfish	14
Other	
Actinopterygii	
Beryciformes	X
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Holocentrus</i> sp. - Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Anisotremus virginicus</i> - Porkfish	X
Carangidae - Jack	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish	X
<i>Chaetodon striatus</i> - Banded Butterflyfish	X
Chaetodontidae - Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon flavolineatum</i> - French Grunt	X

Dive Site: Cuba, S coast, Cayo Caballones, south slope, Jardines de La Reina MPA, Station C-41;
ROV 17-26; 1-VI-17-1

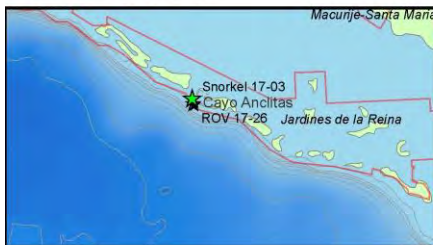
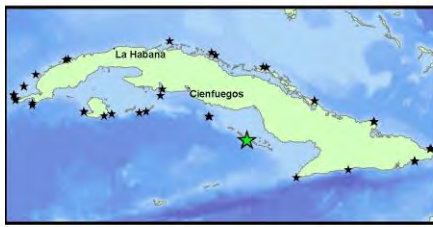
<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon sciurus</i> - Bluestriped Grunt	X
<i>Haemulon</i> sp. - Grunt	X
<i>Haemulon vittatum</i> - Boga	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus bermudensis</i> - Blue Angelfish	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus</i> sp. - Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
Labridae - Wrasse	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacanthus paru</i> - French Angelfish	X
<i>Pomacentrus</i> sp. - Damselfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Scomberomorus</i> sp. - Mackerel	X
<i>Serranus notospilus</i> - Saddle Bass	X
<i>Sparisoma atomarium</i> - Greenblotch Parrotfish	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sparisoma viride</i> - Stoptlight Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes leucostictus</i> - Beaugregory	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Stegastes planifrons</i> - Threespot Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X

Dive Site: Cuba, S coast, Cayo Anclitas, Pta. Practicas, Jardines de la Reina MPA, Station C-41A; Snorkel 17-03; 1-VI-17-3

General Location and Dive Track:

Cuba, S coast, Cayo Anclitas, Pta. Practicas, Jardines de la Reina MPA, Station C-41A; Snorkel 17-03; 1-VI-17-3

- ★ Snorkel 17-03
- ★ Mohawk ROV
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: N/A

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/27/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophoitic Reef Exploration of Cuba

Vehicle: Snorkel

Sensors: GoPro

Data Management: Access Database

Date of Dive: 6/1/2017

Specimens: 31

Digital Photos: 76

No. DVD:

Hard Drive No.:

Dive Site: Cuba, S coast, Cayo Anclitas, Pta. Practicas, Jardines de la Reina MPA, Station C-41A;
Snorkel 17-03; 1-VI-17-3

Dive Data:

Minimum Bottom Depth (m): 5	Total Transect Length (km): 0.000
Maximum Bottom Depth (m): 5	Surface Current (kn):
On Bottom (Time- GMT): 13:30	On Bottom (Lat/Long): 20.8115°N; -78.9661°W
Off Bottom (Time- GMT):	Off Bottom (Lat/Long): 20.8079°N; -78.9555°W
Physical (bottom); Temp (°C): N/A	Salinity: N/A Visibility: N/A Current (kn): N/A

Physical Environment:

Dive Site: Cuba, S coast, Cayo Anclitas, Pta. Practicas, Jardines de la Reina MPA, Station C-41A;
Snorkel 17-03; 1-VI-17-3

Dive Imagery:



Figure 1: 20°48.475'N;78°57.33'W: 5 m
Shallow reef with partially bleached *Montastraea cavernosa* and octocorals



Figure 2: 20°48.475'N;78°57.33'W: 5 m
Montastraea cavernosa and octocorals



Figure 3: 20°48.475'N;78°57.33'W: 5 m
Montastraea cavernosa, *Pseudopterogorgia americana* octocoral, and various algae- *Sargassum* sp., *Cladophora fuliginosa*, and *Dictyota* sp.



Figure 4: 20°48.475'N;78°57.33'W: 5 m
Montastraea cavernosa, octocorals, and green turf algae- *Cladophora fuliginosa*



Figure 5: 20°48.475'N;78°57.33'W: 5 m
Partially bleached *Montastraea cavernosa* on shallow reef



Figure 6: 20°48.475'N;78°57.33'W: 5 m
Montastraea cavernosa, stink sponge- *Ircinia* sp.

Dive Site: Cuba, S coast, Cayo Anclitas, Pta. Practicas, Jardines de la Reina MPA, Station C-41A;
Snorkel 17-03; 1-VI-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 1-VI-17-3; Snorkel 17-03; Cuba, S coast, Cayo Anclitas, Pta. Practicas, Jardines de la Reina MPA, Station C-41A.

Objectives- Snorkel dive for collections.

Site Description/Habitat:

5 m, flat hard bottom reef.

Number of Samples- 31

Montastraea cavernosa- 15

Dive Site: Cuba, S coast, Cayo Anclitas, Pta. Practicas, Jardines de la Reina MPA, Station C-41A;
Snorkel 17-03; 1-VI-17-3

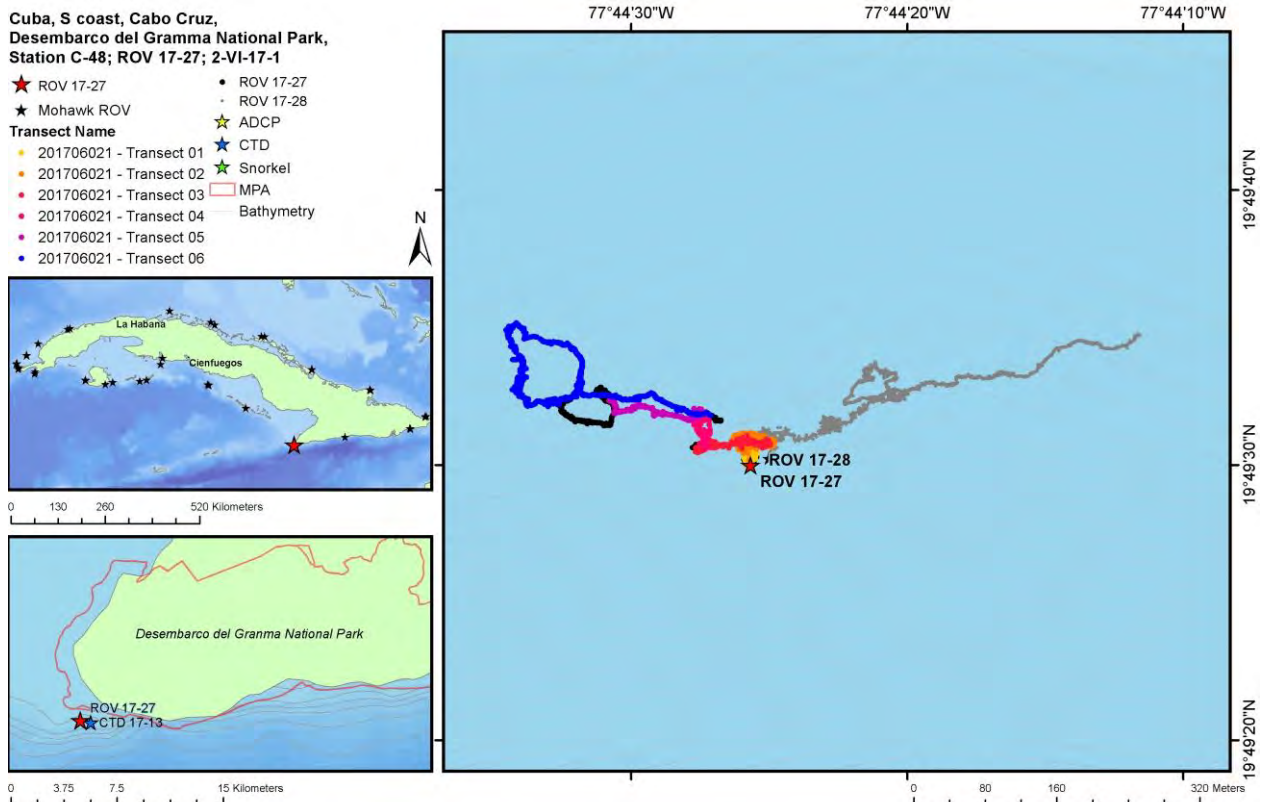
Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic biota identified or collected from snorkel dive site 17-03.

Southeast Coast Snorkel 17-03 C-41A		
Phylum/Class/Scientific Name	Notes	Samples
Algae		11
Chlorophyta		4
<i>Avrainvillea</i> sp.		1
<i>Cladophora fuliginosa</i>		1
<i>Cladophoropsis macromeres</i>	X	
<i>Dictyosphaeria cavernosa</i>		1
<i>Halimeda</i> sp.		1
Ochrophyta		4
<i>Dictyota caribaea</i>		1
<i>Dictyota</i> sp.		1
<i>Padina sanctae-crucis</i>		1
<i>Sargassum</i> sp.		1
Rhodophyta		3
<i>Ceramium cimbricum</i>	X	
<i>Galaxaura</i> sp.		1
<i>Hypnea spinella</i>	X	
<i>Jania capillacea</i>	X	
<i>Jania</i> sp.		1
<i>Polysiphonia</i> sp.	X	
Rhodophyta		1
Cnidaria		15
Scleractinia		15
<i>Montastraea cavernosa</i>		15

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-27; 2-VI-17-1

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophoitec Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/2/2017

Specimens: 11

Digital Photos: 413

No. DVD: 3

Hard Drive No.: 1

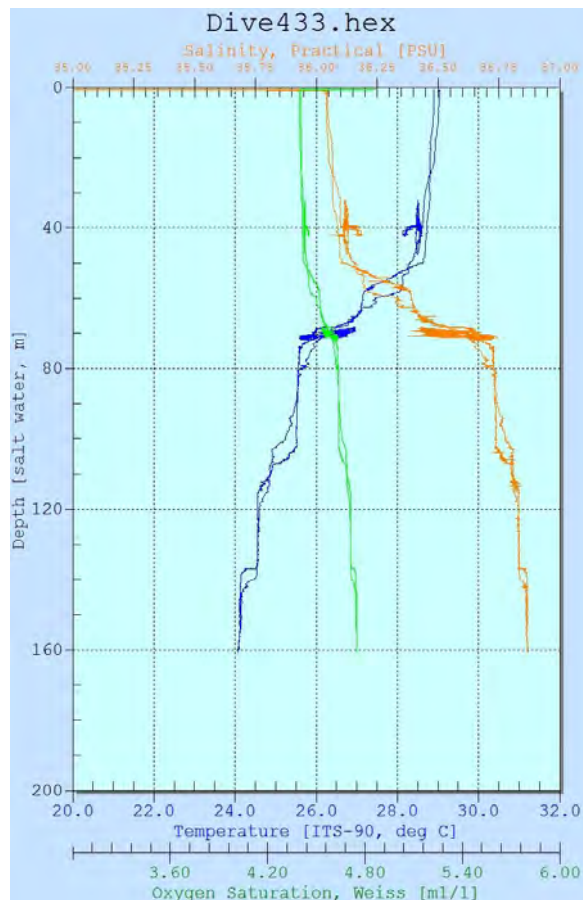
Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-27; 2-VI-17-1

Dive Data:

Minimum Bottom Depth (m): 40	Total Transect Length (km): 1.180
Maximum Bottom Depth (m): 154	Surface Current (kn): 0.7
On Bottom (Time- GMT): 10:14	On Bottom (Lat/Long): 19.825°N; -77.7405°W
Off Bottom (Time- GMT): 13:11	Off Bottom (Lat/Long): 19.8254°N; -77.7407°W
Physical (bottom); Temp (°C): 24.1	Salinity: 36.86 Visibility 30 Current (kn): 0.4

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-27 are as follows: Depth Maximum: 160.8 m, Temperature: 24.1-29 °C, Salinity: 36-36.9 PSU, and Oxygen Saturation: 4.4-4.8 ml/l.

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-27; 2-VI-17-1

Dive Imagery:



Figure 1: 19°49.505'N;77°44.4307'W: -146.9 m
Lionfish- *Pterois volitans/miles* on deep island slope
(10 cm lasers)



Figure 2: 19°49.5053'N;77°44.4302'W: -146.6 m
Short Bigeye- *Pristigenys alta* on deep island slope



Figure 3: 19°49.5122'N;77°44.4329'W: -129.5 m
Nicella goreauii octocoral, and white demospunge



Figure 4: 19°49.5145'N;77°44.4299'W: -126.3 m
Various species of octocorals on deep wall

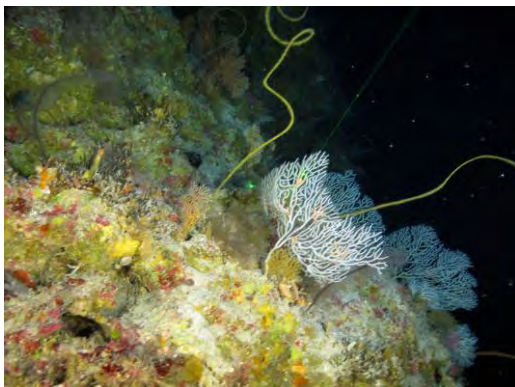


Figure 5: 19°49.5136'N;77°44.4338'W: -119.4 m
White fan octocoral- *Nicella* sp., and wire coral-
Stichopathes sp.



Figure 6: 19°49.5131'N;77°44.4546'W: -54.5 m
Tube sponge- *Agelas cf. tubulata*

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-27; 2-VI-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 2-VI-17-1; ROV 17-27, UNCW Dive 433; Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 154- 40 m.

Transect upslope heading N.

9:59- Launch. Wind- 15 kn from 104°, current- 0.7 kn to W, seas- 1 m from SE, water temperature- 29.11 °C, salinity- 36.01.

10:17 - On bottom; visibility- 30 m.

13:11- End dive.

154 m, deep island slope zone: 60° rock pavement slope, scalloped surface, horizontal layering. Biota: sponges- sponges common, thin encrusting yellow Verongiida sponges; Gorgonacea- small fans, *Ellisella* whip coral, 30 cm Paramuriceidae; *Stichopathes*;

150 m- lionfish, bigeye.

Vertical photo transect upslope, 150-125 m; 10:18-10:27; deep island slope zone.

137 m: Antipathes bush.

135 m: 70° rock slope, sand chutes; gorgonians and sponges common and diverse; *Nicella goreau*, *Tanacetipathes*.

125 m, lower mesophotic zone: 80-90° rock wall, eroded karst-like rock, 1 m wide ledges; dense gorgonians and sponges, *Hypnogorgia*, 60 cm orange fan gorgonians, CCA.

Vertical photo transect upslope, 125-71 m, 10:27- 11:30; lower mesophotic reef.

120 m: buttresses, 10 m wide; dense CCA, sclerosponges.

110 m: ledges, caves; dense black coral fans.

101 m: thin encrusting Chlorophyta, *Filograna* polychaete tubes, fishing line.

90 m: vertical wall; first *Solenastrea* (10 cm).

84 m: first *Agaricia*, several 25 cm.

81 m: rope sponge zone.

72 m: *Madracis formosa*, dense *Agaricia*; first *Orbicella faveolata* (20 cm).

Quantitative horizontal photo transect, 70 m, 11:32- 11:49 (30 photos); along face of 90° eroded wall; 20 cm- 1 m diameter *Agaricia* common.

70 m: first Lobophora.

69 m: upper brow of wall, 60-45° slope; no overhanging buttresses, no deep sand chutes.

Vertical photo transect upslope, 65- 40 m, 11:50- 12:15; continue lower mesophotic zone.

60 m: 45° slope; first *Halimeda*; gorgonians- *Pseudopterogorgia*.

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-27; 2-VI-17-1

53 m, upper mesophotic zone: upper brow, 45° slope, dense gorgonians and sponges, fewer corals.

45- 40 m: top of wall, deep fringing reef, with ½ m deep sand chutes; flattens out at 40 m; dense gorgonians on top; low density and diversity of coral.

Quantitative horizontal photo transect, 40 m, 12:17- 12:30 (30 photos); along crest and fore reef slope.

Fish video transect, 40 m, 12:40- 13:10; along fore reef slope.

Maximum Depth Occurrences:

Lionfish- 150 m

Crustose coralline algae (CCA)- 124 m

Chlorophyta, thin encrusting- 101 m

Solenastrea- 98 m (check- *Stephanocoenia*?)

Agaricia- 84 m

Madracis formosa- 72 m

Orbicella faveolata- 72 m

Halimeda- 60 m

Number of Samples- 11

Disease and Human Impacts:

None

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-27; 2-VI-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-27. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

		Southeast Coast ROV 17-27 C-48	
Phylum/Class/Scientific Name	Notes	Samples	
Algae		4	
Chlorophyta		2	
Chlorophyta	X		
Chlorophyta- bright	X		
Chlorophyta- palida	X		
<i>Halimeda copiosa</i>	X		
<i>Halimeda</i> sp.	X		
<i>Halimeda tuna</i>		2	
<i>Rhypocephalus phoenix</i>	X		
Ochrophyta		2	
<i>Dictyota menstrualis</i>		1	
<i>Dictyota</i> sp.	X		
<i>Lobophora</i> sp.	X	1	
Rhodophyta			
Crustose coralline (CCA)	X		
Porifera		2	
Calcarea			
Calcarea sp. Cu-01	X		
<i>Leucetta</i> cf. <i>floridiana</i>	X		
<i>Leucetta</i> sp. Cu-01	X		
Demospongiae		2	
<i>Agelas cerebrum</i>	X		
<i>Agelas cervicornis</i>	X		
<i>Agelas citrina</i>	X		
<i>Agelas clathrodes</i>	X		
<i>Agelas conifera</i>	X		
<i>Agelas flabelliformis</i>	X		
<i>Agelas repens</i>	X		
<i>Agelas sceptrum</i>	X		
<i>Agelas</i> sp. Cu-02	X		
<i>Agelas</i> sp. Cu-08	X		
<i>Aiolochoira crassa</i>	X		

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-27; 2-VI-17-1

<i>Amphimedon compressa</i>	X	
<i>Amphimedon</i> sp. Cu-01	X	
<i>Amphimedon</i> sp. Cu-02	X	
<i>Amphimedon</i> sp. Cu-04	X	
<i>Aplysina archeri</i>	X	
<i>Aplysina bathyphila</i>	X	1
<i>Aplysina cauliformis</i>	X	
<i>Aplysina fistularis</i>	X	
<i>Aplysina fulva</i>	X	
<i>Aplysina lacunosa</i>	X	
<i>Aplysina</i> sp. Cu-04	X	
<i>Callyspongia plicifera</i>	X	
<i>Callyspongia vaginalis</i>	X	
<i>Ceratoporella nicholsoni</i>	X	
<i>Cinachyrella</i> sp. Cu-03	X	
<i>Ciocalypta cf. porrecta</i>	X	
<i>Clathria echinata</i>	X	
<i>Cribrochalina vasculum</i>	X	
Demospongiae sp. Cu-11	X	
Demospongiae sp. Cu-14	X	
Demospongiae sp. Cu-20	X	
Demospongiae sp. Cu-22	X	
Demospongiae sp. Cu-23	X	
Dictyoceratida sp. Cu-01	X	
<i>Geodia neptuni</i>	X	
<i>Ircinia strobilina</i>	X	
<i>Niphates digitalis</i>	X	
<i>Oceanapia</i> sp. Cu-01	X	
<i>Ptilocaulis walpersi</i>	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Spirastrella coccinea</i>	X	
<i>Spirastrella hartmani</i>	X	
<i>Svenzea zeai</i>	X	1
Tetractinellida Cu-05	X	
Verongiida Cu-01	X	
Verongiida Cu-05	X	
<i>Verongula rigida</i>	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		3

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-27; 2-VI-17-1

Hydrozoa		
Hydroidolina	X	
<i>Millepora alcicornis</i>	X	
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		3
Alcyonacea- gorgonian		2
<i>Ellisella barbadensis</i> (Duchassaing & Michelotti, 1864) syn. <i>elongata</i> (Pallas, 1766)	X	
<i>Ellisella</i> sp.	X	
<i>Eunicea</i> sp.	X	
<i>Gorgonia ventalina</i>	X	
Gorgoniidae	X	
<i>Hypnogorgia</i> sp.	X	1
<i>Iciligorgia schrammi</i>	X	
<i>Nicella</i> sp.	X	
<i>Paramuricea</i> sp.	X	
Plexauridae	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		
<i>Antipathes atlantica</i>	X	
<i>Antipathes furcata</i>	X	
<i>Antipathes</i> sp.	X	
Antipathidae	X	
<i>Aphanipathes</i> sp.	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		
<i>Agaricia agaricites</i>	X	
<i>Agaricia grahamae</i>	X	
<i>Agaricia lamarcki</i>	X	
<i>Agaricia</i> sp.	X	
<i>Colpophyllia natans</i>	X	
<i>Eusmilia fastigiata</i>	X	
<i>Madracis asperula</i>	X	
<i>Madracis auretenra</i>	X	
<i>Madracis formosa</i>	X	
<i>Madrepora</i> sp.	X	
<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-27; 2-VI-17-1

<i>Mycetophyllia</i> sp.	X	
<i>Orbicella faveolata</i>	X	
<i>Orbicella franksi</i>	X	
<i>Porites astreoides</i>	X	
<i>Pseudodiploria strigosa</i>	X	
Scleractinia- unid cup	X	
<i>Scolymia cubensis</i>	X	
<i>Siderastrea siderea</i>	X	
<i>Solenastrea bournoni</i>	X	
<i>Stephanocoenia intersepta</i>	X	
Other		2
Bryozoa		1
Echinodermata		1
Crinoidea		1

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-27; 2-VI-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-27. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

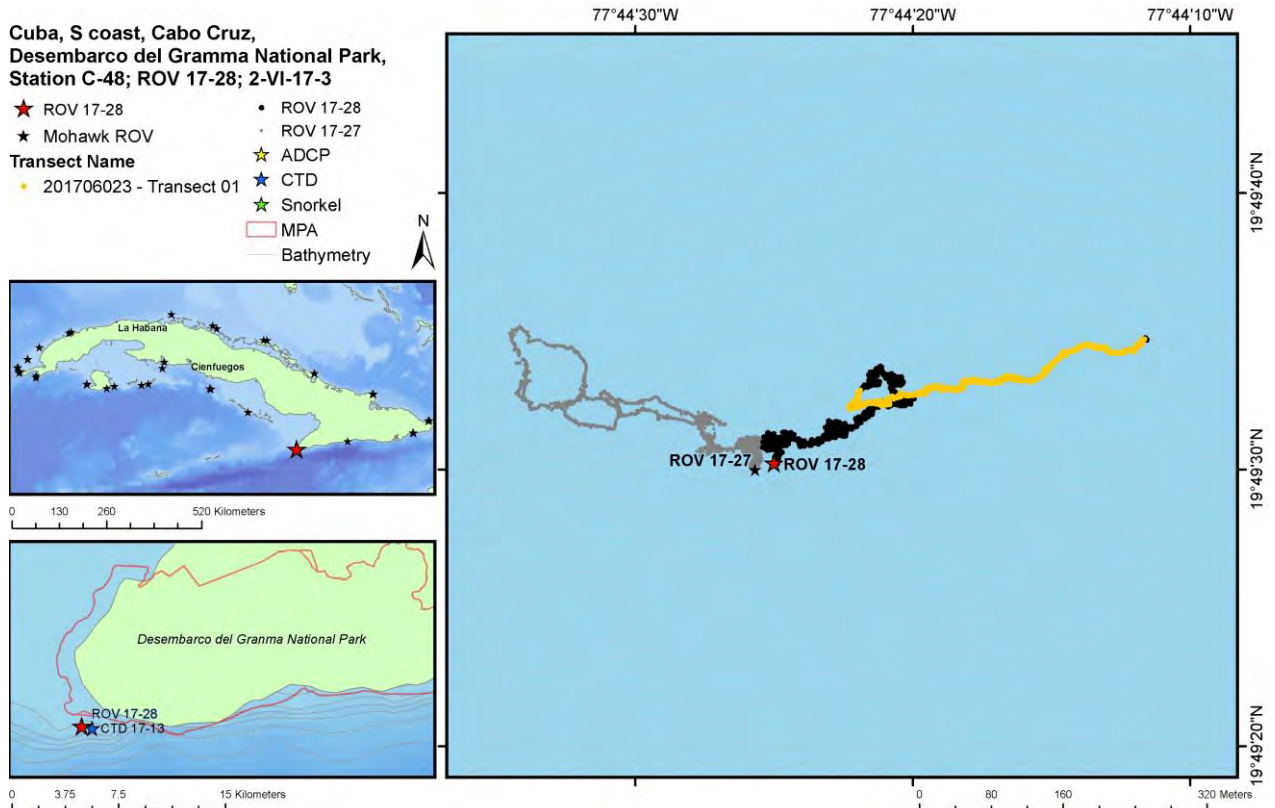
Southeast Coast ROV 17-27 C-48	
Phylum/Class/Order/Scientific Name - Common Name	Notes
Commercially Important Species	20
Actinopterygii	20
Perciformes	14
<i>Epinephelus guttatus</i> - Red Hind	1
<i>Epinephelus striatus</i> - Nassau Grouper	2
<i>Lutjanus campechanus</i> - Red Snapper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	10
Scorpaeniformes	6
<i>Pterois volitans</i> - Lionfish	6
Other	
Actinopterygii	
Anguilliformes	
<i>Gymnothorax</i> sp. - Moray Eel	X
Beryciformes	
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Anisotremus virginicus</i> - Porkfish	X
<i>Calamus</i> sp. - Porgy	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Four-eye Butterflyfish	X
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish	X
<i>Chaetodon striatus</i> - Banded Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Chromis scotti</i> - Purple Reef fish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon flavolineatum</i> - French Grunt	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-27; 2-VI-17-1

<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus indigo</i> - Indigo hamlet	X
<i>Hypoplectrus nigricans</i> - Black Hamlet	X
Labridae - Wrasse	X
<i>Lachnolaimus maximus</i> - Hogfish	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Pomacanthus paru</i> - French Angelfish	X
<i>Pomacentrus</i> sp. - Damselfish	X
<i>Pristigenys alta</i> - Short Bigeye	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Serranus annularis</i> - Orangeback Bass	X
<i>Serranus</i> sp. - Sea Bass	X
<i>Serranus tortugarum</i> - Chalk Bass	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes adustus</i> - dusky damselfish	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Balistes vetula</i> - Queen Triggerfish	X
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Lactophrys triqueter</i> - Smooth Trunkfish	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-28; 2-VI-17-3

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/2/2017

Specimens: 11

Digital Photos: 333

No. DVD: 3

Hard Drive No.: 1

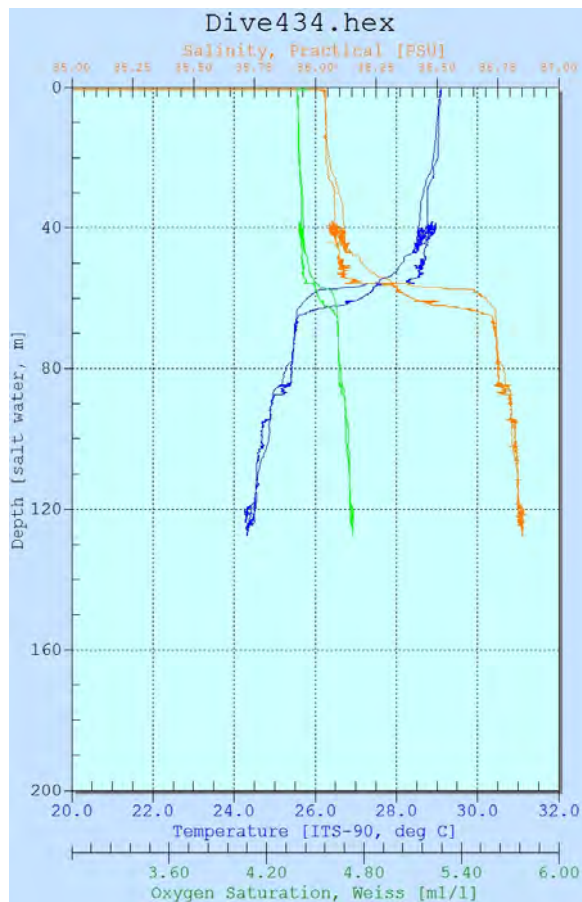
Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-28; 2-VI-17-3

Dive Data:

Minimum Bottom Depth (m): 40	Total Transect Length (km): 0.855
Maximum Bottom Depth (m): 122	Surface Current (kn): 0.1
On Bottom (Time- GMT): 15:06	On Bottom (Lat/Long): 19.8251°N; -77.7403°W
Off Bottom (Time- GMT): 17:30	Off Bottom (Lat/Long): 19.8263°N; -77.7365°W
Physical (bottom); Temp (°C): 24.3	Salinity: 36.85 Visibility 30 Current (kn): 0

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-28 are as follows: Depth Maximum: 127.5 m, Temperature: 24.3-29.1 °C, Salinity: 36-36.9 PSU, and Oxygen Saturation: 4.4-4.7 ml/l.

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-28; 2-VI-17-3

Dive Imagery:



Figure 1: 19°49.5142'N;77°44.4194'W: -121.9 m
Ultra-thin fan sponges- undescribed *Agelas* sp.

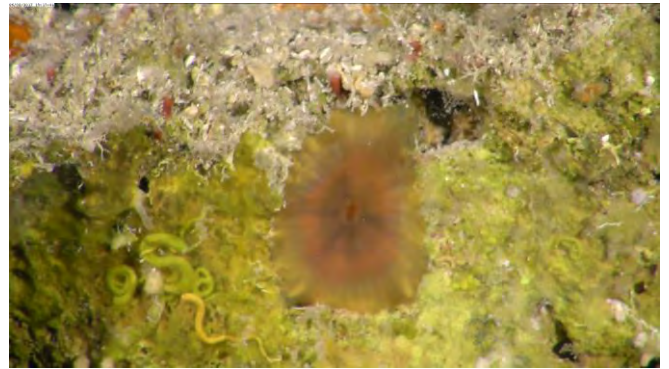


Figure 2: 19°49.5158'N;77°44.4185'W: -122.7 m
Solitary cup coral with polyp exserted, Serpulidae worm tubes

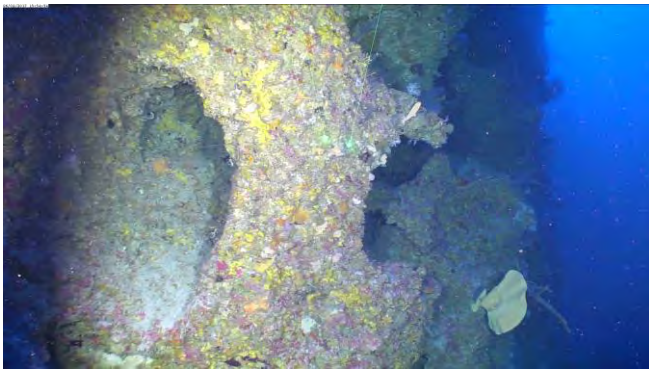


Figure 3: 19°49.5256'N;77°44.3788'W: -96 m
Karst topography eroded during glacial low sea-level stands

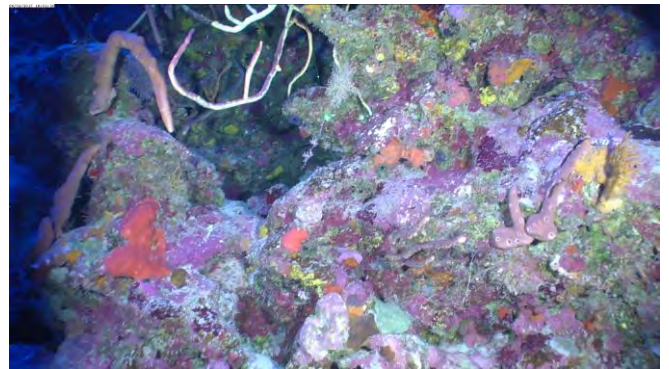


Figure 4: 19°49.5267'N;77°44.3759'W: -69.9 m
Encrusting coralline algae and various species of demosponges

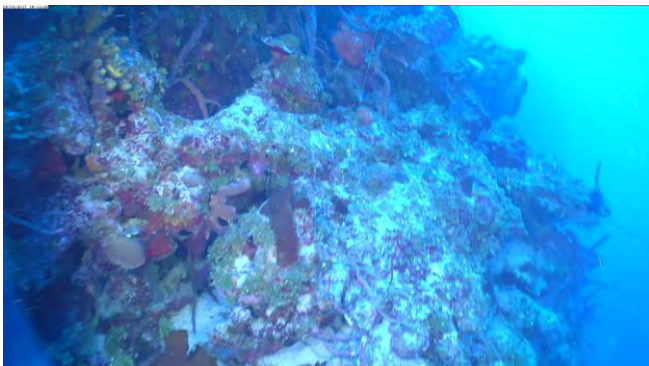


Figure 5: 19°49.5397'N;77°44.3404'W: -51.8 m
Buttress of deep fore reef slope



Figure 6: 19°49.5589'N;77°44.3548'W: -39.8 m
Octocorals on back reef of deep fringing reef

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-28; 2-VI-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 2-VI-17-3; ROV 17-28, UNCW Dive 434; Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Same site as previous dive, starting at 122 m; conduct collections and fish surveys only, no benthic surveys.

Site Description/Habitat:

Depth range: 122- 40 m.

14:48- Launch. Wind- 15 kn from 107°, current- 0.1 kn to 297°, seas- 0.3- 1.0 m from SE, water temperature- 29.38 °C, salinity- 35.99.

14:55 - On bottom; visibility- 30 m.

17:30- End dive.

122 m: vertical 90° wall, eroded surface, ledges.

Fish video survey, 41- 45 m, 16:56- 17:30; along deep fringing fore reef slope.

Number of Samples- 11

Disease and Human Impacts:

None

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-28; 2-VI-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-28. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

		Southeast Coast ROV 17-28 C-48	
Phylum/Class/Scientific Name	Notes	Samples	
Algae		5	
Chlorophyta		3	
Chlorophyta		1	
Chlorophyta- bright		X	
Chlorophyta- palida		X	
<i>Halimeda copiosa</i>		X	
<i>Halimeda goreau</i>			1
<i>Halimeda</i> sp.		X	
<i>Halimeda tuna</i>			1
Ochrophyta		1	
<i>Dictyota</i> sp.		X	
<i>Lobophora</i> sp.		X	1
Rhodophyta		1	
Corallinophycidae		1	
Crustose coralline (CCA)		X	
Porifera		5	
Calcarea		X	
<i>Leucetta cf. floridiana</i>		X	
<i>Leucetta floridana</i>		X	
Demospongiae		5	
<i>Agelas citrina</i>		X	
<i>Agelas clathrodes</i>		X	
<i>Agelas flabelliformis</i>		X	
<i>Agelas sceptrum</i>		X	
<i>Aka</i> sp.			1
<i>Amphimedon</i> sp. Cu-06		X	
<i>Aplysina bathyphila</i>		X	
<i>Aplysina fistularis</i>		X	
<i>Aplysina fulva</i>		X	
<i>Aplysina sciophila</i>		X	
<i>Aplysina</i> sp. Cu-04		X	
<i>Ceratoporella nicholsoni</i>		X	

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-28; 2-VI-17-3

Cinachyrella sp. Cu-03	X	
Demospongiae sp. Cu-13	X	
Demospongiae unid. sp.		2
<i>Geodia cf. cribata</i>	X	
Heteroscleromorpha Cu-01	X	
<i>Ircinia strobilina</i>	X	
<i>Niphates arenata</i>	X	
<i>Niphates digitalis</i>	X	
<i>Oceanapia</i> sp. Cu-01	X	
<i>Petrosia weinbergi</i>	X	1
<i>Smenospongia echina</i>	X	
Spirastrellidae unid. sp.	X	
Verongiida		1
Verongiida Cu-01	X	
<i>Verongula rigida</i>	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Cnidaria		1
Hydrozoa		
Hydroidolina	X	
<i>Millepora alcicornis</i>	X	
Stylasteridae	X	
Alcyonacea - gorgonian		1
Alcyonacea- gorgonian		1
<i>Ellisella</i> sp.	X	
<i>Gorgonia ventalina</i>	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Nicella</i> sp.	X	
<i>Plexaurella</i> sp.	X	
<i>Pseudopterogorgia</i> (syn. <i>Antillogorgia</i>) <i>bipinnata</i>	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		
<i>Antipathes atlantica</i>	X	
Antipathidae	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		
<i>Agaricia agaricites</i>	X	
<i>Agaricia</i> sp.	X	
<i>Eusmilia fastigiata</i>	X	

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-28; 2-VI-17-3

<i>Meandrina meandrites</i>	X
<i>Montastraea cavernosa</i>	X
<i>Mycetophyllia</i> sp.	X
<i>Orbicella faveolata</i>	X
Scleractinia- unid cup	X
<i>Scolymia cubensis</i>	X
<i>Siderastrea siderea</i>	X
<i>Stephanocoenia intersepta</i>	X

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-28; 2-VI-17-3

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-28. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Southeast Coast ROV 17-28 C-48	
Phylum/Class/Order/Scientific Name - Common Name	Notes
Commercially Important Species	14
Actinopterygii	14
Perciformes	12
<i>Lutjanus apodus</i> - Schoolmaster	2
<i>Mycteroperca tigris</i> - tiger grouper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	8
Serranidae - Grouper	1
Scorpaeniformes	2
<i>Pterois volitans</i> - Lionfish	2
Other	
Actinopterygii	
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Anisotremus virginicus</i> - Porkfish	X
<i>Calamus</i> sp. - Porgy	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon striatus</i> - Banded Butterflyfish	X
Chaetodontidae - Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Chromis scotti</i> - Purple Reefish	X
<i>Clepticus parrae</i> - creole wrasse	X
Gobiidae - Goby	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon aurolineatum</i> - Tomtate	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon sciurus</i> - Bluestriped Grunt	X

Dive Site: Cuba, S coast, Cabo Cruz, Desembarco del Gramma National Park, Station C-48; ROV 17-28; 2-VI-17-3

<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus nigricans</i> - Black Hamlet	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Sparisoma atomarium</i> - Greenblotch Parrotfish	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyaena barracuda</i> - Great Barracuda	X
<i>Stegastes leucostictus</i> - Beaugregory	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X

Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-29; 3-VI-17-1

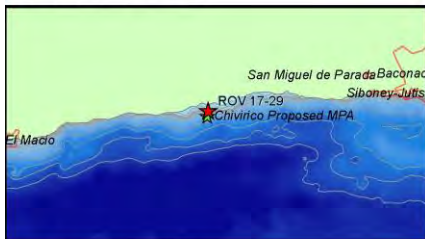
General Location and Dive Track:

Cuba, S coast, Sierra Maestra,
Chivirico Proposed MPA,
Station C-50; ROV 17-29; 3-VI-17-1

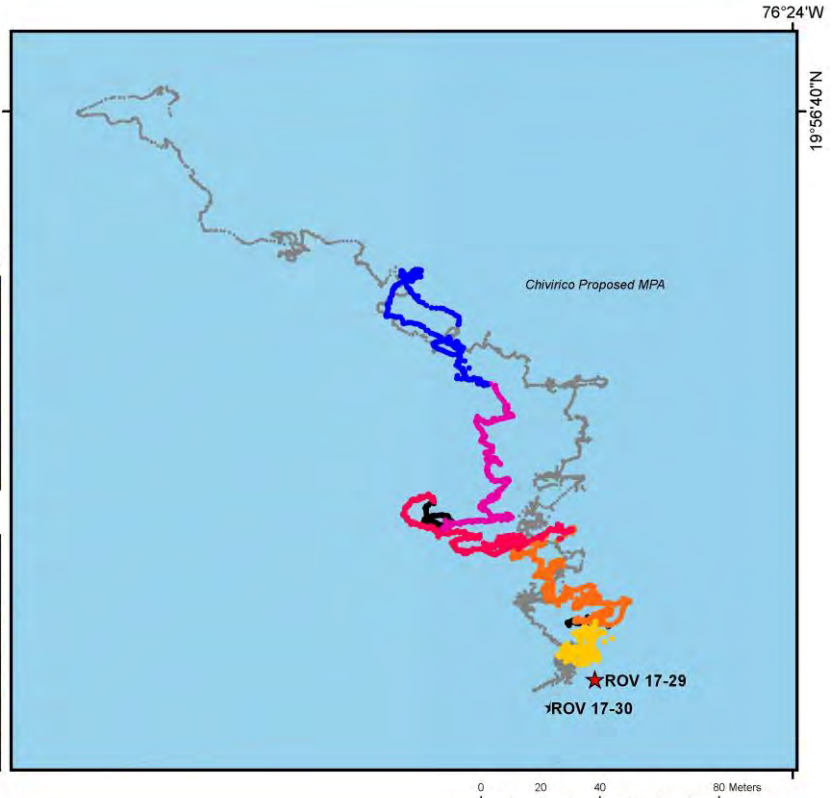
- ★ ROV 17-29
- ★ Mohawk ROV
- Transect Name**
- 201706031 - Transect 01
- 201706031 - Transect 02
- 201706031 - Transect 03
- 201706031 - Transect 04
- 201706031 - Transect 05
- ROV 17-29
- ROV 17-30
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



0 130 260 520 Kilometers



0 15 30 60 Kilometers



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/3/2017

Specimens: 3

Digital Photos: 309

No. DVD: 3

Hard Drive No.: 1

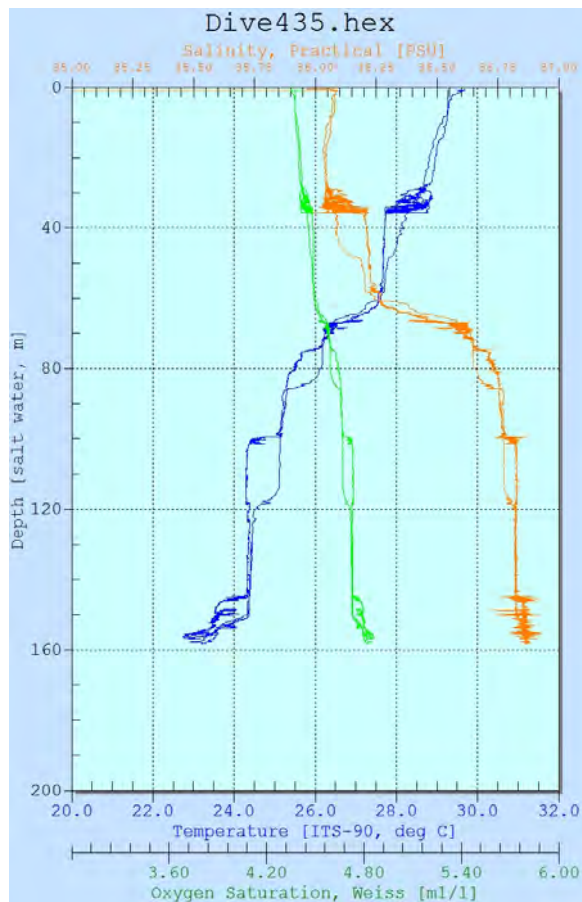
Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-29; 3-VI-17-1

Dive Data:

Minimum Bottom Depth (m): 30	Total Transect Length (km): 0.590
Maximum Bottom Depth (m): 155	Surface Current (kn): 0.3
On Bottom (Time- GMT): 8:38	On Bottom (Lat/Long): 19.9427°N; -76.4006°W
Off Bottom (Time- GMT): 11:08	Off Bottom (Lat/Long): 19.9438°N; -76.4011°W
Physical (bottom); Temp (°C): 23.5	Salinity: 36.86 Visibility 40 Current (kn): 0.5

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-29 are as follows: Depth Maximum: 158.2 m, Temperature: 22.7-29.6 °C, Salinity: 36-36.9 PSU, and Oxygen Saturation: 4.4-4.9 ml/l.

Dive Imagery:

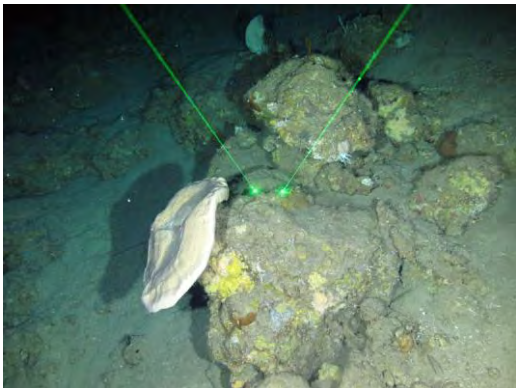


Figure 1: 19°56.5691'N;76°24.0381'W: -153.1 m
Unknown demersal sponge plate on boulders of deep island slope

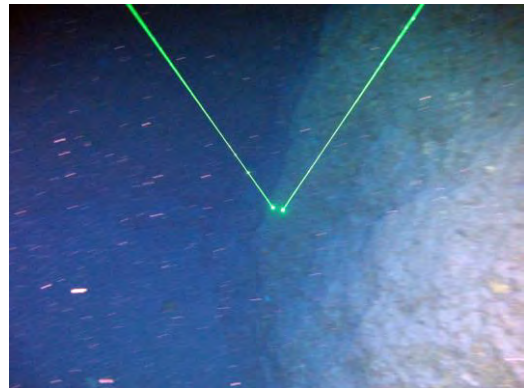


Figure 2: 19°56.5713'N;76°24.0355'W: -150.1 m
Vertical rock wall of the deep island slope (10 cm lasers)



Figure 3: 19°56.5682'N;76°24.0371'W: -153.3 m
Unknown demersal sponge plate (10 cm lasers)



Figure 4: 19°56.5725'N;76°24.0379'W: -144.6 m
Unknown tubular demersal sponge on rock wall



Figure 5: 19°56.5828'N;76°24.0451'W: -84.5 m
Agaricia sp., and orange encrusting sponge- probably a *Spirastrellidae*, Demospongiae

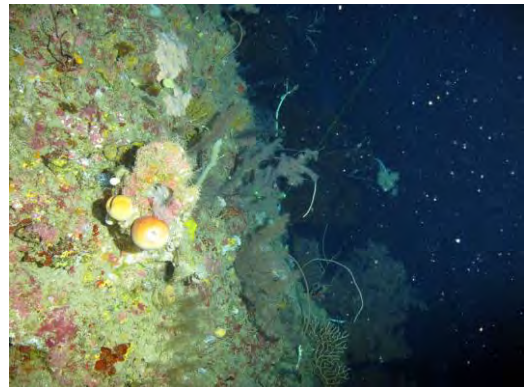


Figure 6: 19°56.5825'N;76°24.0461'W: -82.6 m
The 'Wall' with black corals, sponges, and coralline algae

Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-29; 3-VI-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 3-VI-17-1; ROV 17-29, UNCW Dive 435; Cuba, S coast, Sierra Maestra, Chivirico MPA, Station C-50.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 155- 30 m.

Transect up slope heading 350°.

8:23- Launch. Wind- 3 kn from 322°, current- 0.3 kn to W, seas- 0.3 m from E, water temperature- 29.36 °C, salinity- 36.00.

8:38 - On bottom; visibility- 40 m.

11:09- End dive.

155 m, deep island slope zone: 45° rock slope, stair-step 3 m horizontal shelves, ½-1 m boulders, sediment. Biota: sponges common- Tetractinellida plates, Corallistes plates, *Xestospongia*.

Vertical photo transect upslope, 155- 125 m, 8:38- 9:18; deep island slope zone.

150 m: 90° rock pavement, scalloped surface; *Agelas* tube sponges.

145 m: sediment covered shelf, 3 m wide; Corallistes plates, black coral fans, *Ellisella* whip coral.

140 m: 80-90° rock, sand chutes; first CCA; sponges common, *Oceanapia*. Encrusting yellow sponges, *Davidaster* crinoid,

125 m, lower mesophotic zone: 90° rock wall, sand chutes, vertical fissures; dense, diverse sponges, *Stichopathes*.

Vertical photo transect upslope, 125- 70, 9:24- 10:10; lower mesophotic zone.

110 m: rock wall, smooth, not rugged, but with 15 m wide sand chutes; sponges- *Geodia*, Tetractinellida plates; gorgonians, black coral.

102 m: first *Swiftia exserta*.

100 m: overhanging buttresses. Biota: first CCA, *Peyssonnelia*; bushy black coral; rope sponges; more gorgonians- 1 m *Iciligorgia schrammi*, *Hypnogorgia*.

94 m: vertical wall, eroded karst-like rock, narrow buttresses.

85 m: first *Solenastrea* (10 cm).

81 m: first *Agaricia* (10 cm), Stylaster.

80 m: first *Halimeda*.

Quantitative horizontal photo transect, 70- 67 m, 10:10- 10:31 (30 photos); along face of buttresses.

Vertical photo transect upslope, 60- 35 m, 10:37- 10:57, upper brow of wall and upper mesophotic.

63 m: upper brow of buttresses, 60-45° slope.

60 m: first *M. cavernosa* (15 cm).

55 m: first *Lobophora*, start *Pseudopterogorgia*.

51 m: *Madracis decactis*, dense *Lobophora*.

Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-29; 3-VI-17-1

46 m, upper mesophotic zone: first *Orbicella faveolata* (conical), *Meandrina meandrites*.

40- 30 m: deep fringing reef, flattens out at 30 m; series of 3-m tall pinnacles on top, 30 m top, 35 m base.

Pinnacles with dense *Lobophora* (80% cover), sponges, gorgonians, dense *Agaricia* on slopes of pinnacles.

Quantitative horizontal photo transect, 35- 30 m, 10:57- 11:08 (25 images); upper mesophotic zone; along fringing reef.

Maximum Depth Occurrences:

Crustose coralline algae (CCA)- 140 m

Swiftia exserta- 100 m

Agaricia- 87 m

Solenastrea- 85 m

Halimeda- 80 m

Montastraea cavernosa- 60 m

Madracis decactis- 51 m

Lobophora- 51 m

Orbicella faveolata- 46 m

Lionfish- 34 m

Number of Samples- 3

Disease and Human Impacts:

None

Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-29; 3-VI-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-29. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Notes	Samples
Southeast Coast ROV 17-29 C-50		
Algae		
Chlorophyta		
Chlorophyta- bright	X	
Chlorophyta- palida	X	
<i>Halimeda copiosa</i>	X	
<i>Halimeda goreau</i>	X	
<i>Halimeda</i> sp.	X	
<i>Microdictyon</i> sp.	X	
<i>Udotea cyathiformis</i>	X	
Ochrophyta		
<i>Lobophora</i> sp.	X	
Rhodophyta		
Crustose coralline (CCA)	X	
<i>Peyssonnelia</i> sp.	X	
Porifera		3
Demospongiae		
<i>Agelas cervicornis</i>	X	
<i>Agelas citrina</i>	X	
<i>Agelas clathrodes</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas</i> sp. Cu-04	X	
<i>Agelas</i> sp. Cu-08	X	
<i>Agelas tubulata</i>	X	
<i>Aiolochoiria crassa</i>	X	
<i>Aiolochoiria</i> sp. Cu-01	X	
<i>Amphimedon compressa</i>	X	
<i>Aplysina</i> aff. <i>lacunosa</i>	X	
<i>Aplysina archeri</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina fistularis</i>	X	
<i>Aplysina lacunosa</i>	X	

Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-29; 3-VI-17-1

<i>Aplysina sciophila</i>	X	
<i>Aplysina</i> sp. Cu-03	X	
<i>Aplysina</i> sp. Cu-04	X	
<i>Callyspongia plicifera</i>	X	
<i>Callyspongia</i> sp. Cu-02	X	
<i>Ceratoporella nicholsoni</i>	X	
<i>Cinachyrella</i> sp.		1
<i>Cinachyrella</i> sp. Cu-03	X	
<i>Clathria venosa</i>	X	
<i>Cliona delitrix</i>	X	
<i>Corallistes</i> sp.	X	
<i>Cribrochalina vasculum</i>	X	
Demospongiae sp. Cu-06	X	
Demospongiae sp. Cu-13	X	
Demospongiae sp. Cu-18	X	
Demospongiae unid. sp.	X	2
<i>Discodermia</i> sp. Cu-01	X	
<i>Ectyoplasia ferox</i>	X	
<i>Geodia cf. criбата</i>	X	
<i>Geodia neptuni</i>	X	
<i>Ircinia strobilina</i>	X	
<i>Myrmekioderma</i> sp. Cu-02	X	
<i>Niphates erecta</i>	X	
<i>Oceanapia</i> sp. Cu-01	X	
<i>Oceanapia</i> sp. Cu-02	X	
<i>Oceanapia</i> sp. Cu-04	X	
<i>Oceanapia</i> sp. Cu-06	X	
<i>Petrosia weinbergi</i>	X	
<i>Phakellia folium</i>	X	
<i>Ptilocaulis walpersi</i>	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Siphonodictyon</i> sp. Cu-01	X	
<i>Smenospongia echina</i>	X	
Spirastrellidae unid. sp.	X	
<i>Svenzea zeai</i>	X	
Verongiida Cu-01	X	
<i>Xestospongia deweerdtiae</i>	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia purpurea</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
<i>Oscarella</i> sp. Cu-01	X	

<i>Plakortis</i> sp. Cu-01	X
Cnidaria	
Hydrozoa	
Hydroidolina	X
<i>Millepora alcicornis</i>	X
Stylasteridae	X
Anthozoa- non coral	
<i>Lebrunia neglecta</i>	X
Alcyonacea - Alcyoniina	
<i>Chironephthya caribaea</i>	X
Alcyonacea - gorgonian	
<i>Ellisella</i> sp.	X
<i>Eunicea</i> sp.	X
<i>Gorgonia ventalina</i>	X
Gorgoniidae	X
<i>Hypnogorgia</i> sp.	X
<i>Iciligorgia schrammi</i>	X
<i>Nicella</i> sp.	X
<i>Plexaurella</i> sp.	X
Plexauridae	X
<i>Pseudopterogorgia</i> sp.	X
<i>Swiftia exserta</i>	X
Antipatharia	
<i>Antipathes atlantica</i>	X
Antipathidae	X
<i>Stichopathes</i> sp.	X
<i>Tanacetipathes</i> sp.	X
Scleractinia	
<i>Agaricia agaricites</i>	X
<i>Agaricia</i> sp.	X
<i>Colpophyllia natans</i>	X
<i>Helioseris cucullata</i>	X
<i>Madracis auretenra</i>	X
<i>Madracis decactis</i>	X
<i>Madracis formosa</i>	X
<i>Meandrina meandrites</i>	X
<i>Montastraea cavernosa</i>	X
<i>Mycetophyllia</i> sp.	X
<i>Orbicella faveolata</i>	X
Scleractinia- unid cup	X
<i>Scolymia cubensis</i>	X
<i>Siderastrea siderea</i>	X

Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-29; 3-VI-17-1

<i>Solenastrea bournoni</i>	X
<i>Stephanocoenia intersepta</i>	X

Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-29; 3-VI-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-29. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

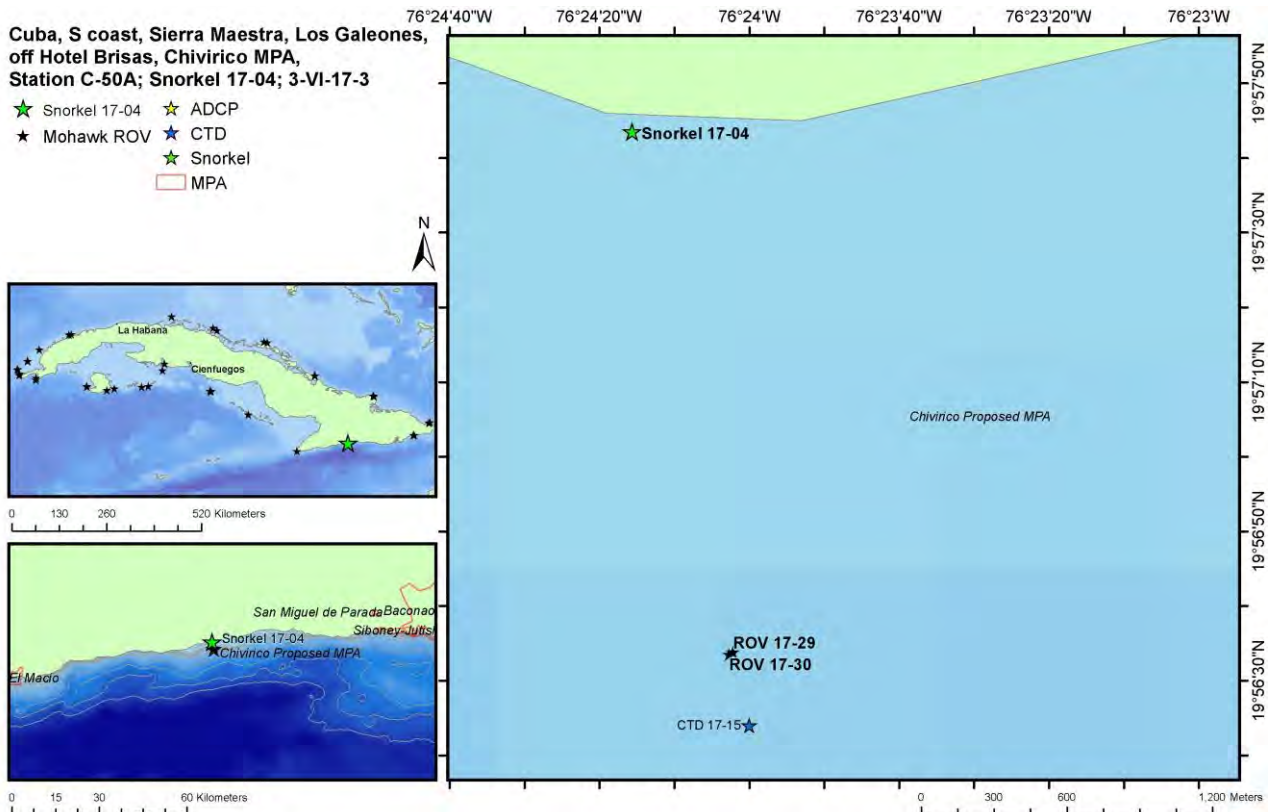
Phylum/Class/Order/Scientific Name - Common Name	Southeast Coast ROV 17-29 C-50 Notes
Commercially Important Species	10
Actinopterygii	10
Perciformes	9
<i>Cephalopholis cruentata</i> - Graysby	1
<i>Lutjanus apodus</i> - Schoolmaster	1
<i>Lutjanus mahogoni</i> - Mahogany Snapper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	3
Serranidae - Grouper	3
Scorpaeniformes	1
<i>Pterois volitans</i> - Lionfish	1
Other	
Actinopterygii	
Beryciformes	
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Anisotremus virginicus</i> - Porkfish	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Caranx</i> sp. - Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon sedentarius</i> - Reef Butterflyfish	X
<i>Chaetodon striatus</i> - Banded Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Grama loreto</i> - Fairy Basslet	X
<i>Grama melacara</i> - Blackcap Basslet	X
<i>Haemulon flavolineatum</i> - French Grunt	X
<i>Haemulon sciurus</i> - Bluestriped Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
Labridae - Wrasse	X

Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-29; 3-VI-17-1

<i>Lachnolaimus maximus</i> - Hogfish	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Liopropoma</i> sp. - Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Mulloidichthys martinicus</i> - Yellow goatfish	X
<i>Pomacentrus</i> sp. - Damselfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Serranus phoebe</i> - Tattler	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X

Dive Site: Cuba, S coast, Sierra Maestra, Los Galeones, off Hotel Brisas, Chivirico MPA, Station C-50A; Snorkel 17-04; 3-VI-17-3

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: N/A

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Snorkel

Sensors: GoPro

Data Management: Access Database

Date of Dive: 6/3/2017

Specimens: 30

Digital Photos: 78

No. DVD:

Hard Drive No.:

Dive Site: Cuba, S coast, Sierra Maestra, Los Galeones, off Hotel Brisas, Chivirico MPA, Station C-50A; Snorkel 17-04; 3-VI-17-3

Dive Data:

Minimum Bottom Depth (m): 4	Total Transect Length (km): 0.000
Maximum Bottom Depth (m): 5	Surface Current (kn):
On Bottom (Time- GMT): 13:30	On Bottom (Lat/Long): 19.9621°N; -76.4043°W
Off Bottom (Time- GMT): 15:00	Off Bottom (Lat/Long): 19.9621°N; -76.4043°W
Physical (bottom); Temp (°C): N/A	Salinity: N/A Visibility N/A Current (kn): N/A

Physical Environment:

Dive Site: Cuba, S coast, Sierra Maestra, Los Galeones, off Hotel Brisas, Chivirico MPA, Station C-50A; Snorkel 17-04; 3-VI-17-3

Dive Imagery:



Figure 1: 19°55.53'N;76°24.22'W: 3 m
Small elkhorn coral colony- *Acropora palmata* on shallow reef



Figure 2: 19°55.53'N;76°24.22'W: 3 m
Shallow patch reef with boulder corals- *Orbicella faveolata*, *Pseudodiploria strigosa*, *Porites astreoides*, *Siderastrea siderea*



Figure 3: 19°55.53'N;76°24.22'W: 3 m
Scleractinia corals- *Pseudodiploria strigosa*, *Orbicella faveolata*

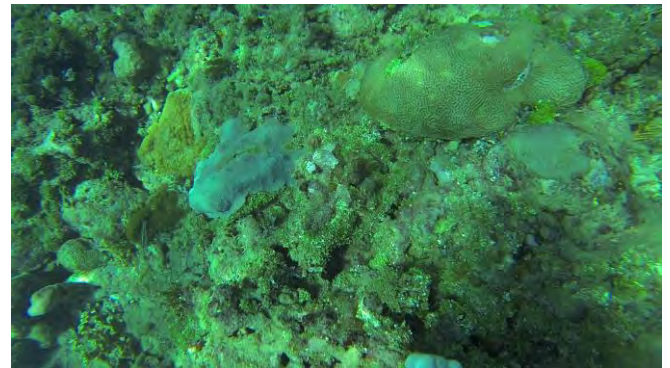


Figure 4: 19°55.53'N;76°24.22'W: 3 m
Orbicella faveolata, *Pseudodiploria strigosa*, *Porites astreoides*, *Montastraea cavernosa*



Figure 5: 19°55.53'N;76°24.22'W: 3 m
Montastraea cavernosa, *Siderastrea siderea*, *Pseudopterogorgia strigosa* with paling



Figure 6: 19°55.53'N;76°24.22'W: 3 m
Siderastrea siderea with partial mortality, *Montastraea cavernosa*, *Halimeda goreaui*

Dive Site: Cuba, S coast, Sierra Maestra, Los Galeones, off Hotel Brisas, Chivirico MPA, Station C-50A; Snorkel 17-04; 3-VI-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 3-VI-17-3; Snorkel 17-04; Cuba, S coast, Sierra Maestra, Los Galeones, off Hotel Brisas, Chivirico MPA, Station C-50A.

Objectives- Snorkel dive for collections.

Site Description/Habitat:

4-5 m, reef, <1 m relief; dense corals- *Siderastrea siderea*, 10-20 cm *Montastraea cavernosa*, 50 cm brain corals, two *Acropora palmata* (50 cm), two *A. cervicornis* (30 cm).

Number of Samples- 30

Montastraea cavernosa- 15

Dive Site: Cuba, S coast, Sierra Maestra, Los Galeones, off Hotel Brisas, Chivirico MPA, Station C-50A; Snorkel 17-04; 3-VI-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic biota identified or collected from snorkel dive site 17-04.

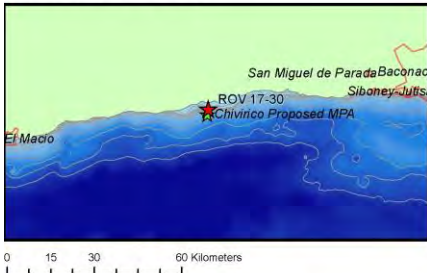
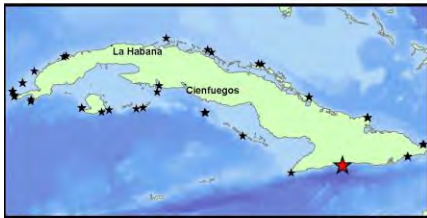
Southeast Coast Snorkel 17-04 C-50A		
Phylum/Class/Scientific Name	Notes	Samples
Algae		9
Chlorophyta		2
<i>Halimeda goreau</i>		1
<i>Halimeda opuntia</i>	X	
<i>Halimeda tuna</i>		1
Ochrophyta		1
<i>Dictyopteris delicatula</i>	X	
<i>Dictyota humifusa</i>	X	
<i>Dictyota pinnatifida</i>		1
Rhodophyta		6
<i>Amphiroa beauvoisii</i>	X	
<i>Amphiroa</i> sp.		1
<i>Amphiroa tribulus</i>		1
<i>Flahaultia tegetiformans</i>		1
<i>Galaxaura</i> sp.		1
<i>Gelidiella acerosa</i>	X	1
<i>Hypnea spinella</i>	X	
Rhodophyta		1
Cnidaria		15
Scleractinia		15
<i>Acropora cervicornis</i>	X	
<i>Acropora palmata</i>	X	
<i>Montastraea cavernosa</i>	X	15
<i>Siderastrea siderea</i>	X	

Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-30; 3-VI-17-4

General Location and Dive Track:

Cuba, S coast, Sierra Maestra,
Chivirico Proposed MPA,
Station C-50; ROV 17-30; 3-VI-17-4

- ★ ROV 17-30
- ★ Mohawk ROV
- Transect Name**
- 201706034 - Transect 01
- ROV 17-30
- ROV 17-29
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/3/2017

Specimens: 13

Digital Photos: 130

No. DVD: 2

Hard Drive No.: 1

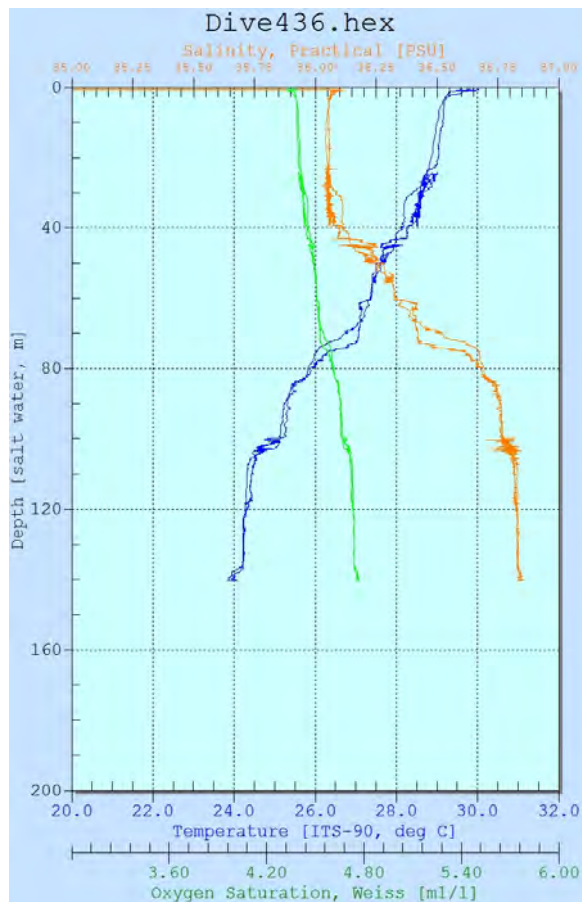
Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-30; 3-VI-17-4

Dive Data:

Minimum Bottom Depth (m): 27	Total Transect Length (km): 0.516
Maximum Bottom Depth (m): 136	Surface Current (kn): 0.1
On Bottom (Time- GMT): 15:50	On Bottom (Lat/Long): 19.9426°N; -76.4007°W
Off Bottom (Time- GMT): 17:50	Off Bottom (Lat/Long): 19.9443°N; -76.4018°W
Physical (bottom); Temp (°C): 24.2	Salinity: 36.83 Visibility 40 Current (kn): 0.1

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-30 are as follows: Depth Maximum: 140.4 m, Temperature: 23.8-29.8 °C, Salinity: 36-36.9 PSU, and Oxygen Saturation: 4.3-4.8 ml/l.

Dive Imagery:

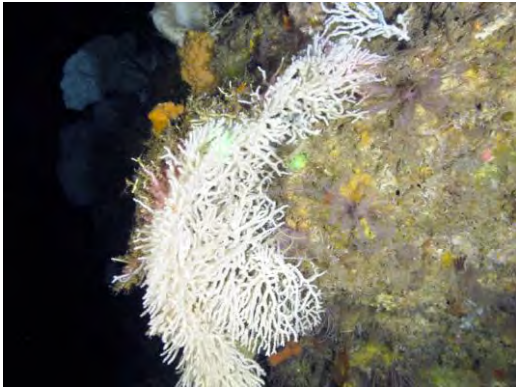


Figure 1: 19°56.5638'N;76°24.0409'W: -135.3 m
Azooxanthellate coral- *Madracis myriaster* on deep island slope

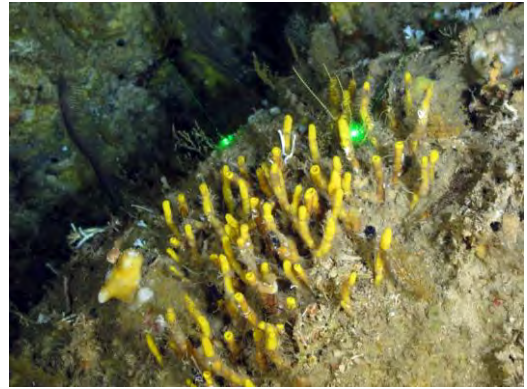


Figure 2: 19°56.5669'N;76°24.0409'W: -134.4 m
Oceanapia sp. demosponge



Figure 3: 19°56.5652'N;76°24.0415'W: -127 m
Large *Madracis myriaster* on the 'Wall'



Figure 4: 19°56.5655'N;76°24.0417'W: -122.7 m
Madracis myriaster (70 cm diam.)



Figure 5: 19°56.5823'N;76°24.0424'W: -85.7 m
Dense cover of sponges, black corals, and encrusting algae



Figure 6: 19°56.671'N;76°24.1149'W: -26.9 m
Staghorn coral- *Acropora cervicornis* on crest of deep fringing reef

Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-30; 3-VI-17-4

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 3-VI-17-4; ROV 17-30, UNCW Dive 436; Cuba, S coast, Sierra Maestra, Chivirico MPA, Station C-50.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Same site as previous ROV dive, starting at 136 m; conduct collections and fish surveys only, no benthic surveys.

Site Description/Habitat:

Depth range: 136- 27 m.

Transect up slope heading 350°.

15:37- Launch. Wind- 3 kn from 172°, current- 0.1 kn to W, seas- calm, water temperature- 30.43 °C, salinity- 36.05.

15:50 - On bottom; visibility- 40 m, current 0.1 kn to W.

17:51- End dive.

136 m: 90° eroded rock wall. Biota: 30 cm *Antipathes* fans, sponges, *Stichopathes*; crinoids- *Davidaster*; *Madracis myriaster*- 15 cm white fans.

128 m: CCA, fishing line.

122 m, lower mesophotic zone: 90° wall, narrow buttresses, sand chutes; 50 cm *M. myriaster* corals.

116 m: *Swiftia exserta*.

106 m: *Nicella goreau*, *Chironophthya*.

87 m: Antipatharia zone, dense black coral.

64 m: *Halimeda copiosa*, *H. tuna*.

45 m, upper mesophotic zone: 45° slope, collect *Agaricia*.

28 m: spawning aggregation of black durgon.

27 m: 2-3 m patch of *Acropora cervicornis*.

Fish video survey, 37-27 m, 17:16- 17:50, stopping for collections; along deep fringing fore reef slope and crest, spawning aggregation of black durgon.

Number of Samples- 13

Disease and Human Impacts:

Fishing line.

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-30. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Southeast Coast ROV 17-30 C-50	
	Notes	Samples
Algae		4
Chlorophyta		2
Chlorophyta- bright	X	
Chlorophyta- palida	X	
<i>Halimeda copiosa</i>	X	1
<i>Halimeda</i> sp.	X	
<i>Halimeda tuna</i>		1
Ochrophyta		1
<i>Dictyota</i> sp.	X	
<i>Lobophora</i> sp.	X	1
Rhodophyta		1
Corallinophycidae		1
Crustose coralline (CCA)	X	
Porifera		5
Demospongiae		5
<i>Agelas citrina</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas flabelliformis</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas</i> sp. Cu-05	X	
<i>Agelas</i> sp. Cu-08	X	
<i>Aiolochoiria crassa</i>	X	
<i>Aiolochoiria</i> sp. Cu-01	X	
<i>Amphimedon compressa</i>	X	
<i>Aplysina archeri</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina fistularis</i>	X	
<i>Aplysina lacunosa</i>	X	
<i>Axinella corrugata</i>	X	
<i>Ceratoporella nicholsoni</i>	X	
<i>Cinachyrella</i> sp. Cu-03	X	
<i>Clathria</i> sp.		1

Demospongiae sp. Cu-02	X	
Demospongiae unid. sp.	X	3
<i>Geodia neptuni</i>	X	
<i>Halisarca caerulea</i>	X	
<i>Iotrochota birotulata</i>	X	
<i>Mycale laxissima</i>	X	
<i>Niphates erecta</i>	X	
<i>Phakellia folium</i>	X	
<i>Siphonodictyon brevitubulatum</i>	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Svenzea zeai</i>	X	
<i>Topsentia</i> sp.	X	
Verongiida		1
Verongiida Cu-01	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
<i>Oscarella</i> sp. Cu-01	X	
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		3
Hydrozoa		
<i>Millepora alcicornis</i>	X	
Stylasteridae	X	
Alcyonacea - gorgonian		
<i>Ellisella</i> sp.	X	
<i>Gorgonia ventalina</i>	X	
Gorgoniidae	X	
<i>Hypnogorgia</i> sp.	X	
<i>Iciligorgia schrammi</i>	X	1
<i>Nicella</i> sp.	X	
<i>Plexaurella</i> sp.	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		
Antipathidae	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
<i>Tanacetipathes tanacetum</i>	X	
Scleractinia		
<i>Acropora cervicornis</i>	X	
<i>Agaricia agaricites</i>		1
<i>Agaricia lamarcki</i>	X	

Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-30; 3-VI-17-4

<i>Agaricia</i> sp.	X	
<i>Eusmilia fastigiata</i>	X	
<i>Madracis formosa</i>	X	
<i>Madracis myriaster</i>	X	
<i>Madracis</i> sp.	X	1
<i>Madrepora</i> sp.	X	
<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Mycetophyllia</i> sp.	X	
<i>Orbicella faveolata</i>	X	
<i>Porites astreoides</i>	X	
<i>Porites furcata</i>	X	
<i>Porites porites</i>	X	
Scleractinia- unid cup	X	
<i>Scolymia cubensis</i>	X	
<i>Siderastrea siderea</i>	X	
<i>Solenastrea bournoni</i>	X	
<i>Stephanocoenia intersepta</i>	X	
Non-Fauna		1
Human debris		
Human debris- fishing line	X	
Rock		1
Granitic Rock		1

Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-30; 3-VI-17-4

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-30. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

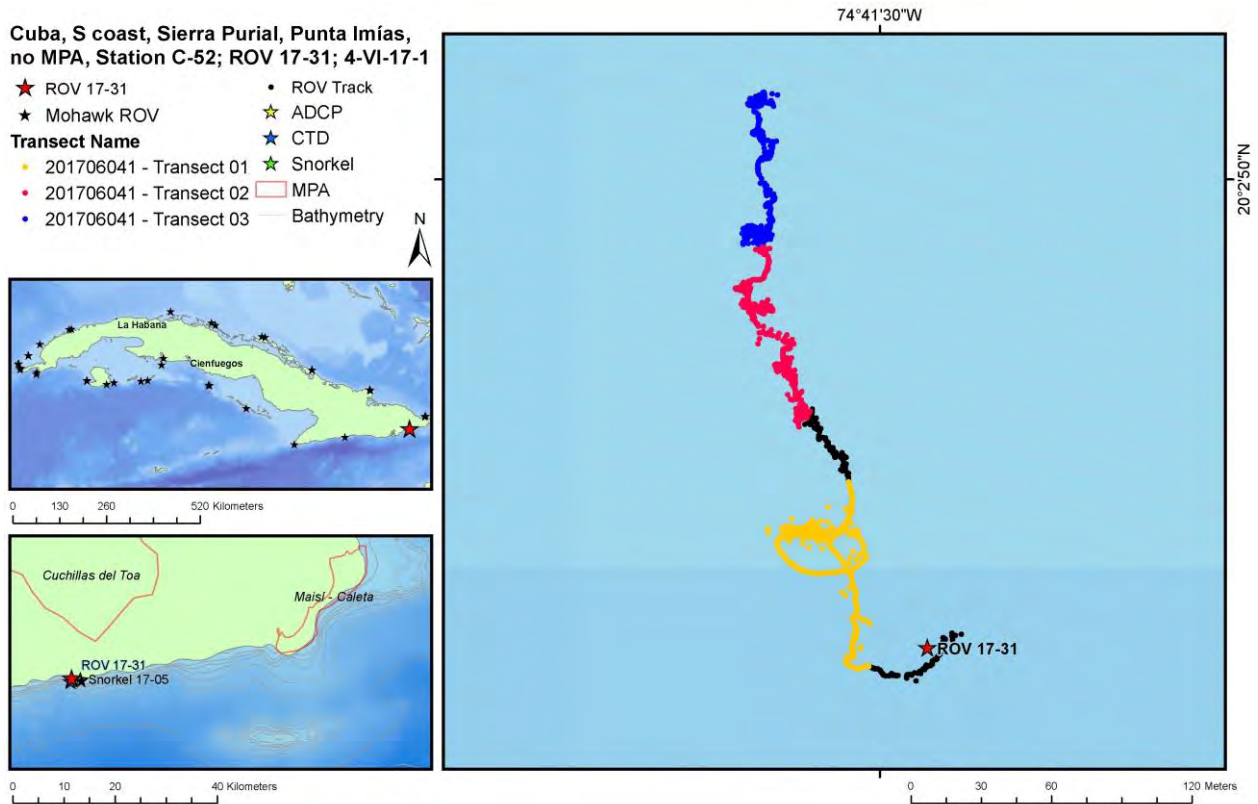
Southeast Coast ROV 17-30 C-50	
Phylum/Class/Order/Scientific Name - Common Name	Notes
Commercially Important Species	6
Actinopterygii	6
Perciformes	4
<i>Lutjanus apodus</i> - Schoolmaster	2
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	2
Scorpaeniformes	2
<i>Pterois volitans</i> - Lionfish	2
Other	
Actinopterygii	
Beryciformes	
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Holocentrus</i> sp. - Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Abudefduf saxatilis</i> - Sergeant major	X
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Anisotremus virginicus</i> - Porkfish	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon striatus</i> - Banded Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus nigricans</i> - Black Hamlet	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Microspathodon chrysurus</i> - Yellowtail Damselfish	X
<i>Mulloidichthys martinicus</i> - Yellow goatfish	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X

Dive Site: Cuba, S coast, Sierra Maestra, Chivirico Proposed MPA, Station C-50; ROV 17-30; 3-VI-17-4

<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyaena barracuda</i> - Great Barracuda	X
<i>Stegastes leucostictus</i> - Beaugregory	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Melichthys niger</i> - Black Durgon	X

Dive Site: Cuba, S coast, Sierra Purial, Punta Imías, no MPA, Station C-52; ROV 17-31; 4-VI-17-1

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO₂

Data Management: Access Database

Date of Dive: 6/4/2017

Specimens: 14

Digital Photos: 346

No. DVD: 2

Hard Drive No.: 1

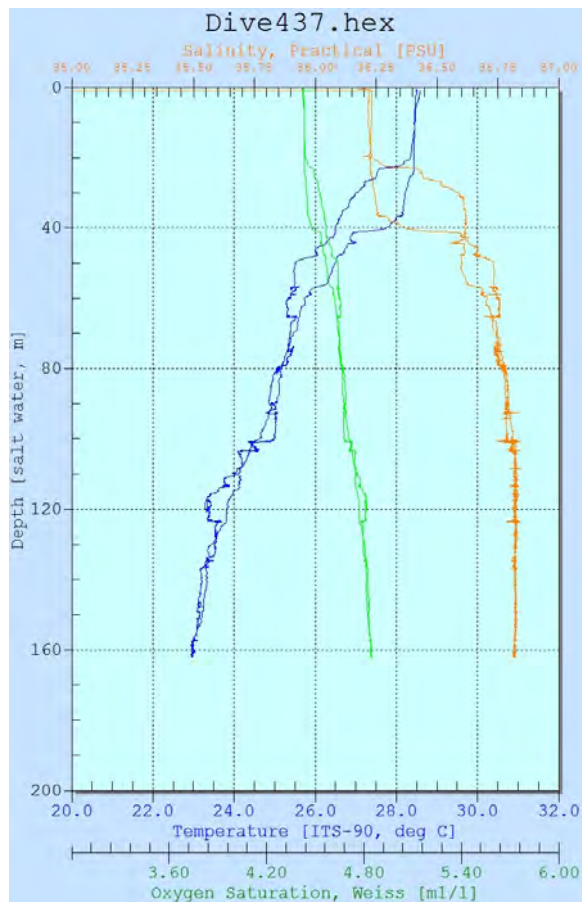
Dive Site: Cuba, S coast, Sierra Purial, Punta Imías, no MPA, Station C-52; ROV 17-31; 4-VI-17-1

Dive Data:

Minimum Bottom Depth (m): 60	Total Transect Length (km): 0.432
Maximum Bottom Depth (m): 161	Surface Current (kn): 0.2
On Bottom (Time- GMT): 9:14	On Bottom (Lat/Long): 20.0454°N; -74.6915°W
Off Bottom (Time- GMT): 11:14	Off Bottom (Lat/Long): 20.0474°N; -74.6922°W
Physical (bottom); Temp (°C): 23	Salinity: 36.82 Visibility 40 Current (kn): 0

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-31 are as follows: Depth Maximum: 162.1 m, Temperature: 22.9-28.6 °C, Salinity: 36.2-36.8 PSU, and Oxygen Saturation: 4.4-4.8 ml/l.

Dive Imagery:



Figure 1: 20°2.7514'N;74°41.5188'W: -124.9 m
Large fan sponge- *Agelas citrina*, various sponges, black corals, and octocorals



Figure 2: 20°2.7761'N;74°41.5186'W: -105.3 m
Sturdy barrel sponge- *Xestospongia* sp. Cu-01 ('bebe'), orange fan- *Agelas* sp., and octocorals



Figure 3: 20°2.7832'N;74°41.5192'W: -101.9 m
Solenastrea bournoni with various octocorals



Figure 4: 20°2.7836'N;74°41.5193'W: -101.9 m
Soft coral- *Chironephthya caribaea*, and various octocorals on the 'Wall'



Figure 5: 20°2.8115'N;74°41.5265'W: -70.1 m
Mesophotic zone of dense *Agaricia* corals, and Rock Beauty- *Holacanthus tricolor*



Figure 6: 20°2.8204'N;74°41.5256'W: -66.4 m
Collection of orange sponge- *Agelas* sp.; encrusting coral- *Agaricia* sp.

Dive Site: Cuba, S coast, Sierra Purial, Punta Imías, no MPA, Station C-52; ROV 17-31; 4-VI-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 4-VI-17-1; ROV 17-31, UNCW Dive 437; Cuba, S coast, Sierra Purial, Punta Imías, no MPA, Station C-52.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Shipboard CTD broke; no data for June 4-7; just water samples.

Site Description/Habitat:

Depth range: 161- 60 m.

Transect up slope heading 033°.

09:05- Launch. Wind- 1 kn from 319°, current- 0.2 kn to E, seas- calm, water temperature- 28.70 °C, salinity- 36.18.

09:16 - On bottom; visibility- 40 m, current 0.

11:15- End dive.

161 m, deep island slope zone: 30° slope, 100% sediment, occasional low ledges 10-15 cm. Biota: sparse, *Stichopathes*, 10 cm Paramuriceidae, demosponges, *Ellisella barbadensis*.

Vertical photo transect upslope, 153- 120 m, 9:17- 9:51; deep island slope zone.

142- 130 m: 30- 50 cm rock outcrops, 80% cover sediment. Biota- sponges more common, thin encrusting yellow, *Xestospongia*, *Axinellida* fans, 1 m *Agelas flabellum* fans; *Stichopathes*, *Tanacetipathes*; dense crinoids; gorgonians.

120 m, lower mesophotic zone: 45° slope, ½ m rock outcrops; *Ellisella* whips; black coral common; tube and rope sponges common.

112 m: 30° slope, 1-2 m rock outcrops; dense sponges, *Agelas sceptrum*, *Aplysina* tube sponges, *Stylaster*, hydroids; gorgonians- *Bebryce*, *Nicella guadalupensis*.

Vertical photo transect upslope, 112- 70 m, 9:55- 10:34; lower mesophotic zone.

102 m: first *Solenastrea*; 45° rock slope, 50% rock cover, 1-2 m outcrops.

87 m: first CCA.

81 m: first lionfish. 45° slope, buttresses, 3 m relief, sand chutes; dense and diverse sponges.

78 m: first *Agaricia* (1 m). 45° slope with buttress outcrops.

76 m: first *Stephanocoenia* (5 cm); Verongiida sponges. Fishing line.

72 m: dense CCA.

Vertical photo transect upslope, 70- 60 m, 10:34- 11:13; continue lower mesophotic zone, top of wall.

66 m: top of wall, flattens out, 30 cm rock on mud. Sponges common; no *Halimeda*, no *Lobophora*.

60 m: flat, 100% mud cover. ½ mile to shore. Site off beach with dry river valley; must have considerable runoff in rains.

Maximum Depth Occurrences:

Solenastrea- 102 m

Dive Site: Cuba, S coast, Sierra Purial, Punta Imías, no MPA, Station C-52; ROV 17-31; 4-VI-17-1

Crustose coralline algae (CCA)- 87 m

Lionfish- 81 m

Agaricia- 78 m

Stephanocoenia intersepta- 76 m

Number of Samples- 14

Disease and Human Impacts:

None.

Dive Site: Cuba, S coast, Sierra Purial, Punta Imías, no MPA, Station C-52; ROV 17-31; 4-VI-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-31. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

		Southeast Coast ROV 17-31 C-52	
Phylum/Class/Scientific Name	Notes	Samples	
Algae		3	
Chlorophyta		3	
<i>Avrainvillea</i> sp.	X	1	
Chlorophyta	X	1	
Chlorophyta- palida	X		
Chlorophyta- Turf Algae		1	
Ochrophyta			
<i>Sargassum</i> sp.	X		
Rhodophyta			
Crustose coralline (CCA)	X		
Porifera		8	
Demospongiae		8	
<i>Aptos</i> sp. Cu-01	X		
<i>Agelas cervicornis</i>	X		
<i>Agelas clathrodes</i>	X		
<i>Agelas flabelliformis</i>	X		
<i>Agelas sceptrum</i>	X		
<i>Aiolochoxia crassa</i>	X		
<i>Amphimedon compressa</i>	X		
<i>Aplysina archeri</i>	X		
<i>Aplysina bathyphila</i>	X		
<i>Aplysina cauliformis</i>	X		
<i>Aplysina fistularis</i>	X		
<i>Aplysina lacunosa</i>	X		
<i>Aplysina sciophila</i>	X		
<i>Aplysina</i> sp.		1	
<i>Aplysina</i> sp. Cu-04	X		
Axinellidae		1	
<i>Callyspongia</i> sp.		1	
<i>Cinachyrella</i> sp. Cu-01	X		
<i>Cliona caribbaea</i>	X		
Demospongiae unid. sp.	X	2	

Dive Site: Cuba, S coast, Sierra Purial, Punta Imías, no MPA, Station C-52; ROV 17-31; 4-VI-17-1

<i>Geodia neptuni</i>	X	
<i>Igernella</i> sp.	X	
<i>Iotrochota birotulata</i>	X	
<i>Oceanapia peltata</i>	X	
<i>Oceanapia</i> sp. Cu-01	X	
<i>Oceanapia</i> sp. Cu-04	X	
<i>Petrosia weinbergi</i>	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Smenospongia conulosa</i>	X	
<i>Stylissa</i> sp.	X	
Tetillidae unid. sp.		1
Verongiida		1
Verongiida Cu-01	X	
<i>Xestospongia deweerdtae</i>	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp.		1
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		2
Hydrozoa		1
Hydroidolina	X	1
Stylasteridae	X	
Alcyonacea - Alcyoniina		1
<i>Chironephthya caribaea</i>	X	1
Alcyonacea - gorgonian		
<i>Ellisella barbadensis</i> (Duchassaing & Michelotti, 1864) syn. <i>elongata</i> (Pallas, 1766)	X	
<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Nicella</i> sp.	X	
<i>Paramuricea</i> sp.	X	
Antipatharia		
Antipathidae	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		
<i>Agaricia</i> sp.	X	
<i>Madracis</i> sp.	X	
Scleractinia- unid cup	X	
<i>Scolymia cubensis</i>	X	
<i>Solenastrea bournoni</i>	X	

Dive Site: Cuba, S coast, Sierra Purial, Punta Imías, no MPA, Station C-52; ROV 17-31; 4-VI-17-1

<i>Stephanocoenia intersepta</i>	X	
Other		1
Bryozoa		1

Dive Site: Cuba, S coast, Sierra Purial, Punta Imías, no MPA, Station C-52; ROV 17-31; 4-VI-17-1

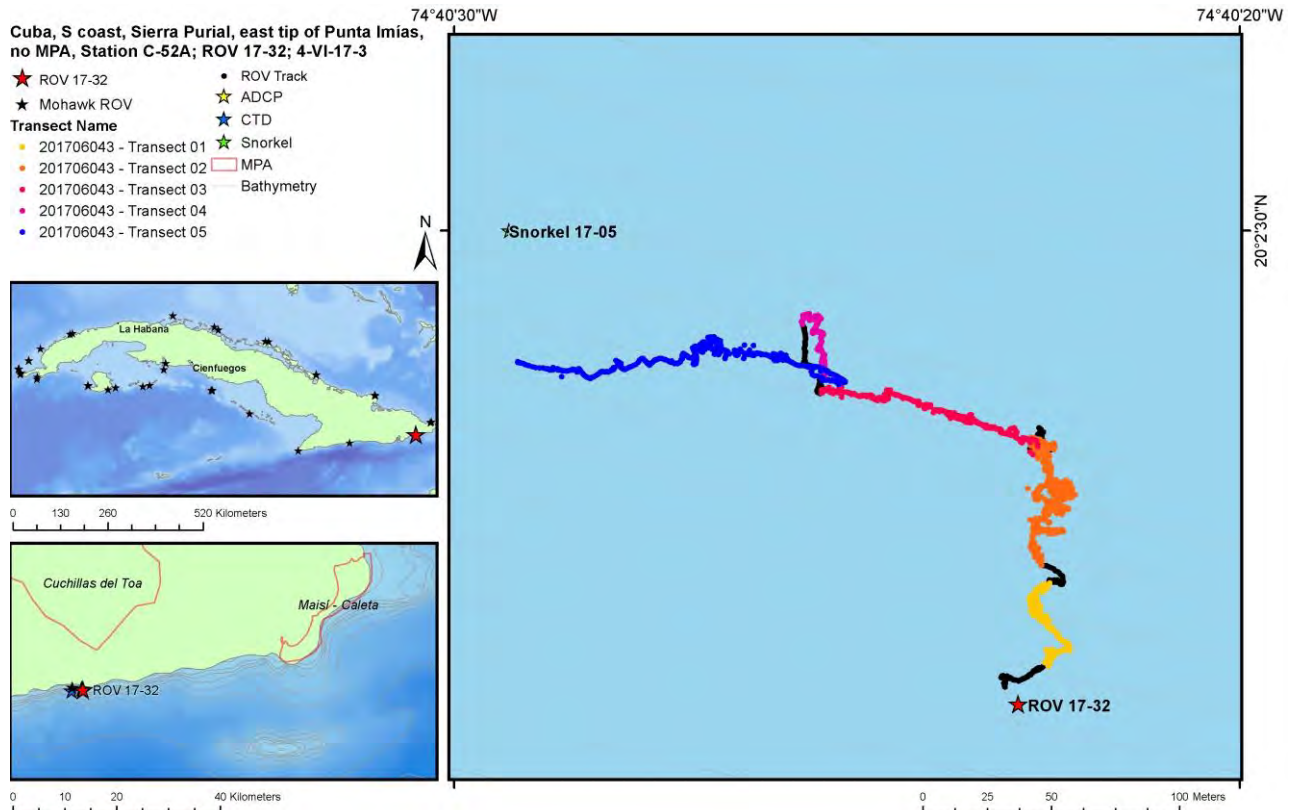
Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-31. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Southeast Coast ROV 17-31 C-52	
Phylum/Class/Order/Scientific Name - Common Name	Notes
Commercially Important Species	1
Actinopterygii	1
Scorpaeniformes	1
<i>Pterois volitans</i> - Lionfish	1
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
Perciformes	
<i>Caranx ruber</i> - Bar Jack	X
<i>Centropyge argi</i> - Cherubfish	X
<i>Chaetodon sedentarius</i> - Reef Butterflyfish	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacentrus</i> sp. - Damselfish	X
<i>Serranus phoebe</i> - Tattler	X
<i>Serranus</i> sp. - Sea Bass	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
Tetraodontiformes	
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A; ROV 17-32; 4-VI-17-3

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/4/2017

Specimens: 9

Digital Photos: 490

No. DVD: 2

Hard Drive No.: 1

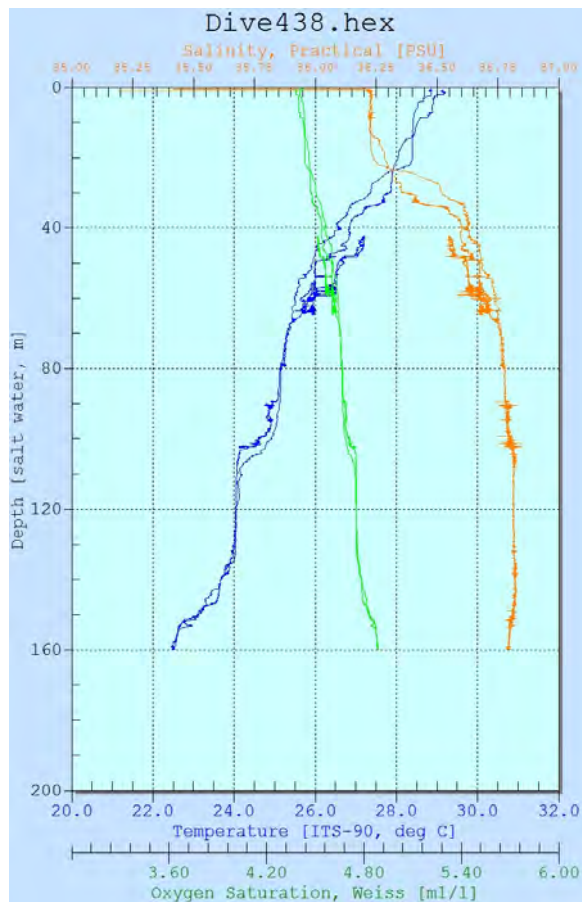
Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A; ROV 17-32; 4-VI-17-3

Dive Data:

Minimum Bottom Depth (m): 43	Total Transect Length (km): 0.492
Maximum Bottom Depth (m): 156	Surface Current (kn): 0.2
On Bottom (Time- GMT): 13:18	On Bottom (Lat/Long): 20.04°N; -74.673°W
Off Bottom (Time- GMT): 15:02	Off Bottom (Lat/Long): 20.0413°N; -74.6748°W
Physical (bottom); Temp (°C): 22.6	Salinity: 36.8 Visibility 20 Current (kn): 0.2

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-32 are as follows: Depth Maximum: 159.8 m, Temperature: 22.5-29.2 °C, Salinity: 36.2-36.8 PSU, and Oxygen Saturation: 4.4-4.9 ml/l.

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A; ROV 17-32; 4-VI-17-3

Dive Imagery:



Figure 1: 20°2.4221'N;74°40.3767'W: -132 m
Various demosponges on deep island slope



Figure 2: 20°2.4536'N;74°40.3743'W: -61.8 m
Longspine Squirrelfish- *Holocentrus rufus*

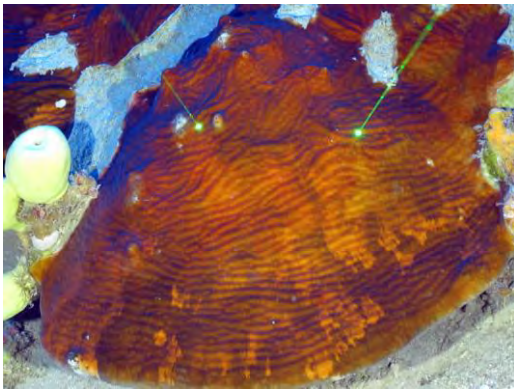


Figure 3: 20°2.4425'N;74°40.373'W: -91.7 m
Agaricia grahamae (10 cm lasers)



Figure 4: 20°2.4495'N;74°40.3744'W: -67 m
Possibly *Mycetophyllia* sp. (10 cm lasers)



Figure 5: 20°2.4473'N;74°40.3729'W: -71.3 m
Great star coral- *Montastraea cavernosa*

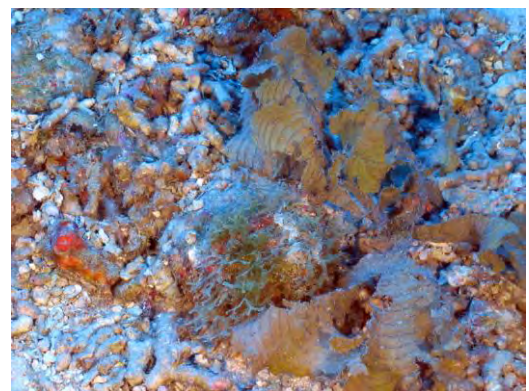


Figure 6: 20°2.4535'N;74°40.3747'W: -61.8 m
Stripped brown alga- *Stypopodium zonale*, and *Dictyota* sp. in coral rubble

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A; ROV 17-32; 4-VI-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 4-VI-17-3; ROV 17-32, UNCW Dive 438; Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Shipboard CTD broke; no data for June 4-7; just water samples.

Site Description/Habitat:

Depth range: 156- 43 m.

Transect up slope heading 042°.

13:05- Launch. Wind- 10 kn from 128°, current- 0.2 kn to 71°, seas- calm, water temperature- 29.10 °C, salinity- 36.18.

13:48 - On bottom; visibility- 20 m, current 0.1- ½ kn from W.

15:01- End dive.

156 m, deep island slope zone: 60° rock pavement, sediment veneer. Biota: few demosponges, Tetractinellida; Paramuriceidae fans, *Ellisella* whips, *Stichopathes*, *Madracis* white fan coral. Fishing line.

Vertical photo transect upslope, 156- 125 m, 13:20- 13:28; deep island slope zone.

125 m: lower mesophotic zone: 70° rock slope, no ledges; sponges common.

Vertical photo transect upslope, 125- 65 m, 13:29- 14:15; lower mesophotic zone.

113 m: 70° slope, ridges, sand chutes, 1 m wide ledges.

102 m: first *Agaricia*; 70-80° slope. Rope sponges.

92 m: 80° slope with sand chutes; not karst topography. *Tanacetipathes* common.

81 m: first *Swiftia exserta*.

80 m: first *Halimeda copiosa*, *Styopodium*.

75 m: upper brow of wall, 45° slope, rubble, sediment.

71 m: first *M. cavernosa*.

65 m: first lionfish.

Quantitative horizontal photo transect, 65m, 14:17 to 14:32, (30 images); along upper brow of wall.

61 m: *Dictyota*.

Vertical photo transect upslope, 60- 43 m, 14:32- 14:37; upper mesophotic zone.

50-43 m, upper mesophotic zone: top of wall; 80% cover rubble, 30 cm boulders; looks like dead *Porites* rubble; gorgonians, few sponges.

Fish video survey, 60- 43 m, 14:39- 15:02; along deep fringing fore reef slope and crest.

Maximum Depth Occurrences:

Agaricia- 102 m

Swiftia exserta- 81 m

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A; ROV 17-32; 4-VI-17-3

Halimeda- 80 m

Styopodium- 80 m

Lionfish- 65 m

Number of Samples- 9

Disease and Human Impacts:

Fishing line.

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A; ROV 17-32; 4-VI-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-32. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Southeast Coast ROV 17-32 C-52A		
Phylum/Class/Scientific Name	Notes	Samples
Algae		5
Chlorophyta		2
Chlorophyta- palida	X	
<i>Halimeda copiosa</i>	X	1
<i>Halimeda</i> sp.	X	
<i>Microdictyon umbilicatum</i>		1
Ochrophyta		2
<i>Dictyota</i> sp.	X	1
<i>Styopodium zonale</i>	X	1
Rhodophyta		1
Corallinophycidae		1
Crustose coralline (CCA)	X	
Porifera		
Demospongiae		
<i>Agelas cervicornis</i>	X	
<i>Agelas citrina</i>	X	
<i>Agelas clathrodes</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Amphimedon cf. caribica</i>	X	
<i>Amphimedon compressa</i>	X	
<i>Aplysina archeri</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina fistularis</i>	X	
<i>Aplysina insularis</i>	X	
<i>Aplysina lacunosa</i>	X	
<i>Aplysina sciophila</i>	X	
<i>Aplysina</i> sp. Cu-02	X	
Axinellidae Cu-01	X	
<i>Cinachyrella</i> sp. Cu-03	X	
<i>Corallistes</i> sp.	X	
Demospongiae sp. Cu-11	X	

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A; ROV 17-32; 4-VI-17-3

<i>Geodia</i> sp. Cu-03	X	
<i>Myrmekioderma gyroderma</i>	X	
<i>Myrmekioderma</i> sp. Cu-02	X	
<i>Niphates digitalis</i>	X	
<i>Oceanapia</i> sp. Cu-01	X	
Petrosiidae Cu-04	X	
Petrosiidae Cu-06	X	
<i>Polymastia</i> sp. Cu-01	X	
<i>Polymastia</i> sp. Cu-04	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Spirastrella coccinea</i>	X	
<i>Spirastrella hartmani</i>	X	
<i>Svenzea zeai</i>	X	
Topsentia sp.	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia purpurea</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		3
Hydrozoa		
<i>Millepora alcicornis</i>	X	
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		3
Alcyonacea- gorgonian		1
<i>Ellisella elongata</i>	X	
<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Nicella goreau</i>		1
<i>Nicella</i> sp.	X	
<i>Plexaura</i> sp.	X	
Plexauridae	X	
Pseudopterogorgia sp.	X	
<i>Swiftia exserta</i>	X	1
Antipatharia		
Antipathidae	X	
<i>Plumapathes</i> sp.	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
Scleractinia		

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A; ROV 17-32; 4-VI-17-3

<i>Agaricia lamarcki</i>	X	
<i>Agaricia</i> sp.	X	
<i>Madracis</i> sp.	X	
<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Scolymia lacera</i>	X	
Other		1
Echinodermata		1
Ophiuroidea		1
Non-Fauna		
Human debris		
Human debris- fishing line	X	

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A; ROV 17-32; 4-VI-17-3

Fish:

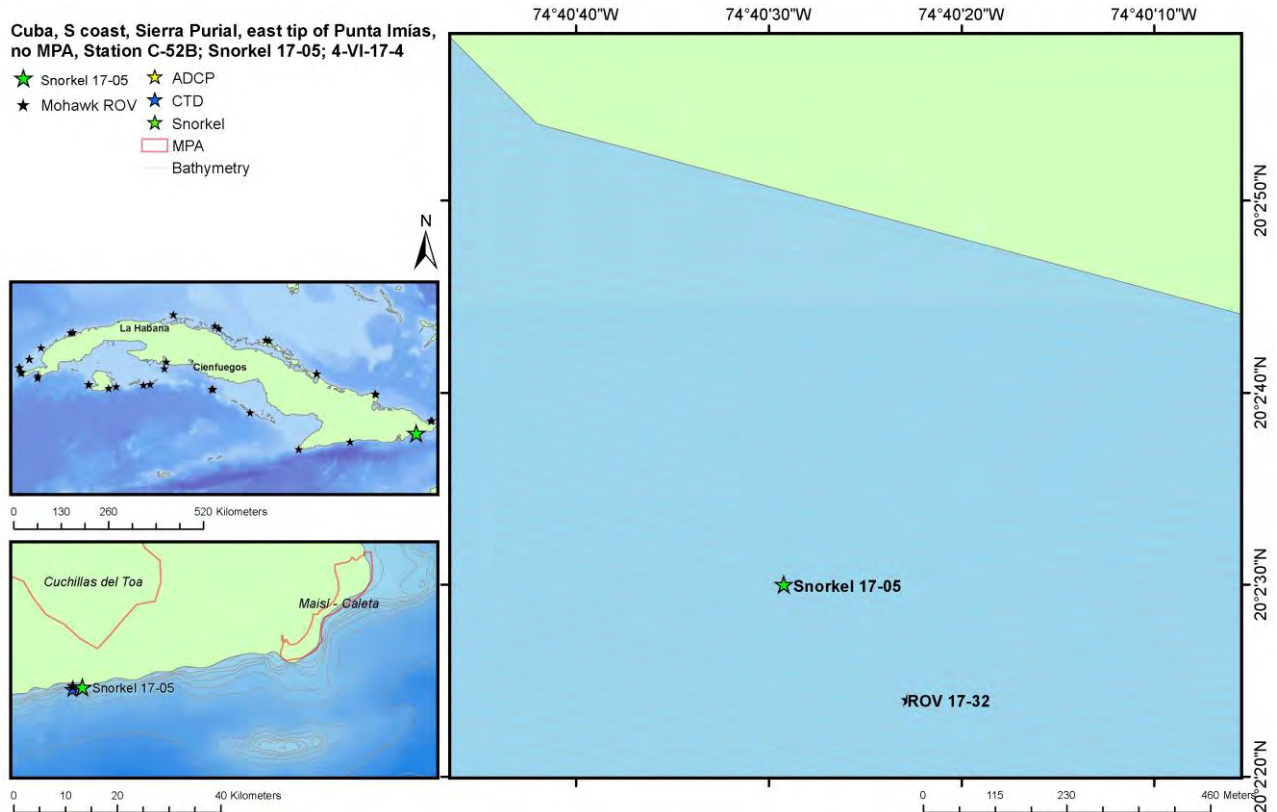
Table 2. Species list of fish identified from video at ROV dive site 17-32. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Southeast Coast ROV 17-32 C-52A	
Phylum/Class/Order/Scientific Name - Common Name	Notes
Commercially Important Species	14
Actinopterygii	14
Perciformes	6
<i>Cephalopholis cruentata</i> - Graysby	6
Scorpaeniformes	8
<i>Pterois volitans</i> - Lionfish	8
Other	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Bodianus rufus</i> - Spanish Hogfish	X
<i>Centropyge argi</i> - Cherubfish	X
Chaetodontidae - Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Equetus lanceolatus</i> - Jacknife Fish	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon aurolineatum</i> - Tomtate	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pristigenys alta</i> - Short Bigeye	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Serranus tabacarius</i> - Tobacconfish	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
Tetraodontiformes	
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, 1 nmi east of ROV 31, no MPA, Station C-52A; ROV 17-32; 4-VI-17-3

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, no MPA, Station C-52B; Snorkel 17-05; 4-VI-17-4

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: N/A

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Snorkel

Sensors: GoPro

Data Management: Access Database

Date of Dive: 6/4/2017

Specimens: 12

Digital Photos: 135

No. DVD:

Hard Drive No.:

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, no MPA, Station C-52B; Snorkel 17-05; 4-VI-17-4

Dive Data:

Minimum Bottom Depth (m): 5	Total Transect Length (km): 0.000
Maximum Bottom Depth (m): 6	Surface Current (kn):
On Bottom (Time- GMT): 12:00	On Bottom (Lat/Long): 20.0417°N; -74.6748°W
Off Bottom (Time- GMT): 17:00	Off Bottom (Lat/Long): 20.0417°N; -74.6748°W
Physical (bottom); Temp (°C): N/A	Salinity: N/A Visibility N/A Current (kn): N/A

Physical Environment:

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, no MPA, Station C-52B; Snorkel 17-05; 4-VI-17-4

Dive Imagery:



Figure 1: 20°2.5'N;74°40.487'W: 6 m
Shallow patch reef with boulder corals

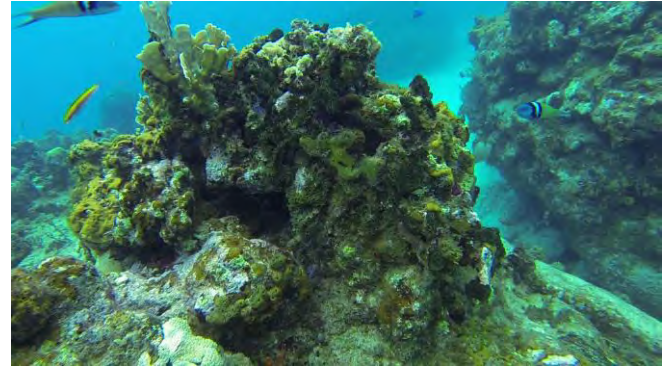


Figure 2: 20°2.5'N;74°40.487'W: 6 m
Shallow patch reef with Bluehead Wrasse-
Thalassoma bifasciatum, adult and juvenile phases



Figure 3: 20°2.5'N;74°40.487'W: 6 m
Siderastrea siderea



Figure 4: 20°2.5'N;74°40.487'W: 6 m
Patch reef with snorkeler, multiple *Pseudodiploria strigosa*



Figure 5: 20°2.5'N;74°40.487'W: 6 m
Agaricia tenuifolia, *Pseudodiploria strigosa*



Figure 6: 20°2.5'N;74°40.487'W: 6 m
Acropora palmata and juvenile Bluehead Wrasse-
Thalassoma bifasciatum

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, no MPA, Station C-52B; Snorkel 17-05; 4-VI-17-4

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 4-VI-17-4; Snorkel 17-05; Cuba, S coast, Sierra Purial, east tip of Punta Imías, no MPA, Station C-52B.

Objectives- Snorkel dive for collections.

Site Description/Habitat:

5-6 m, reef, 3 m tall coral rock mounds, 5-10 m diameter on sand bottom. Dense coral cover- *Siderastrea siderea*, *Millepora squarrosa*, 1 *Acropora palmata*, *Pseudodiploria*, *Montastraea cavernosa*. Lots of plastic in water column (bottles, shredded bags).

Number of Samples- 12

Montastraea cavernosa- none collected

Disease and Human Impacts:

Lots of plastic debris in water.

Dive Site: Cuba, S coast, Sierra Purial, east tip of Punta Imías, no MPA, Station C-52B; Snorkel 17-05; 4-VI-17-4

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic biota identified or collected from snorkel dive 17-05.

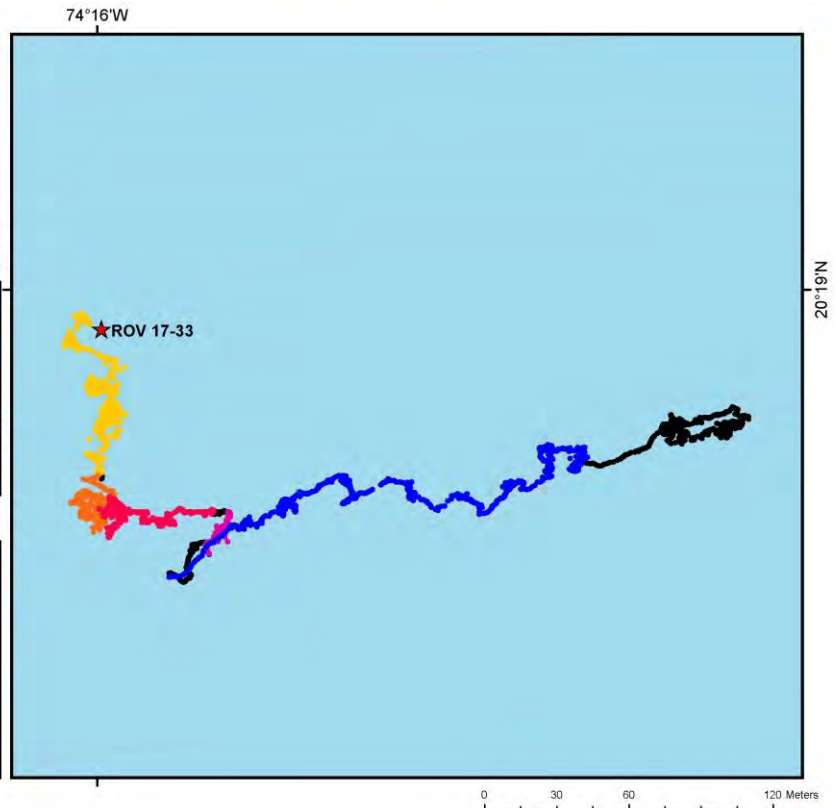
Southeast Coast Snorkel 17-05 C-52B		
Phylum/Class/Scientific Name	Notes	Samples
Algae		7
Chlorophyta		2
<i>Cladophora fuliginosa</i>		1
<i>Halimeda goreau</i>		1
Ochrophyta		2
<i>Dictyota crenulata</i>		1
<i>Dictyota</i> sp.		1
Rhodophyta		3
<i>Agardhiella subulata</i>	X	
<i>Amphiroa beauvoisii</i>		1
<i>Amphiroa fragilissima</i>	X	1
<i>Antithamnion</i> sp.	X	
<i>Galaxaura rugosa</i>		1
<i>Polysiphonia howeii</i>	X	
<i>Wrangelia</i> sp.	X	
Cnidaria		
Hydrozoa		
<i>Millepora squarrosa</i>	X	
Scleractinia		
<i>Acropora palmata</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Pseudodiploria</i> sp.	X	
<i>Siderastrea siderea</i>	X	
Non-Fauna		
Human debris		
Human debris- plastic	X	

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A; ROV 17-33; 5-VI-17-1

General Location and Dive Track:

Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A; ROV 17-33; 5-VI-17-1

- ★ ROV 17-33
- ★ Mohawk ROV
- Transect Name
- 201706051 - Transect 01
- 201706051 - Transect 02
- 201706051 - Transect 03
- 201706051 - Transect 04
- 201706051 - Transect 05
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

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Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/5/2017

Specimens: 6

Digital Photos: 369

No. DVD: 3

Hard Drive No.: 1

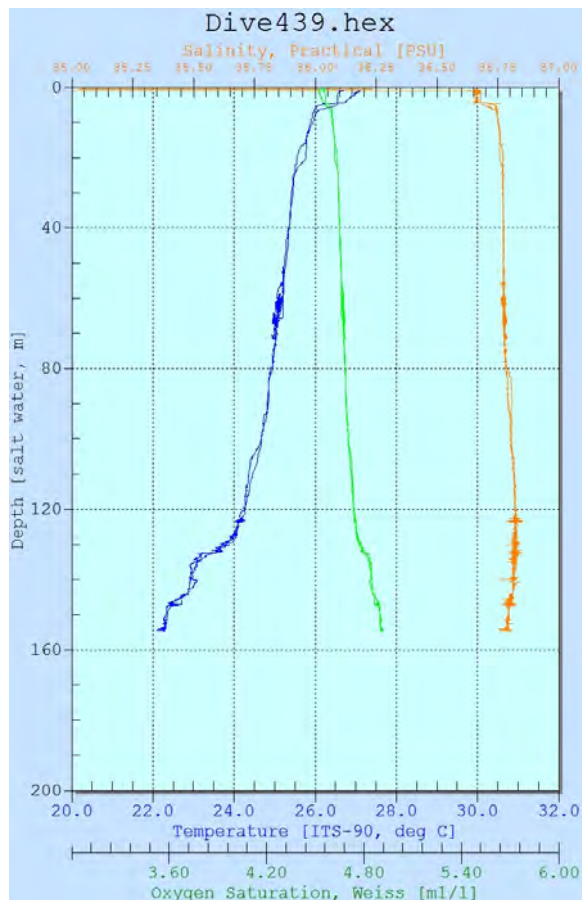
Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A; ROV 17-33; 5-VI-17-1

Dive Data:

Minimum Bottom Depth (m): 54	Total Transect Length (km): 0.645
Maximum Bottom Depth (m): 155	Surface Current (kn): 0.1
On Bottom (Time- GMT): 9:14	On Bottom (Lat/Long): 20.3165°N; -74.2666°W
Off Bottom (Time- GMT): 11:31	Off Bottom (Lat/Long): 20.3161°N; -74.2644°W
Physical (bottom); Temp (°C): 22.4	Salinity: 36.8 Visibility 30 Current (kn): 0.1

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-33 are as follows: Depth Maximum: 154.7 m, Temperature: 22.1-27.1 °C, Salinity: 36.7-36.8 PSU, and Oxygen Saturation: 4.5-4.9 ml/l.

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A; ROV 17-33; 5-VI-17-1

Dive Imagery:



Figure 1: 20°18.974'N;74°15.998'W: -126.1 m
Wire coral- *Stichopathes lutkeni*, and soft coral- *Chironephthya caribea* on deep island slope



Figure 2: 20°18.9737'N;74°15.9982'W: -125.9 m
Soft coral- *Chironephthya caribea*, and white *Stylander* sp.



Figure 3: 20°18.9506'N;74°15.9996'W: -67.6 m
Large tube sponge- *Verongula reiswigi*, and smaller tube- *Aplysina archeri*

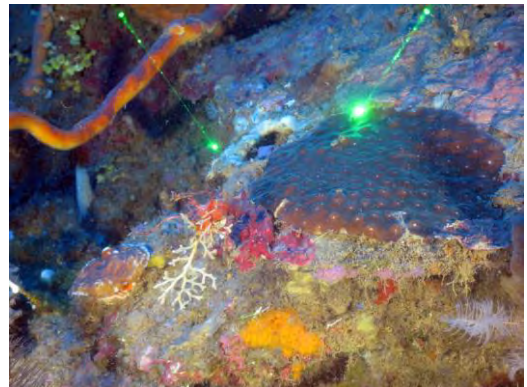


Figure 4: 20°18.9507'N;74°15.9976'W: -67.4 m
Flattened *Montastraea cavernosa* on deep wall (10 cm lasers)



Figure 5: 20°18.9416'N;74°15.9782'W: -56.3 m
Large vase sponge- *Agelas citrina*

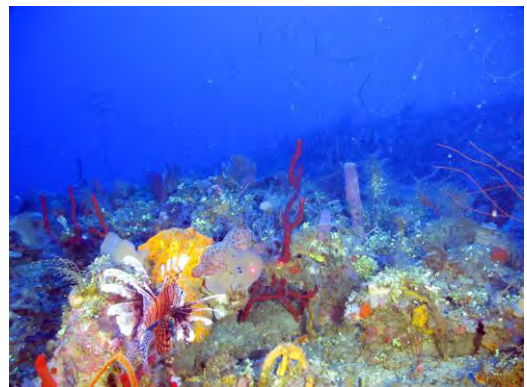


Figure 6: 20°18.9542'N;74°15.9289'W: -60.2 m
Lionfish- *Pterois volitans/miles* and dense demosponges on deep fore reef slope

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A; ROV 17-33; 5-VI-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 5-VI-17-1; ROV 17-33, UNCW Dive 439; Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Shipboard CTD broke; no data for June 4-7; just water samples.

Site Description/Habitat:

Depth range: 155- 54 m.

Transect up slope heading 180°, 0.2 nmi to shore from end of transect (depth 100 m).

09:01- Launch. Wind- 2 kn from 051°, current- 0.1 kn to NW, seas- calm, water temperature- 26.97 °C, salinity- 36.57.

09:14 - On bottom; visibility- 30 m, current 0.1.

11:31- End dive.

155 m, deep island slope zone: 45° rock slope, 3 m tall rock spurs on sediment, with sediment chutes. Biota: dense on spurs, *Ellisella* whips. *Stichopathes*, 4-5 spp. *Antipatharia* fans; demosponges common- *Agelas* fans, *Xestospongia*; *Stylaster*, *Nicella goreau*.

Vertical photo transect upslope, 155- 105, 9:14- 9:47; deep island slope zone.

125 m: 45° slope with sand chutes; sponges common, rope sponges, *Antipathes* fans, *Stylaster*, *Chironephthya*, hydroids.

115 m: 100% sediment.

104 m: lower mesophotic zone: 60° rock pavement, scalloped surface, 100% hard bottom; dense sponges- *Agelas* cups, rope sponges, fans.

Vertical photo transect upslope, 104- 67 m, 9:47- 10:07; lower mesophotic zone.

92 m: slope varies from 70-90° wall, not eroded.

75 m: 90° wall, overhanging buttresses; first *Halimeda copiosa*; first *Solenastrea*; dense and diverse sponges.

67 m: first *Agaricia* (50 cm), first lionfish, CCA; fishing line.

Quantitative horizontal photo transect, 65-67 m, 10:07 to 10:28, (30 images); along face of buttresses.

65 m: first *M. cavernosa*.

Vertical photo transect upslope, 65 m- 54 m, 10:28- 10:32.

60 m: 60° slope, upper brow of buttresses; fewer sponges, more sediment.

54 m, upper mesophotic zone: top of wall, 50% sediment, 20 cm boulders; sparse sponges- *Agelas*, *Xestospongia*; gorgonians- *Ellisella barbadensis*, *Iciligorgia schrammi*.

Fish video survey, 44-60 m, 10:36-11:07; along deep fringing fore reef slope and crest.

Maximum Depth Occurrences:

Halimeda copiosa- 75 m

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A; ROV 17-33; 5-VI-17-1

Solenastrea- 75 m

Agaricia- 67 m

Montastraea cavernosa- 65 m

Orbicella- none.

Number of Samples- 6

Disease and Human Impacts:

Fishing line.

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A; ROV 17-33; 5-VI-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-33. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Notes	Samples
Northeast Coast ROV 17-33 C-53A		
Algae		
Chlorophyta		
Chlorophyta- palida	X	
<i>Halimeda copiosa</i>	X	
<i>Halimeda</i> sp.	X	
Ochrophyta		
<i>Dictyota</i> sp.	X	
<i>Lobophora</i> sp.	X	
Rhodophyta		
Crustose coralline (CCA)	X	
Porifera		2
Demospongiae		2
<i>Agelas cervicornis</i>	X	
<i>Agelas citrina</i>	X	
<i>Agelas clathrodes</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas flabelliformis</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas</i> sp.		1
<i>Agelas</i> sp. Cu-01	X	
<i>Agelas</i> sp. Cu-02	X	
<i>Agelas</i> sp. Cu-03	X	
<i>Agelas</i> sp. Cu-07	X	
<i>Agelas</i> sp. Cu-09	X	
<i>Aiolochoia</i> sp. Cu-01	X	
<i>Amphimedon cf. caribica</i>	X	
<i>Amphimedon compressa</i>	X	
<i>Aplysina archeri</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina lacunosa</i>	X	
<i>Aplysina sciophila</i>	X	
<i>Aplysina</i> sp. Cu-04	X	

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A; ROV 17-33; 5-VI-17-1

<i>Callyspongia plicifera</i>	X	
<i>Callyspongia</i> sp. Cu-02	X	
<i>Cinachyrella</i> sp. Cu-03	X	
<i>Clathria echinata</i>	X	
<i>Cribrochalina vasculum</i>	X	
Demospongiae sp. Cu-11	X	
Demospongiae sp. Cu-24	X	
Demospongiae sp. Cu-25	X	
Demospongiae unid. sp.	X	
<i>Geodia neptuni</i>	X	
<i>Niphates digitalis</i>	X	
<i>Niphates erecta</i>	X	
<i>Oceanapia</i> sp.		1
<i>Oceanapia</i> sp. Cu-01	X	
<i>Oceanapia</i> sp. Cu-05	X	
<i>Phakellia folium</i>	X	
<i>Ptilocaulis walpersi</i>	X	
<i>Spirastrella coccinea</i>	X	
<i>Stylissa</i> sp.	X	
Tetractinellida Cu-03	X	
<i>Topsentia</i> sp.	X	
Verongiida Cu-01	X	
<i>Verongula cf. rigida</i>	X	
<i>Verongula reiswigi</i>	X	
<i>Verongula rigida</i>	X	
<i>Verongula</i> sp. Cu-02	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia purpurea</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		3
Hydrozoa		1
Hydroidolina	X	1
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		
<i>Ellisella barbadensis</i> (Duchassaing & Michelotti, 1864) syn. <i>elongata</i> (Pallas, 1766)	X	
<i>Ellisella</i> sp.	X	
Gorgoniidae	X	

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A; ROV 17-33; 5-VI-17-1

<i>Iciligorgia schrammi</i>	X	
<i>Nicella</i> sp.	X	
<i>Paramuricea</i> sp.	X	
<i>Plexaurella</i> sp.	X	
Antipatharia		1
Antipathidae	X	1
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
<i>Tanacetipathes tanacetum</i>	X	
Scleractinia		1
<i>Agaricia agaricites</i>	X	
<i>Agaricia</i> sp.	X	1
<i>Colpophyllia natans</i>	X	
<i>Madracis formosa</i>	X	
<i>Madracis</i> sp.	X	
<i>Montastraea cavernosa</i>	X	
<i>Scolymia cubensis</i>	X	
<i>Solenastrea</i> sp.	X	
Other		1
Echinodermata		1
Asteroidea		1
Non-Fauna		
Disease		
Bleaching	X	

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A; ROV 17-33; 5-VI-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-33. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Notes
Northeast Coast ROV 17-33 C-53A	
Commercially Important Species	16
Actinopterygii	16
Perciformes	11
<i>Cephalopholis fulva</i> - Coney	4
<i>Lutjanus apodus</i> - Schoolmaster	2
<i>Lutjanus jocu</i> - Dog Snapper	1
<i>Mycteroperca interstitialis</i> - Yellowmouth Grouper	2
Serranidae - Grouper	2
Scorpaeniformes	5
<i>Pterois volitans</i> - Lionfish	5
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Bodianus pulchellus</i> - Spotfin Hogfish	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish	X
<i>Chaetodon sedentarius</i> - Reef Butterflyfish	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Equetus lanceolatus</i> - Jacknife Fish	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon sciurus</i> - Bluestriped Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
Labridae - Wrasse	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta Silencio, no MPA, Station C-53A; ROV 17-33; 5-VI-17-1

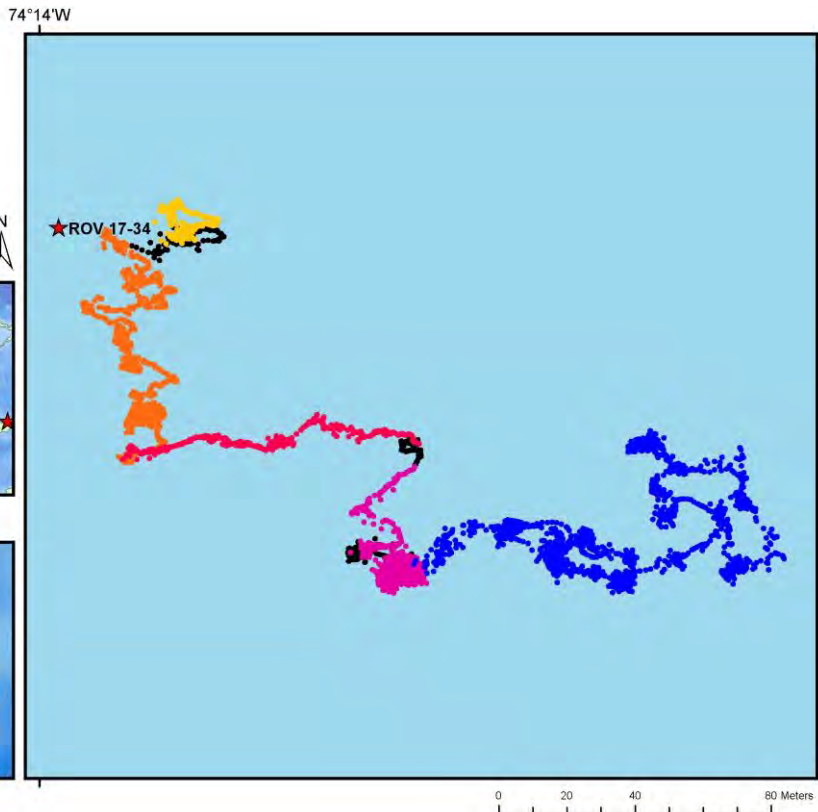
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
Scaridae - Parrotfish	X
<i>Serranus tabacarius</i> - Tobaccofish	X
<i>Sphyræna barracuda</i> - Great Barracuda	X
Tetraodontiformes	
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B; ROV 17-34; 5-VI-17-3

General Location and Dive Track:

Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B; ROV 17-34; 5-VI-17-3

- ★ ROV 17-34
- ★ Mohawk ROV
- Transect Name
- 201706053 - Transect 01
- 201706053 - Transect 02
- 201706053 - Transect 03
- 201706053 - Transect 04
- 201706053 - Transect 05
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/5/2017

Specimens: 17

Digital Photos: 442

No. DVD: 3

Hard Drive No.: 1

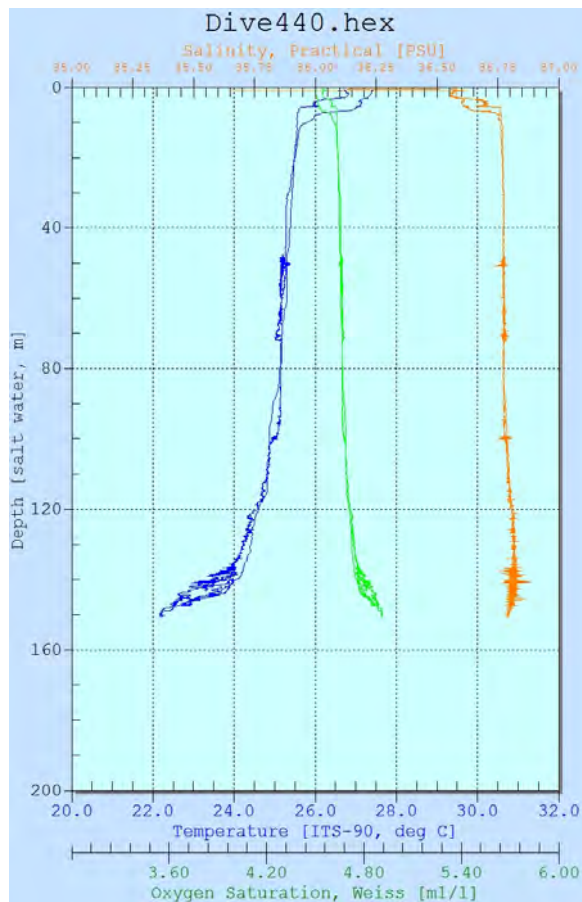
Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B; ROV 17-34; 5-VI-17-3

Dive Data:

Minimum Bottom Depth (m): 50	Total Transect Length (km): 0.843
Maximum Bottom Depth (m): 142	Surface Current (kn): 0.7
On Bottom (Time- GMT): 13:57	On Bottom (Lat/Long): 20.3241°N; -74.2333°W
Off Bottom (Time- GMT): 16:45	Off Bottom (Lat/Long): 20.3232°N; -74.232°W
Physical (bottom); Temp (°C): 23.3	Salinity: 36.81 Visibility 35 Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-34 are as follows: Depth Maximum: 150.5 m, Temperature: 22.2-27.4 °C, Salinity: 36.6-36.9 PSU, and Oxygen Saturation: 4.5-4.9 ml/l.

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B; ROV 17-34; 5-VI-17-3

Dive Imagery:



Figure 1: 20°19.4339'N;74°13.9907'W: -96.8 m
Moose horn sponge- *Agelas cf. cervicornis*



Figure 2: 20°19.4269'N;74°13.9879'W: -87.9 m
Flabellate sponge- *Agelas* sp., and rope sponges- *Agelas cf. sceptrum* (10 cm lasers)



Figure 3: 20°19.415'N;74°13.9846'W: -73.4 m
Knocked over tube sponge- *Aplysina archeri*



Figure 4: 20°19.4111'N;74°13.9702'W: -65.5 m
Spiny *Xestospongia* sp.



Figure 5: 20°19.3949'N;74°13.9191'W: -50.6 m
Flute sponge- *Agelas tubulata*



Figure 6: 20°19.3978'N;74°13.9255'W: -51.2 m
Nassau Grouper- *Epinephelus striatus* on deep fore reef slope

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B; ROV 17-34; 5-VI-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 5-VI-17-3; ROV 17-34, UNCW Dive 440; Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Shipboard CTD broke; no data for June 4-7; just water samples.

Site Description/Habitat:

Depth range: 142- 50 m.

Transect up slope heading- ?, 0.6 nmi to shore, rocky.

13:39- Launch. Wind- 15 kn from 102°, current- 0.7 kn to 297°, seas- 0.5 m from E, water temperature- 27.70 °C, salinity- 36.55.

13:56 - On bottom; visibility- 35 m.

16:45- End dive.

142 m, deep island slope zone: 80° slope, rock pavement with scalloped facies, 1-2 m wide ledges. Biota: diverse and dense fauna, sponges- *Xestospongia*, yellow encrusting Verongiida, *Agelas* tubes; black coral- *Stichopathes*, bushy *Antipathes*, *Tanacetipathes*; gorgonians- *Nicella* fans, *Ellisella barbadensis*; *Stylaster*.

Vertical photo transect upslope, 142- 130, 13:57- 14:03, deep island slope zone.

123 m, lower mesophotic zone: 80-90° wall with caves, ledges, not eroded, no sand chutes.

Vertical photo transect upslope, 123- 65 m; 14:07- 14:47; lower mesophotic zone.

98 m: *Entemnotrochus adansonianus* slit shell.

96 m: rope sponges.

87 m: first *Halimeda*, 60° rock pavement.

81 m: CCA, 45° slope.

75 m: first *Agaricia* (20 cm); 30-45° slope, rubble/sediment, barren.

Quantitative horizontal photo transect, 65 m, 14:46 to 15:03 (30 images); along face of slope, 45° slope, rubble, coarse sediment, low rugosity, low relief; *Xestospongia*, small gorgonians, *Agaricia* (30 cm), *Iciligorgia schrammi*.

65 m: first *M. cavernosa*, 1 m *Agaricia*.

55 m, upper mesophotic zone: top of wall, 10° slope, rubble; *Ellisella* whips, *Xestospongia*, low rugosity, fairly barren.

Start vertical photo transect upslope, 55- 50 m, 15:05:15- 15:43; upper mesophotic zone

52 m: dense *Lobophora*.

Fish video survey, 50-60 m, 15:50- 16:45; along deep fringing fore reef slope.

Maximum Depth Occurrences:

Halimeda- 87 m

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B; ROV 17-34; 5-VI-17-3

Crustose coralline algae (CCA)- 81 m

Agaricia- 75 m

Montastraea cavernosa- 65 m

Lobophora- 51 m

Number of Samples- 17

Disease and Human Impacts:

None.

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B; ROV 17-34; 5-VI-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-34. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

		Northeast Coast ROV 17-34 C-53B	
Phylum/Class/Scientific Name	Notes	Samples	
Algae		7	
Chlorophyta		3	
<i>Anadyomene stellata</i>		1	
<i>Caulerpa racemosa</i>	X	1	
Chlorophyta- palida	X		
<i>Halimeda copiosa</i>	X		
<i>Halimeda</i> sp.	X	1	
<i>Microdictyon umbilicatum</i>	X		
Ochrophyta		2	
<i>Dictyota</i> sp.	X	1	
<i>Lobophora</i> sp.	X	1	
<i>Styopodium zonale</i>	X		
Rhodophyta		2	
<i>Botryocladia pyriformis</i>		1	
Crustose coralline (CCA)	X		
<i>Sciniaia complanata</i>		1	
Porifera		8	
Demospongiae		7	
<i>Agelas cervicornis</i>	X		
<i>Agelas citrina</i>	X		
<i>Agelas clathrodes</i>	X		
<i>Agelas conifera</i>	X		
<i>Agelas flabelliformis</i>	X		
<i>Agelas sceptrum</i>	X		
<i>Agelas schmidtii</i>		1	
<i>Agelas</i> sp. Cu-07	X		
<i>Aiolochoxia crassa</i>	X		
<i>Amphimedon cf. caribica</i>	X		
<i>Aplysina archeri</i>	X		
<i>Aplysina bathyphila</i>	X		
<i>Aplysina cf. fulva</i>	X		
<i>Aplysina lacunosa</i>	X		

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B; ROV 17-34; 5-VI-17-3

<i>Aplysina sciophila</i>		1
<i>Aplysina</i> sp.		1
<i>Aplysina</i> sp. Cu-01	X	
<i>Axinella corrugata</i>	X	
<i>Callyspongia</i> sp.		1
<i>Callyspongia vaginalis</i>	X	
<i>Ceratoporella nicholsoni</i>	X	
<i>Cinachyrella</i> sp. Cu-03	X	
Demospongiae sp. Cu-04	X	
Demospongiae sp. Cu-25	X	
Demospongiae unid. sp.		2
<i>Geodia neptuni</i>	X	
<i>Ircinia strobilina</i>	X	
<i>Melophlus ruber</i>	X	
<i>Mycale laxissima</i>	X	
Myrmekioderma sp.		1
<i>Niphates</i> sp. Cu-01	X	
<i>Niphates</i> sp. Cu-02	X	
<i>Oceanapia</i> sp. Cu-01	X	
Petrosiidae Cu-06	X	
Spirastrellidae unid. sp.	X	
<i>Svenzea zeai</i>	X	
<i>Topsentia</i> sp.	X	
<i>Verongula rigida</i>	X	
<i>Verongula</i> sp. Cu-01	X	
<i>Xestospongia deweerdtae</i>	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia purpurea</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		1
<i>Plakortis</i> sp.		1
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		
Hydrozoa		
Hydroidolina	X	
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		
<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B; ROV 17-34; 5-VI-17-3

<i>Nicella</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		
<i>Antipathes furcata</i>	X	
<i>Antipathes</i> sp.	X	
Antipathidae	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
<i>Tanacetipathes tanacetum</i>	X	
Scleractinia		
<i>Agaricia agaricites</i>	X	
<i>Agaricia</i> sp.	X	
<i>Madracis formosa</i>	X	
<i>Madracis</i> sp.	X	
<i>Montastraea cavernosa</i>	X	
<i>Orbicella faveolata</i>	X	
Other		1
Mollusca		
<i>Entemnotrochus adansonianus</i>	X	
Bryozoa	X	
Echinodermata		1
Comatulida	X	
Ophiuroidea		1
Chordata - Invertebrate		
Ascidiacea	X	

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B; ROV 17-34; 5-VI-17-3

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-34. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

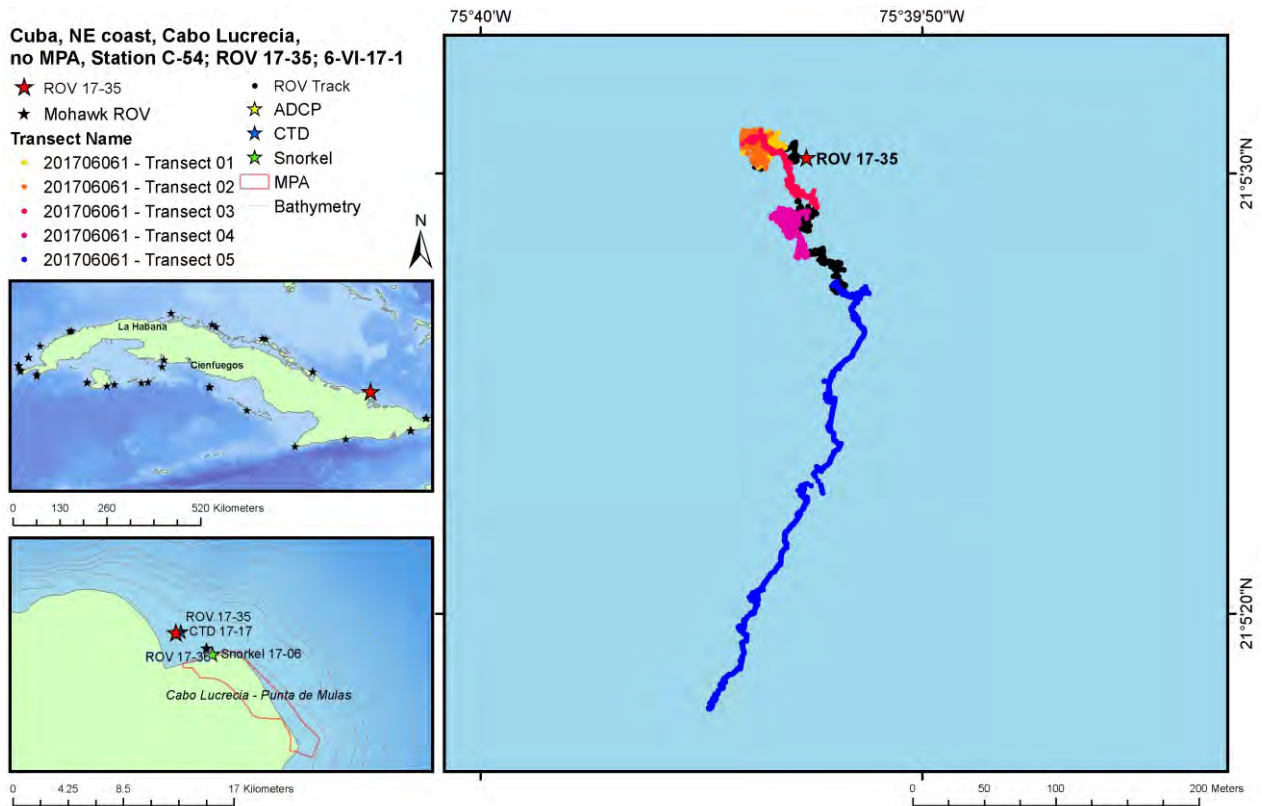
Northeast Coast ROV 17-34 C-53B	
Phylum/Class/Order/Scientific Name - Common Name	Notes
Commercially Important Species	24
Actinopterygii	24
Perciformes	23
<i>Cephalopholis cruentata</i> - Graysby	7
<i>Cephalopholis fulva</i> - Coney	10
<i>Epinephelus striatus</i> - Nassau Grouper	3
<i>Malacanthus plumieri</i> - Sand Tilefish	1
<i>Mycteroperca interstitialis</i> - Yellowmouth Grouper	1
Serranidae - Grouper	1
Scorpaeniformes	1
<i>Pterois volitans</i> - Lionfish	1
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	X
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Abudefduf saxatilis</i> - Sergeant major	X
<i>Acanthurus chirurgus</i> - Doctorfish	X
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Bodianus rufus</i> - Spanish Hogfish	X
<i>Centropristis ocyurus</i> - Bank Sea Bass	X
<i>Centropyge argi</i> - Cherubfish	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish	X
<i>Chaetodon sedentarius</i> - Reef Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
Labridae - Wrasse	X

Dive Site: Cuba, eastern tip of Cuba, NW Punta Maisí, Punta del Fraile, no MPA, Station C-53B; ROV 17-34; 5-VI-17-3

<i>Lachnolaimus maximus</i> - Hogfish	X
<i>Pomacanthus paru</i> - French Angelfish	X
<i>Pomacentrus</i> sp. - Damselfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
<i>Serranus annularis</i> - Orangeback Bass	X
<i>Serranus tabacarius</i> - Tobaccofish	X
<i>Stegastes leucostictus</i> - Beaugregory	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Stegastes planifrons</i> - Threespot Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54; ROV 17-35; 6-VI-17-1

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophoitic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/6/2017

Specimens: 10

Digital Photos: 794

No. DVD: 3

Hard Drive No.: 1

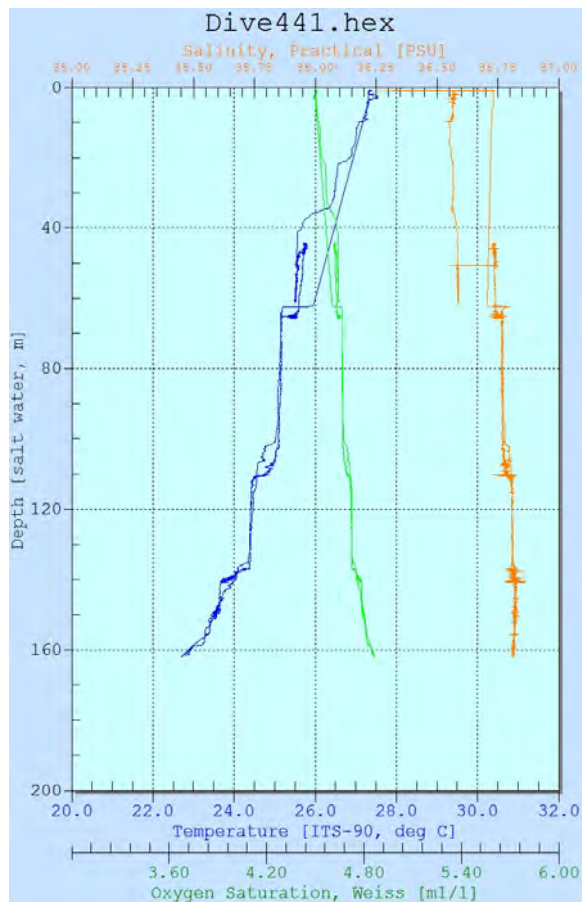
Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54; ROV 17-35; 6-VI-17-1

Dive Data:

Minimum Bottom Depth (m): 45	Total Transect Length (km): 0.899
Maximum Bottom Depth (m): 151	Surface Current (kn): 0.2
On Bottom (Time- GMT): 8:45	On Bottom (Lat/Long): 21.0918°N; -75.6646°W
Off Bottom (Time- GMT): 11:35	Off Bottom (Lat/Long): 21.0882°N; -75.6651°W
Physical (bottom); Temp (°C): 23.6	Salinity: 36.82 Visibility 15 Current (kn): 0.1

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-35 are as follows: Depth Maximum: 162 m, Temperature: 22.7-27.5 °C, Salinity: 36.6-36.9 PSU, and Oxygen Saturation: 4.5-4.9 ml/l.

Dive Imagery:



Figure 1: 21°5.4819'N;75°39.8764'W: -64.8 m
Wall and ledge with dense sponges and encrusting algae, rope sponge- *Agelas sceptrum*

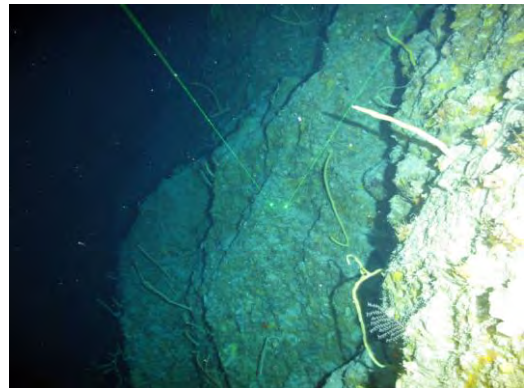


Figure 2: 21°5.5091'N;75°39.8936'W: -132.1 m
Sparse sponges, black corals, and octocorals on deep island slope

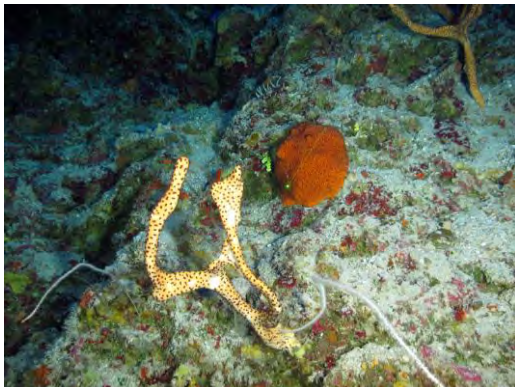


Figure 3: 21°5.5084'N;75°39.8965'W: -93 m
Yellow branching sponge- *Agelas cervicornis* with zoanthids, orange demersal sponge



Figure 4: 21°5.5151'N;75°39.9008'W: -82.4 m
Crustose bryozoan- *Colatooecia serrulata*



Figure 5: 21°5.5126'N;75°39.8995'W: -65.6 m
Agaricia sp., encrusting coralline algae, and *Petrosiidae* sponge (right)



Figure 6: 21°5.5129'N;75°39.8968'W: -65.5 m
Vertical deep wall with dense wire coral- *Stichopathes* sp.

Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54; ROV 17-35; 6-VI-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 6-VI-17-1; ROV 17-35, UNCW Dive 441; Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Shipboard CTD broke; no data for June 4-7; just water samples.

Site Description/Habitat:

Depth range: 151- 45 m.

Transect up slope heading 270°, 0.3 nmi to shore at end of transect (depth 40 m).

08:30- Launch. Wind- 2 kn from 195°, current- 0.2 kn to 148°, seas- 0.5 m swell from E, water temperature- 27.59 °C, salinity- 36.68.

08:46 - On bottom; visibility- 15 m, current- ½ kn from S.

1:35- End dive.

151 m, deep island slope zone: 30° slope, 100% cover coarse sediment (*Halimeda detritus*), 10 cm coral rubble.

Vertical photo transect upslope, 150- 119 m, 8:48- 9:12; deep island slope zone.

142 m: vertical rock wall; sponges- dense and diverse, Tetractinellida vase, *Penares*, *Corallistes* cup, yellow encrusting Verongiida, *Agelas* plates, *Aplysina* rope sponges. Fishing line.

130 m: *Ellisella* whips, *Bebryce*; *Aplysina scepstrum*.

119 m: 90° rock wall, vertical fissures, narrow 1 m ledges.

112 m, lower mesophotic zone: first CCA, thin encrusting Chlorophyta; dense sponges, *Polymastia*, rope sponges; no black coral, no gorgonians.

Vertical photo transect upslope, 112- 65 m, 9:20- 9:54; lower mesophotic zone.

90 m: *Halimeda*, dense CCA, *Peyssonnelia*; gorgonians- Paramuriceidae, *Ellisella barbadensis*; *Aplysina archeri*.

84 m: 2 m wide ledge, bushy fan *Antipathes*.

76 m: 90° wall; dense CCA, *Ellisella* whips; black coral- dense whips, not *Stichopathes*.

Quantitative horizontal photo transect, 65 m, 09:54 to 10:05 (30 images); along face of 90° wall; dense *Agaricia* (30 cm – 1 m).

65 m: first *Agaricia*.

Vertical photo transect upslope, 58- 47 m, 10:11- 10:50.

58 m: upper brow of wall, 70° slope.

57 m: first *Solenastrea*; 45° slope; dense *Agaricia*; *Pseudopterogorgia*, *Eunicea* gorgonians.

50 m, upper mesophotic zone: top of wall, flat rock, low relief, low rugosity, <1/2 m relief. Dense *Pseudopterogorgia*; mostly *Lobophora*, gorgonians, and sponges.

48 m: *Lobophora* dense on top.

46 m: first *M. cavernosa* (15 cm conical).

Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54; ROV 17-35; 6-VI-17-1

Fish video survey, 52-60 m, 11:04- 11:35; along upper brow of wall, along deep fringing fore reef slope.

Maximum Depth Occurrences:

Crustose coralline algae (CCA)- 112 m

Chlorophyta, thin encrusting- 105 m

Peyssonnelia- 81 m

Agaricia- 65 m

Solenastrea- 57 m

Orbicella- none.

Number of Samples- 10

Disease and Human Impacts:

Fishing line.

Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54; ROV 17-35; 6-VI-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-35. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

		Northeast Coast ROV 17-35 C-54	
Phylum/Class/Scientific Name	Notes	Samples	
Algae		3	
Chlorophyta		1	
Chlorophyta- palida	X		
<i>Halimeda copiosa</i>	X		
<i>Halimeda</i> sp.	X		
<i>Rhipocephalus phoenix</i>	X	1	
Ochrophyta		1	
<i>Dictyota</i> sp.	X		
<i>Lobophora</i> sp.	X	1	
<i>Sargassum hystrix</i>	X		
Rhodophyta		1	
Corallinophycidae		1	
Crustose coralline (CCA)	X		
<i>Peyssonnelia</i> sp.	X		
Porifera		4	
Calcarea			
Calcarea sp. Cu-02	X		
Demospongiae		4	
<i>Agelas cervicornis</i>	X		
<i>Agelas citrina</i>	X		
<i>Agelas clathrodes</i>	X		
<i>Agelas conifera</i>	X		
<i>Agelas sceptrum</i>	X		
<i>Agelas</i> sp. Cu-03	X		
<i>Agelas</i> sp. Cu-07	X		
<i>Agelas</i> sp. Cu-08	X		
<i>Agelas sventres</i>	X		
<i>Aiolochoiria crassa</i>	X		
<i>Amphimedon</i> cf. <i>caribica</i>	X		
<i>Amphimedon</i> sp. Cu-01	X		
<i>Aplysina archeri</i>	X		
<i>Aplysina bathyphila</i>	X		

Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54; ROV 17-35; 6-VI-17-1

<i>Aplysina cf. fulva</i>	X	
<i>Aplysina</i> sp. Cu-04	X	
<i>Auletta</i> sp.		1
<i>Callyspongia</i> sp. Cu-02	X	
<i>Cinachyrella</i> sp. Cu-03	X	
<i>Clathria</i> sp. Cu-03	X	
<i>Cliona delitrix</i>	X	
<i>Corallistes</i> sp.	X	
Demospongiae sp. Cu-04	X	
Demospongiae sp. Cu-11	X	
Demospongiae sp. Cu-16	X	
Demospongiae sp. Cu-20	X	
Demospongiae sp. Cu-25	X	
Demospongiae unid. sp.		1
<i>Geodia cf. criбата</i>	X	
<i>Geodia neptuni</i>	X	
<i>Igernella</i> sp.	X	
<i>Ircinia</i> sp. Cu-05	X	
<i>Myrmekioderma</i> sp. Cu-01	X	
<i>Niphates arenata</i>	X	
<i>Niphates erecta</i>	X	
<i>Oceanapia</i> sp. Cu-05	X	
<i>Petrosia weinbergi</i>	X	
<i>Polymastia</i> sp. Cu-01	X	
<i>Polymastia</i> sp. Cu-04	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Spirastrella coccinea</i>	X	
<i>Spongia</i> sp. Cu-01	X	
Verongiida		1
Verongiida Cu-01	X	
Verongiida Cu-05	X	
<i>Verongula rigida</i>	X	
Xestospongia sp. Cu-01	X	1
Homoscleromorpha		
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria 1		
Hydrozoa		
Hydroidolina	X	
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		

Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54; ROV 17-35; 6-VI-17-1

<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Nicella</i> sp.	X	
<i>Plexaurella</i> sp.	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		1
Antipathidae	X	
<i>Stichopathes</i> sp.	X	1
<i>Tanacetipathes</i> sp.	X	
Scleractinia		
<i>Agaricia agaricites</i>	X	
<i>Agaricia</i> sp.	X	
<i>Madracis formosa</i>	X	
<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Porites astreoides</i>	X	
Scleractinia- unid colonial	X	
Scleractinia- unid cup	X	
<i>Solenastrea bournoni</i>	X	
Other		1
Bryozoa		1
Bryozoa unid. sp.		1
<i>Colatooecia serrulata</i>	X	

Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54; ROV 17-35; 6-VI-17-1

Fish:

Table 2. Species list of fish identified from video and samples at ROV dive site 17-35. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

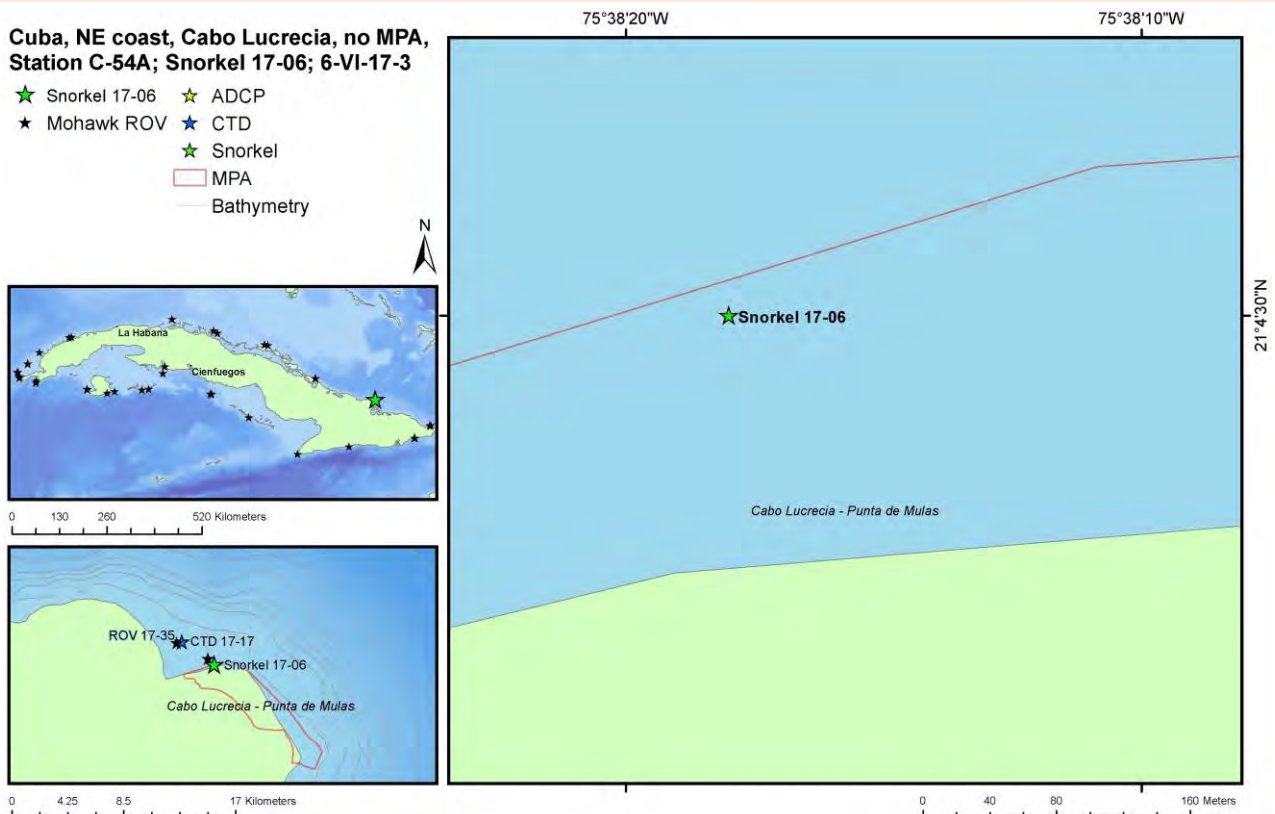
		Northeast Coast ROV 17-35 C-54	
Phylum/Class/Order/Scientific Name - Common Name	Notes	Samples	
Commercially Important Species		34	
Actinopterygii		34	
Perciformes		26	
<i>Cephalopholis cruentata</i> - Graysby		4	
<i>Cephalopholis fulva</i> - Coney		20	
<i>Lutjanus apodus</i> - Schoolmaster		1	
Serranidae - Grouper		1	
Scorpaeniformes		8	
<i>Pterois volitans</i> - Lionfish		8	
Other		1	
Actinopterygii		1	
Actinopterygii - Unid Fish		X	
Beryciformes			
<i>Holocentrus adscensionis</i> - Squirrelfish		X	
<i>Holocentrus rufus</i> - Longspine Squirrelfish		X	
<i>Myripristis jacobus</i> - Blackbar Soldierfish		X	
<i>Neoniphon marianus</i> - Longjaw Squirrelfish		X	
Perciformes		1	
<i>Acanthurus coeruleus</i> - Blue Tang		X	
<i>Bodianus pulchellus</i> - Spotfin Hogfish		X	
<i>Bodianus rufus</i> - Spanish Hogfish		X	
<i>Caranx ruber</i> - Bar Jack		X	
<i>Chaetodon capistratus</i> - Foureye Butterflyfish		X	
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish		X	
Chaetodontidae - Butterflyfish		X	
<i>Chromis cyanea</i> - Blue Chromis		X	
<i>Chromis insolata</i> - Sunshinefish		X	
<i>Clepticus parrae</i> - creole wrasse		X	
<i>Elacatinus genie</i> - Cleaning goby		X	
<i>Grama loreto</i> - Fairy Basslet		X	
<i>Grama melacara</i> - Blackcap Basslet		X	
<i>Haemulon plumierii</i> - White Grunt		X	
<i>Halichoeres garnoti</i> - Yellowhead Wrasse		X	

Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54; ROV 17-35; 6-VI-17-1

<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus nigricans</i> - Black Hamlet	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
<i>Hypoplectrus</i> sp. - hamlet	X
<i>Hypoplectrus unicolor</i> - Butter Hamlet	X
<i>Labrisomus filamentosus</i> - Quillfin Blenny	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Mulloidichthys martinicus</i> - Yellow goatfish	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Pomacentrus</i> sp. - Damselfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
Tetraodontiformes	
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54A; Snorkel 17-06; 6-VI-17-3

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: N/A

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophoitic Reef Exploration of Cuba

Vehicle: Snorkel

Sensors: GoPro

Data Management: Access Database

Date of Dive: 6/6/2017

Specimens: 53

Digital Photos: 188

No. DVD:

Hard Drive No.:

Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54A; Snorkel 17-06; 6-VI-17-3

Dive Data:

Minimum Bottom Depth (m): 2	Total Transect Length (km): 0.000
Maximum Bottom Depth (m): 3	Surface Current (kn):
On Bottom (Time- GMT): 12:00	On Bottom (Lat/Long): 21.075°N; -75.6383°W
Off Bottom (Time- GMT):	Off Bottom (Lat/Long): 21.075°N; -75.6383°W
Physical (bottom); Temp (°C): N/A	Salinity: N/A Visibility N/A Current (kn): N/A

Physical Environment:

Dive Imagery:



Figure 1: 21°4.5'N;75°38.3'W: 3 m
Diadema antillarum were abundant on this shallow patch reef



Figure 2: 21°4.5'N;75°38.3'W: 3 m
Pillar coral- *Dendrogyra cylindrica*



Figure 3: 21°4.5'N;75°38.3'W: 3 m
Montastraea cavernosa, flower coral- *Eusmilia fastigiata* (top)



Figure 4: 21°4.5'N;75°38.3'W: 3 m
Meandrina meandrites



Figure 5: 21°4.5'N;75°38.3'W: 3 m
Corallimorpharian- *Ricordia florida*



Figure 6: 21°4.5'N;75°38.3'W: 3 m
Shallow patch reef dominated with boulder corals and octocorals

Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54A; Snorkel 17-06; 6-VI-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 6-VI-17-3; Snorkel 17-06; Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54A.

Objectives- Snorkel dive for collections.

Site Description/Habitat:

2-3 m, flat hard bottom, eroded limestone on shore. Dense brown algae- *Sargassum*, *Turbinaria*, *Styopodium*; corals- scattered brain coral, *Montastraea cavernosa*, *Siderastrea*, *Millepora*, 1- *Dendrogyra cylindrus*; echinoderms- dense *Diadema antillarum*, *Tripneustes ventricosus*.

Number of Samples- 53

Montastraea cavernosa- 17

Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54A; Snorkel 17-06; 6-VI-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic biota identified or collected from snorkel dive 17-06.

Northeast Coast Snorkel 17-06 C-54A		
Phylum/Class/Scientific Name	Notes	Samples
Algae		9
Chlorophyta		2
<i>Cladophora fuliginosa</i>	X	1
<i>Dictyosphaeria verluysii</i>	X	
<i>Microdictyon marinum</i>		1
Ochrophyta		2
<i>Sargassum polyceratium</i>		1
<i>Sargassum</i> sp.	X	
<i>Styopodium</i> sp.	X	
<i>Turbinaria</i> sp.	X	
<i>Turbinaria turbinata</i>		1
Rhodophyta		5
<i>Acantophora spicifera</i>	X	
<i>Agardhiella subulata</i>	X	
<i>Amphiroa beauvoisii</i>	X	
<i>Amphiroa fragilissima</i>	X	
<i>Amphiroa rigida</i>	X	
<i>Amphiroa tribulus</i>		1
<i>Bryothamnion triquetrum</i>		1
<i>Centroceras</i> sp.	X	
<i>Dasya</i> sp.		1
<i>Dichotomaria obtusata</i>	X	
<i>Galaxaura</i> sp.	X	
<i>Hypnea spinella</i>	X	
<i>Jania cubensis</i>	X	
<i>Jania pumila</i>	X	
<i>Liagoropsis schrammii</i>	X	
<i>Neogonolithon spectabile</i>		1
<i>Titanophycus validus</i>		1
Porifera		1
Demospongiae		1
<i>Tethya</i> sp.		1
Cnidaria		17

Dive Site: Cuba, NE coast, Cabo Lucrecia, no MPA, Station C-54A; Snorkel 17-06; 6-VI-17-3

Hydrozoa		
Millepora sp.	X	
Scleractinia		17
<i>Dendrogyra cylindrus</i>	X	
Faviidae	X	
<i>Montastraea cavernosa</i>	X	17
<i>Siderastrea</i> sp.	X	
Other		
Echinodermata		
<i>Diadema antillarum</i>	X	
<i>Tripneustes ventricosus</i>	X	

Dive Site: Cuba, NE coast, Cabo Lucrecia, proposed MPA, Station C-54B; ROV 17-36; 6-VI-17-4

General Location and Dive Track:

Cuba, NE coast, Cabo Lucrecia,
proposed MPA, Station C-54B;
ROV 17-36; 6-VI-17-4

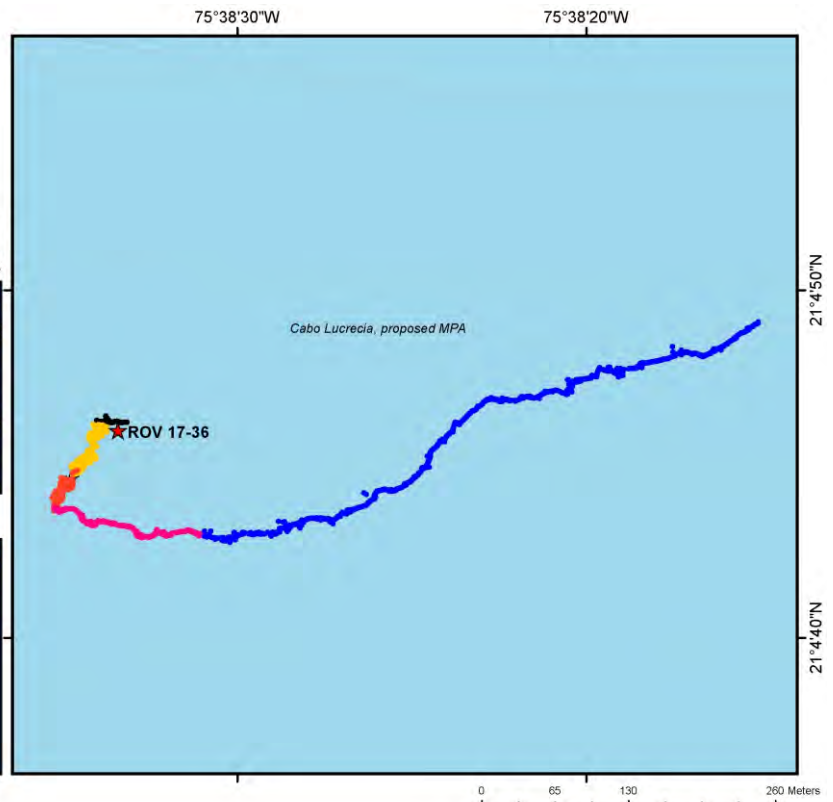
- ★ ROV 17-36
- ★ Mohawk ROV
- Transect Name**
- 201706064 - Transect 01
- 201706064 - Transect 02
- 201706064 - Transect 03
- 201706064 - Transect 04
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



0 130 260 520 Kilometers



0 4.25 8.5 17 Kilometers



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/6/2017

Specimens: 12

Digital Photos: 565

No. DVD: 2

Hard Drive No.: 1

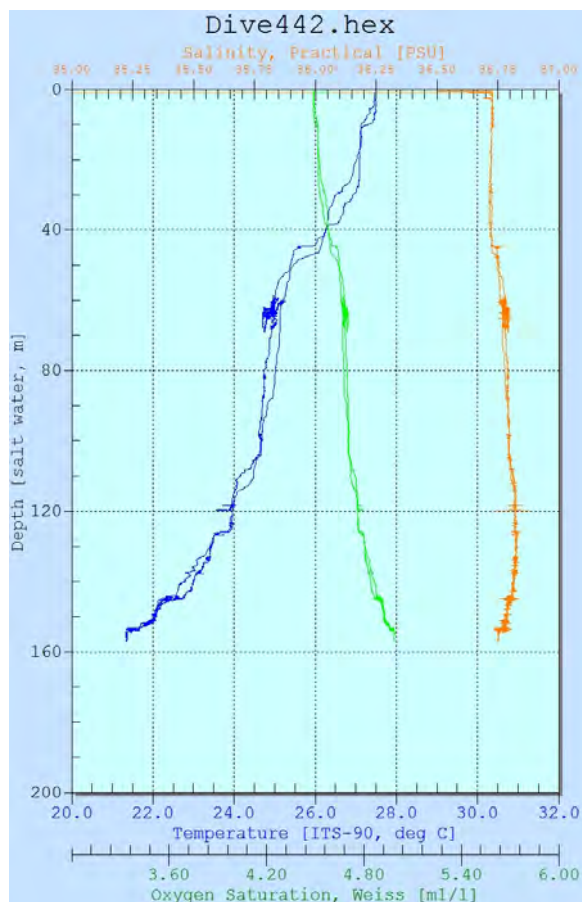
Dive Site: Cuba, NE coast, Cabo Lucrecia, proposed MPA, Station C-54B; ROV 17-36; 6-VI-17-4

Dive Data:

Minimum Bottom Depth (m): 65	Total Transect Length (km): 0.959
Maximum Bottom Depth (m): 156	Surface Current (kn): 0.1
On Bottom (Time- GMT): 15:58	On Bottom (Lat/Long): 21.0794°N; -75.6426°W
Off Bottom (Time- GMT): 17:59	Off Bottom (Lat/Long): 21.0803°N; -75.6374°W
Physical (bottom); Temp (°C): 21.3	Salinity: 36.75 Visibility 30 Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-36 are as follows: Depth Maximum: 157.1 m, Temperature: 21.3-27.5 °C, Salinity: 36.7-36.9 PSU, and Oxygen Saturation: 4.5-5 ml/l.

Dive Imagery:



Figure 1: 21°4.7635'N;75°38.5684'W: -146.3 m
Nephtheidae on deep island slope (10 cm lasers)



Figure 2: 21°4.7696'N;75°38.5635'W: -155.3 m
Lionfish- *Pterois volitans/miles* on barren deep island slope



Figure 3: 21°4.7405'N;75°38.5818'W: -105 m
Black corals- *Tanacetipathes* sp., *Stichopathes lutkeni*;
demosponges, and octocorals



Figure 4: 21°4.7358'N;75°38.5846'W: -83.2 m
Plate coral- *Agaricia* sp., green algae- *Halimeda* sp.,
and finger sponge- *Aplysina* sp.



Figure 5: 21°4.7895'N;75°38.338'W: -69.4 m
Finger sponges- unidentified Haplosclerida

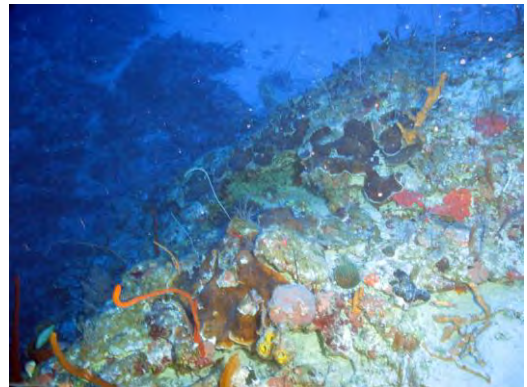


Figure 6: 21°4.7164'N;75°38.4889'W: -62.3 m
Upper buttress with diverse sponges and *Agaricia* sp.

Dive Site: Cuba, NE coast, Cabo Lucrecia, proposed MPA, Station C-54B; ROV 17-36; 6-VI-17-4

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 6-VI-17-4; ROV 17-36, UNCW Dive 442; Cuba, NE coast, Cabo Lucrecia, proposed MPA, Station C-54B.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Shipboard CTD broke; no data for June 4-7; just water samples.

Submitted as proposed MPA based on dense coral habitat.

Site Description/Habitat:

Depth range: 156- 65 m.

Transect up slope heading 177°.

15:41- Launch. Wind- 16 kn from 103°, current- 0.3 kn to 100°, seas- 0.5 m from SE, water temperature- 27.80 °C, salinity- 36.68.

15:58 - On bottom; visibility- 30 m.

16:01- End dive.

156 m, deep island slope zone: 60° slope, rock pavement, with sediment veneer on horizontal surfaces. Biota- Lionfish, sponges- *Oceanapia*, *Asteropus*, thin encrusting yellow Verongiida; 10 cm gorgonians.

Vertical photo transect upslope, 153- 123, 16:00- 16:29; deep island slope zone.

150 m: rock spur with horizontal layering, scalloped facies, sand chutes. Off spur is 45° slope, 80% cover sediment.

130 m: 60° rock slope and sediment, rock ledges 1-2 m wide. *Ellisella* whips; sponges- *Agelas archeri* tubes, *Oceanapia*.

123 m, lower mesophotic zone: 45° slope, eroded rock, karst-like topography, caves; stair-step topography, series 1 m ledges; *Geodia*, axinellid sponges, *Stichopathes*.

109 m: first CCA.

Vertical photo transect upslope, 109- 68 m, 16:31- 17:14; lower mesophotic zone.

104 m: first *Swiftia exserta*.

100 m: eroded rock wall, flat platform 5 m wide, 1-2 m relief stair step ledges. Biota- Demosponges, *Geodia*, *Stichopathes*, *Ellisella* whips, Paramuriceidae.

94 m: first CCA, *Peyssonnelia*. Same stair-step geomorphology, 5 m wide shelves.

87 m: first *Halimeda*.

85 m: *Solenastrea*.

83 m: first *Agaricia*.

80 m: 45° rock, low relief, low rugosity.

Quantitative horizontal photo transect, 68-62 m, 17:14 to 17:29 (30 images); upper brow of wall, 45-60° slope, 1-5 m wide sand chutes, 1-2 m relief spurs. Dense *Agaricia* (to 1 m), shingles of *Agaricia* on 45° slope, up to 80% cover of *Agaricia*.

68 m: first *Agaricia*.

Dive Site: Cuba, NE coast, Cabo Lucrecia, proposed MPA, Station C-54B; ROV 17-36; 6-VI-17-4

62 m: first *M. cavernosa* (10 cm).

60 m, upper mesophotic zone: top of wall, deep fringing reef, with 1-5 m wide sand chutes, 2 m relief mounds covered with *Agaricia* shingles, top 60 m, sand chutes 64 m. *Iciligorgia schrammi* common.

Fish video survey, 62-65 m, 17:29-18:00; along upper brow of wall, deep fringing fore reef and spurs.

Maximum Depth Occurrences:

Lionfish- 156 m

Crustose coralline algae (CCA)- 109 m

Swiftia exserta- 104 m

Peyssonnelia- 94 m

Halimeda- 87 m

Solenastrea- 85 m

Agaricia- 83 m (dense *Agaricia* 65 m- 60 m)

Montastraea cavernosa- 62 m.

Number of Samples- 12

Disease and Human Impacts:

None.

Dive Site: Cuba, NE coast, Cabo Lucrecia, proposed MPA, Station C-54B; ROV 17-36; 6-VI-17-4

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-36. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Notes	Samples
Northeast Coast ROV 17-36 C-54B		
Algae		1
Chlorophyta		
Chlorophyta- palida	X	
<i>Halimeda</i> sp.	X	
Ochrophyta		
<i>Dictyota</i> sp.	X	
<i>Lobophora</i> sp.	X	
Rhodophyta		1
Corallinophycidae		1
Crustose coralline (CCA)	X	
<i>Peyssonnelia</i> sp.	X	
Porifera		8
Demospongiae		7
<i>Agelas citrina</i>	X	
<i>Agelas clathrodes</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas schmidti</i>		1
<i>Aiolochoxia crassa</i>	X	
<i>Amphimedon cf. caribica</i>	X	
<i>Amphimedon compressa</i>	X	
<i>Amphimedon</i> sp. Cu-05	X	
<i>Aplysina archeri</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina cf. fulva</i>	X	
<i>Aplysina sciophila</i>	X	
<i>Auletta</i> sp.		1
<i>Auletta</i> sp. Cu-01	X	
<i>Axinella corrugata</i>	X	
<i>Callyspongia cf. armigera</i>	X	
<i>Callyspongia pallida</i>	X	

Dive Site: Cuba, NE coast, Cabo Lucrecia, proposed MPA, Station C-54B; ROV 17-36; 6-VI-17-4

<i>Callyspongia plicifera</i>	X	
<i>Cinachyrella cf. alloclada</i>	X	
<i>Cinachyrella kuekenthali</i>	X	
<i>Cinachyrella</i> sp. Cu-03	X	
<i>Cliona delitrix</i>	X	
Demospongiae sp. Cu-04	X	
Demospongiae sp. Cu-16	X	
Demospongiae sp. Cu-25	X	
Demospongiae unid. sp.	X	2
<i>Geodia</i> sp.		2
<i>Ircinia</i> sp. Cu-02	X	
<i>Ircinia strobilina</i>		1
<i>Niphates arenata</i>	X	
<i>Oceanapia</i> sp. Cu-01	X	
<i>Oceanapia</i> sp. Cu-05	X	
<i>Phakellia folium</i>	X	
<i>Polymastia</i> sp. Cu-01	X	
<i>Ptilocaulis walpersi</i>	X	
<i>Stylissa</i> sp.	X	
Tetractinellida Cu-04	X	
<i>Topsentia</i> sp.	X	
Verongiida Cu-01	X	
Verongiida Cu-05	X	
<i>Verongula gigantea</i>	X	
<i>Verongula reiswigi</i>	X	
<i>Verongula rigida</i>	X	
<i>Verongula</i> sp. Cu-01	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		1
<i>Plakortis</i> sp.		1
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		2
Hydrozoa		
Hydroidolina	X	
Stylasteridae	X	
Anthozoa- non coral		
<i>Condylactis gigantea</i>	X	
<i>Palythoa grandis</i>	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		1

Dive Site: Cuba, NE coast, Cabo Lucrecia, proposed MPA, Station C-54B; ROV 17-36; 6-VI-17-4

<i>Ellisella barbadensis</i> (Duchassaing & Michelotti, 1864) syn. <i>elongata</i> (Pallas, 1766)	X	
<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Nicella</i> sp.	X	
<i>Paramuricea</i> sp.		1
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		
Antipathidae	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
<i>Tanacetipathes tanacetum</i>	X	
Scleractinia		1
<i>Agaricia</i> sp.	X	1
<i>Montastraea cavernosa</i>	X	
<i>Porites astreoides</i>	X	
Scleractinia- unid cup	X	
<i>Scolymia cubensis</i>	X	
<i>Solenastrea bournoni</i>	X	
<i>Stephanocoenia intersepta</i>	X	
Other		1
Echinodermata		1
Ophiuroidea		1
Non-Fauna		
Human debris		
Human debris- fishing line	X	

Dive Site: Cuba, NE coast, Cabo Lucrecia, proposed MPA, Station C-54B; ROV 17-36; 6-VI-17-4

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-36. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Northeast Coast ROV 17-36 C-54B Notes
Commercially Important Species	18
Actinopterygii	18
Perciformes	12
<i>Cephalopholis fulva</i> - Coney	5
<i>Epinephelus striatus</i> - Nassau Grouper	1
<i>Lutjanus apodus</i> - Schoolmaster	4
<i>Mycteroperca venenosa</i> - yellowfin Grouper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	1
Scorpaeniformes	6
<i>Pterois volitans</i> - Lionfish	6
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish	X
<i>Chaetodon sedentarius</i> - Reef Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon aurolineatum</i> - Tomtate	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon striatum</i> - Striped Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X

Dive Site: Cuba, NE coast, Cabo Lucrecia, proposed MPA, Station C-54B; ROV 17-36; 6-VI-17-4

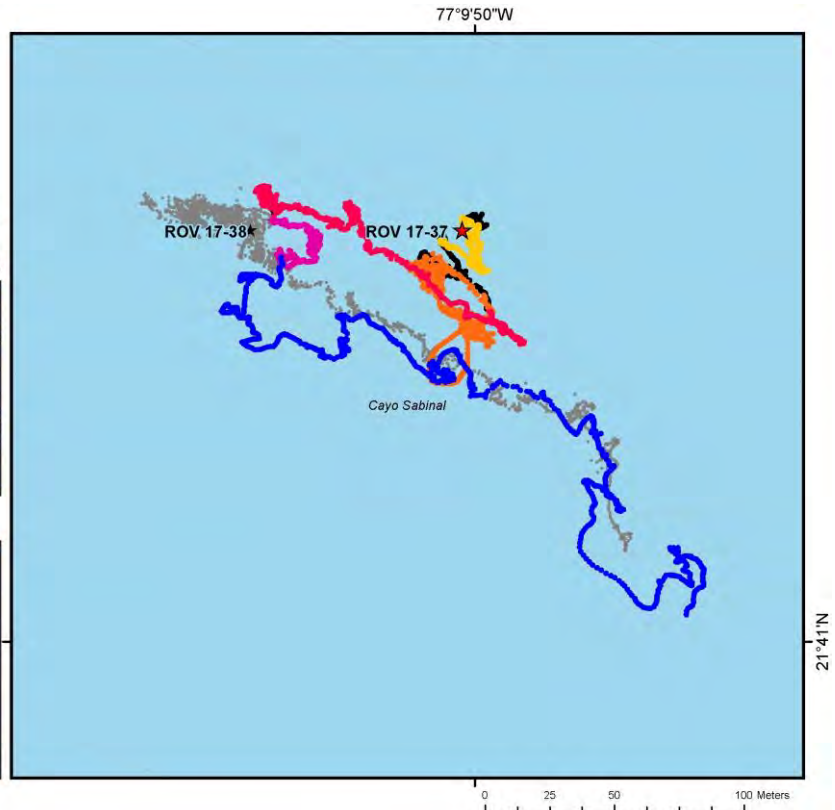
<i>Hypoplectrus unicolor</i> - Butter Hamlet	X
Labridae - Wrasse	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Mulloidichthys martinicus</i> - Yellow goatfish	X
<i>Paranthias furcifer</i> - Atlantic Creolefish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyaena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
Tetraodontiformes	
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-37; 7-VI-17-1

General Location and Dive Track:

Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-37; 7-VI-17-1

- ★ ROV 17-37
- ★ Mohawk ROV
- Transect Name**
- 201706071 - Transect 01
- 201706071 - Transect 02
- 201706071 - Transect 03
- 201706071 - Transect 04
- 201706071 - Transect 05
- ROV 17-37
- ROV 17-38
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investigator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J. González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/7/2017

Specimens: 12

Digital Photos: 394

No. DVD: 3

Hard Drive No.: 1

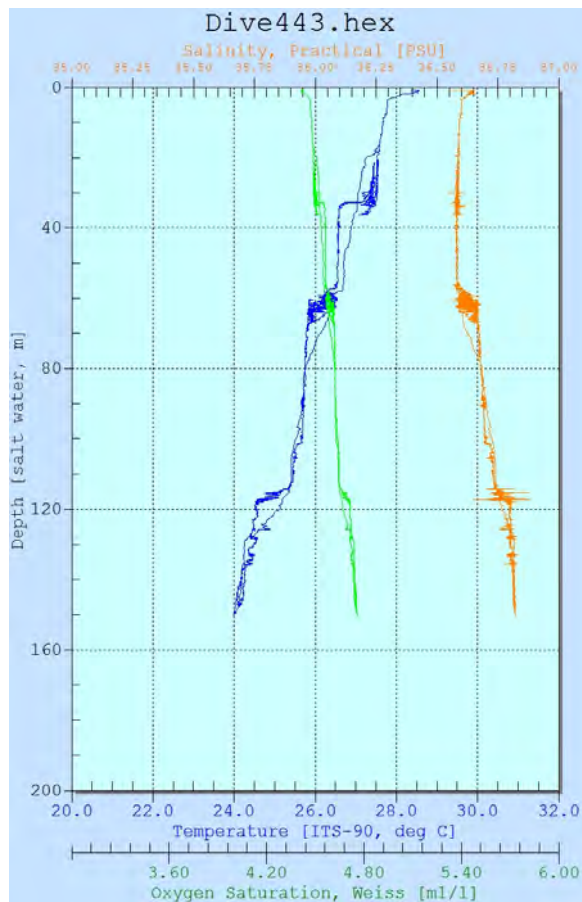
Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-37; 7-VI-17-1

Dive Data:

Minimum Bottom Depth (m): 24	Total Transect Length (km): 0.927
Maximum Bottom Depth (m): 150	Surface Current (kn): 0.2
On Bottom (Time- GMT): 8:36	On Bottom (Lat/Long): 21.6848°N; -77.1639°W
Off Bottom (Time- GMT): 11:31	Off Bottom (Lat/Long): 21.6833°N; -77.1632°W
Physical (bottom); Temp (°C): 24.2	Salinity: 36.81 Visibility 50 Current (kn): 0.2

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-37 are as follows: Depth Maximum: 150.1 m, Temperature: 24-28.5 °C, Salinity: 36.6-36.8 PSU, and Oxygen Saturation: 4.4-4.8 ml/l.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-37; 7-VI-17-1

Dive Imagery:



Figure 1: 21°41.077'N;77°9.8395'W: -116.4 m
Iciligorgia schrammi octocoral on deep wall



Figure 2: 21°41.0696'N;77°9.839'W: -88.9 m
Whip corals- *Ellisella elongata*, orange fan sponge- *Agelas* sp., and rope sponge- *Aplysina* sp.



Figure 3: 21°41.0774'N;77°9.8373'W: -68.9 m
Small *Montastraea cavernosa*, red crustose coralline algae

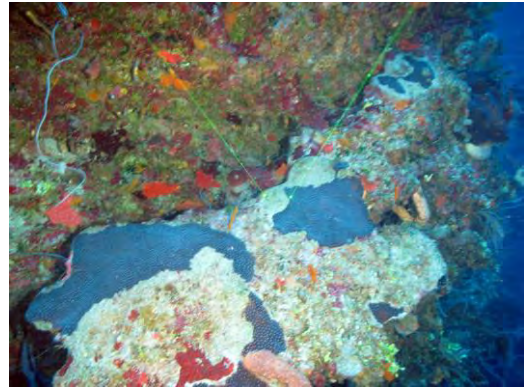


Figure 4: 21°41.0903'N;77°9.8599'W: -61.6 m
Sheets of *Montastraea cavernosa* on ledge (10 cm lasers)



Figure 5: 21°41.0912'N;77°9.877'W: -67.5 m
School of Anchovies and Silversides- Atherinidae, Engraulididae, in mouth of cave on the 'Wall'



Figure 6: 21°41.0365'N;77°9.8044'W: -33.1 m
Solenastrea bournoni on deep fringing reef

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-37; 7-VI-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 7-VI-17-1; ROV 17-37, UNCW Dive 443; Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Shipboard CTD broke; no data for June 4-7; just water samples.

Site Description/Habitat:

Depth range: 150- 24 m.

Transect heading up slope- 260°, 1.5 nmi offshore.

08:24- Launch. Wind- 4 kn from 194°, current- 0.2 kn to 091°, seas- calm, water temperature- 28.04 °C, salinity- 36.55.

08:37 - On bottom; visibility- 50 m, current- 0.2 to S.

11:31- End dive.

150 m, deep island slope zone: 70° slope, rock pavement, scalloped surface, 100% hard bottom, 2 m wide sand chutes. Biota: sponges- yellow encrusting, *Geodia*, *Asteropus*, *Aplysina* tubes, *Xestospongia*, *Cinachyrella*, thick vase; gorgonians- *Ellisella barbadensis*, 10 cm fans; corals- *Madracis* white fans; crinoids- *Davidaster*.

Vertical photo transect upslope, 144- 122, 8:40- 8:55; deep island slope zone.

130 m: *Entemnotrochus adansonianus*, slit shell.

120 m, lower mesophotic zone: 80-90° wall, ledges, undercut. Purple gorgonians- *Villogorgia?*, 10 cm gorgonians common.

Vertical photo transect upslope, 118- 67 m, 9:00- 9:54, lower mesophotic zone.

117 m: gorgonians common- *Nicella goreau*; sponges common- *Aplysina* rope sponges, *Ircinia*, *Geodia*; black coral- *Tanacetipathes*, bushy *Antipathes*.

105 m: 90° vertical wall, small caves, rugged eroded rock, karst topography, sand chutes. Danforth anchor and rope; *Agelas sceptrum*.

100 m: dense, diverse sponges.

97 m: CCA, sclerosponges, *Stichopathes*.

91 m: Lionfish.

88 m: bottom of buttress overhangs, 2-3 m wide ledge.

85 m: dense CCA, dense *Iciligorgia schrammi*.

70 m: first *Halimeda copiosa*; first *Solenastrea*, *Peyssonnelia*, *Ellisella* whips.

69 m: first *Agaricia* (50 cm), face of buttress; first *M. cavernosa* (10 cm), *Agaricia* common.

Quantitative horizontal photo transect, 65-60 m, 10:03 to 10:25 (30 images); face of buttresses, dense *Stichopathes* like whips but straight, not curled; *Agaricia* and *M. cavernosa* common.

50 m: *Mycetophyllia*.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-37; 7-VI-17-1

Vertical photo transect upslope, 50- 40, 10:25- 11:00; upper mesophotic zone.

47 m, upper mesophotic zone: upper brow of buttress, 45° slope; first *Orbicella* (30 cm), *Lobophora*, *Halimeda*, *Dictyota*; *Stephanocoenia intersepta*, *Meandrina meandrites*.

35-24 m: top of wall, flat fringing reef with few sand chutes, low relief <1/2 m, 90% hard bottom; sparse biota, less dense coral, sponges, gorgonians.

Fish video survey, 35-24 m, 11:00- 11:31; along top of deep fringing reef.

Maximum Depth Occurrences:

Crustose coralline algae (CCA)- 97 m

Lionfish- 91 m

Solenastrea- 70 m

Halimeda copiosa- 70 m

Peyssonnelia- 70 m

Agaricia- 69 m

Montastraea cavernosa- 69 m

Mycetophyllia- 50 m

Lobophora-, *Dictyota*- 47 m

Meandrina meandrites- 47 m

Orbicella faveolata- 47 m

Stephanocoenia intersepta- 47 m.

Number of Samples- 12

Disease and Human Impacts:

Anchor and rope.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-37; 7-VI-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-37. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

		Northeast Coast ROV 17-37 C-56	
Phylum/Class/Scientific Name	Notes	Samples	
Algae		4	
Cyanobacteria	X	1	
Chlorophyta		2	
Chlorophyta- bright	X		
Chlorophyta- palida	X		
<i>Halimeda copiosa</i>	X		
<i>Halimeda</i> sp.	X	1	
<i>Halimeda tuna</i>		1	
<i>Rhipocephalus phoenix</i>	X		
Ochrophyta		1	
<i>Dictyota</i> sp.	X		
<i>Lobophora</i> sp.	X	1	
Rhodophyta			
Crustose coralline (CCA)	X		
<i>Peyssonnelia</i> sp.	X		
Rhodophyta	X		
Rhodophyta- Red Blade	X		
Porifera		5	
Demospongiae		5	
<i>Agelas cervicornis</i>	X		
<i>Agelas citrina</i>	X		
<i>Agelas clathrodes</i>	X		
<i>Agelas flabelliformis</i>	X		
<i>Agelas sceptrum</i>	X		
<i>Agelas</i> sp. Cu-06	X		
<i>Aiolochoia crassa</i>	X		
<i>Amphimedon compressa</i>	X		
<i>Aplysina archeri</i>	X		
<i>Aplysina bathyphila</i>	X		
<i>Aplysina cauliformis</i>	X		
<i>Aplysina cf. fulva</i>	X		
<i>Aplysina</i> sp.		1	

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-37; 7-VI-17-1

<i>Aplysina</i> sp. Cu-01	X	
<i>Aplysina</i> sp. Cu-04	X	
<i>Asteropus</i> sp. Cu-01	X	
<i>Axinella corrugata</i>	X	
<i>Callyspongia plicifera</i>	X	
<i>Ceratoporella nicholsoni</i>	X	
<i>Cinachyrella</i> sp. Cu-03	X	
<i>Cliona delitrix</i>	X	
<i>Cribrochalina vasculum</i>	X	
Demospongiae sp. Cu-08	X	
Demospongiae sp. Cu-20	X	
Demospongiae sp. Cu-22	X	
Demospongiae sp. Cu-25	X	
Demospongiae unid. sp.	X	
Dictyoceratida unid. sp.		1
<i>Erylus cf. formosus</i>	X	
<i>Geodia cf. criбата</i>	X	
<i>Geodia neptuni</i>	X	
<i>Geodia</i> sp. Cu-03	X	
<i>Iotrochota birotulata</i>	X	
<i>Ircinia cf. strobilina</i>	X	
<i>Ircinia</i> sp. Cu-03	X	
<i>Monanchora arbuscula</i>	X	
<i>Niphates arenata</i>	X	
<i>Oceanapia</i> sp.		1
<i>Oceanapia</i> sp. Cu-07	X	
<i>Polymastia</i> sp. Cu-03	X	
<i>Spirastrella coccinea</i>	X	
<i>Spirastrella hartmani</i>	X	
Verongiida		2
Verongiida Cu-01	X	
Verongiida Cu-05	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Cnidaria		1
Hydrozoa		
Hydroidolina	X	
<i>Millepora alcicornis</i>	X	
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinas MPA, Station C-56; ROV 17-37; 7-VI-17-1

<i>Ellisella</i> sp.	X	
<i>Gorgonia ventalina</i>	X	
Gorgoniidae	X	
<i>Hypnogorgia</i> sp.	X	
<i>Iciligorgia schrammi</i>	X	
<i>Nicella</i> sp.	X	
Plexauridae	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		
Antipathidae	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
<i>Tanacetipathes tanacetum</i>	X	
Scleractinia		1
<i>Agaricia</i> sp.	X	
<i>Eusmilia fastigiata</i>	X	
<i>Madracis formosa</i>	X	
<i>Madracis</i> sp.	X	
<i>Meandrina meandrites</i>	X	1
<i>Meandrina</i> sp.	X	
<i>Montastraea cavernosa</i>	X	
<i>Orbicella faveolata</i>	X	
<i>Porites astreoides</i>	X	
<i>Porites divaricata</i>	X	
<i>Porites porites</i>	X	
<i>Porites</i> sp.	X	
Scleractinia- unid cup	X	
<i>Scolymia cubensis</i>	X	
<i>Siderastrea siderea</i>	X	
<i>Solenastrea bournoni</i>	X	
<i>Stephanocoenia intersepta</i>	X	
Other		2
Mollusca		1
<i>Entemnotrochus adansonianus</i>		1
Chordata - Invertebrate		1
Ascidacea		1

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-37; 7-VI-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-37. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

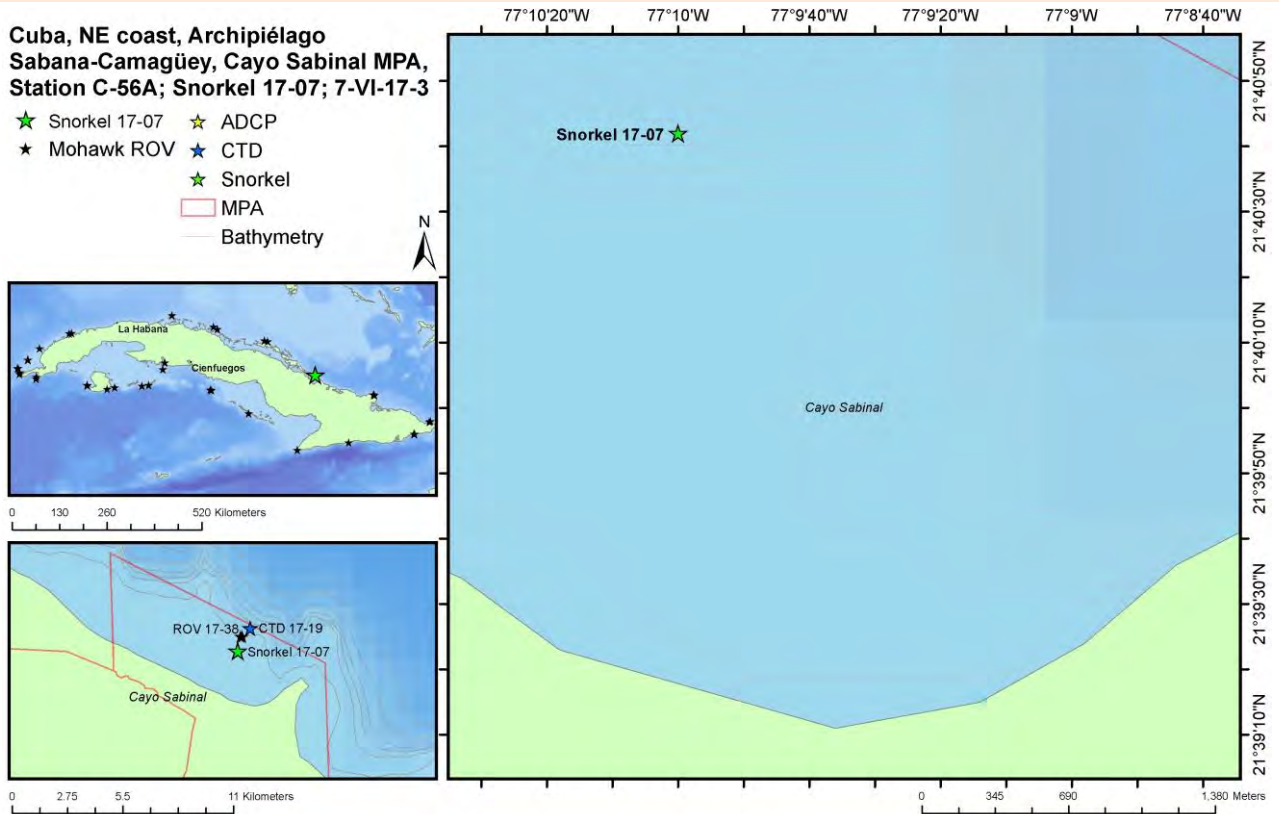
Phylum/Class/Order/Scientific Name - Common Name	Northeast Coast ROV 17-37 C-56 Notes
Commercially Important Species	14
Actinopterygii	14
Perciformes	12
<i>Cephalopholis cruentata</i> - Graysby	2
<i>Cephalopholis fulva</i> - Coney	4
<i>Epinephelus guttatus</i> - Red Hind	1
<i>Lutjanus apodus</i> - Schoolmaster	1
<i>Lutjanus buccanella</i> - Blackfin Snapper	1
<i>Lutjanus jocu</i> - Dog Snapper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	1
Serranidae - Grouper	1
Scorpaeniformes	2
<i>Pterois volitans</i> - Lionfish	2
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Anisotremus virginicus</i> - Porkfish	X
<i>Bodianus rufus</i> - Spanish Hogfish	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish	X
Chaetodontidae - Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
Gobiidae - Goby	X
<i>Grama loreto</i> - Fairy Basslet	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-37; 7-VI-17-1

<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon flavolineatum</i> - French Grunt	X
<i>Haemulon melanurum</i> - Cottonwick	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon sciurus</i> - Bluestriped Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
Labridae - Wrasse	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Pomacanthus paru</i> - French Angelfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Serranus tigrinus</i> - Harlequin Bass	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes leucostictus</i> - Beaugregory	X
<i>Stegastes partitus</i> - Bicolor Damsel	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Melichthys niger</i> - Black Durgon	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56A; Snorkel 17-07; 7-VI-17-3

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: N/A

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Snorkel

Sensors: GoPro

Data Management: Access Database

Date of Dive: 6/7/2017

Specimens: 33

Digital Photos: 215

No. DVD:

Hard Drive No.:

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56A;
Snorkel 17-07; 7-VI-17-3

Dive Data:

Minimum Bottom Depth (m): 1	Total Transect Length (km): 0.000
Maximum Bottom Depth (m): 4	Surface Current (kn): 0.1
On Bottom (Time- GMT): 13:00	On Bottom (Lat/Long): 21.6783°N; -77.1667°W
Off Bottom (Time- GMT): 15:30	Off Bottom (Lat/Long): 21.6783°N; -77.1667°W
Physical (bottom); Temp (°C): N/A	Salinity: N/A Visibility: N/A Current (kn): N/A

Physical Environment:

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56A;
Snorkel 17-07; 7-VI-17-3

Dive Imagery:



Figure 1: 21°40.7'N;77°10'W: 4 m
Elkhorn coral- *Acropora palmata* on shallow reef



Figure 2: 21°40.7'N;77°10'W: 4 m
Fire coral- *Millepora complanta* and *Millepora alcicornis*



Figure 3: 21°40.7'N;77°10'W: 4 m
Acropora palmata



Figure 4: 21°40.7'N;77°10'W: 4 m
Acropora palmata



Figure 5: 21°40.7'N;77°10'W: 4 m
Acropora palmata



Figure 6: 21°40.7'N;77°10'W: 4 m
Diver on *Acropora palmata* reef

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56A;
Snorkel 17-07; 7-VI-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

ite/Objectives:

Site #- 7-VI-17-3; Snorkel 17-07; Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56A.

Objectives- Snorkel dive for collections.

Site Description/Habitat:

1-4 m, fringing reef, with dense 1-2 m diameter *Acropora palmata* at 1-2 m depth; 30% alive. 2-5 m depth: flat hard bottom, with scattered meandroid corals, *Siderastrea*, *Pseudodiploria*, *Montastraea cavernosa*. 3 bull sharks to 3-4 m (depending on who you asked).

Number of Samples- 33

Montastraea cavernosa- 15

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56A;
Snorkel 17-07; 7-VI-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic biota identified or collected from snorkel dive 17-07.

Northeast Coast Snorkel 17-07 C-56A		
Phylum/Class/Scientific Name	Notes	Samples
Algae		8
Chlorophyta		2
<i>Cladophora fuliginosa</i>	X	
<i>Halimeda scabra</i>	X	
<i>Halimeda</i> sp.		1
<i>Microdictyon marinum</i>		1
Ochrophyta		3
<i>Canistrocarpus cripatus</i>		1
<i>Dictyota caribaea</i>	X	
<i>Dictyota ciliolata</i>	X	
<i>Lobophora</i> sp.	X	
<i>Sargassum</i> sp.		1
<i>Turbinaria tricostata</i>		1
Rhodophyta		3
<i>Amphiroa rigida</i>		1
<i>Centroceras</i> sp.	X	
<i>Jania pumila</i>	X	
<i>Jania rubens</i>	X	1
<i>Liagora</i> sp.		1
<i>Polysiphonia howeii</i>	X	
Cnidaria		16
Alcyonacea - gorgonian		1
<i>Briareum</i> sp.		1
Scleractinia		15
<i>Acropora palmata</i>	X	
Faviidae	X	
<i>Montastraea cavernosa</i>	X	15
<i>Pseudodiploria</i> sp.	X	
<i>Siderastrea</i> sp.	X	

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56A;
Snorkel 17-07; 7-VI-17-3

Fish:

Table 2. Species list of fish identified from dive site Snorkel 17-07.

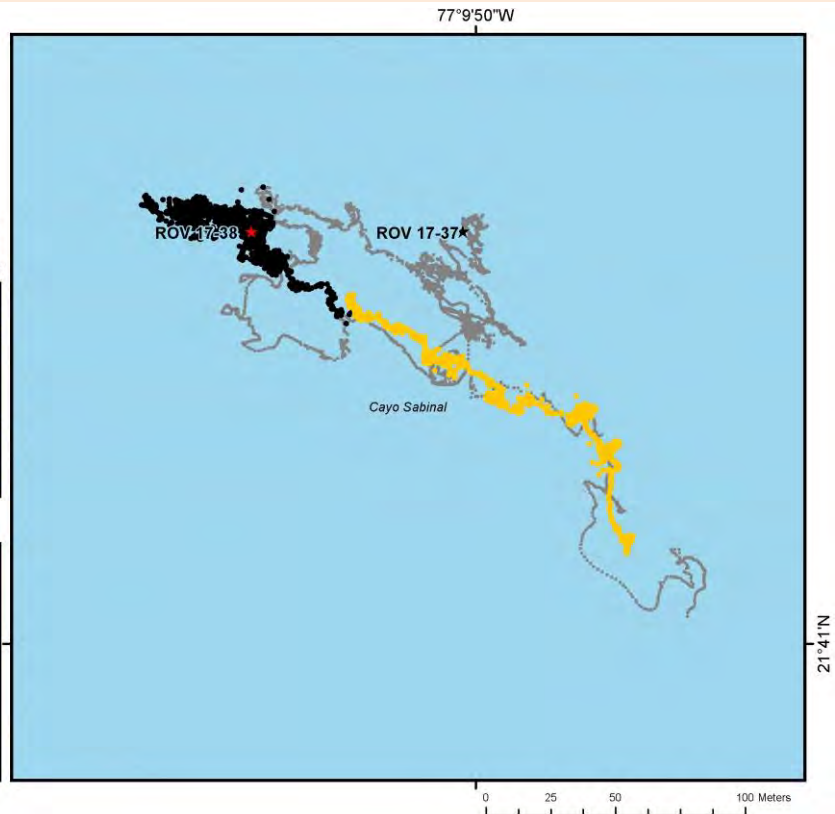
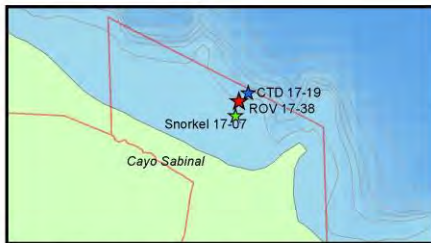
Northeast Coast Snorkel 17-07 C-56A	
Phylum/Class/Order/Scientific Name - Common Name	Notes
Commercially Important Species	1
Elasmobranchii	1
Carcharhiniformes	1
<i>Carcharhinus leucas</i> - Bull Shark	1

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-38; 7-VI-17-4

General Location and Dive Track:

Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-38; 7-VI-17-4

- ★ ROV 17-38
- ★ Mohawk ROV
- Transect Name
- 201706074 - Transect 01
- ROV 17-38
- ROV 17-37
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/7/2017

Specimens: 8

Digital Photos: 206

No. DVD: 2

Hard Drive No.: 1

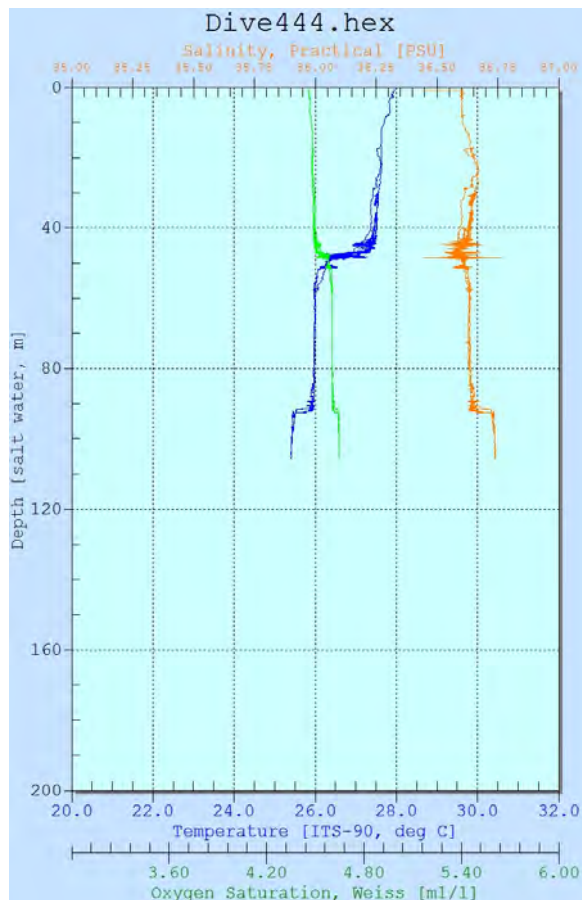
Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-38; 7-VI-17-4

Dive Data:

Minimum Bottom Depth (m): 31	Total Transect Length (km): 0.435
Maximum Bottom Depth (m): 91	Surface Current (kn): 0.1
On Bottom (Time- GMT): 15:57	On Bottom (Lat/Long): 21.6848°N; -77.1647°W
Off Bottom (Time- GMT): 17:40	Off Bottom (Lat/Long): 21.6836°N; -77.1633°W
Physical (bottom); Temp (°C): 26	Salinity: 36.63 Visibility 50 Current (kn): 0.5

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-38 are as follows: Depth Maximum: 105.6 m, Temperature: 25.4-27.9 °C, Salinity: 36.5-36.8 PSU, and Oxygen Saturation: 4.5-4.6 ml/l.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-38; 7-VI-17-4

Dive Imagery:

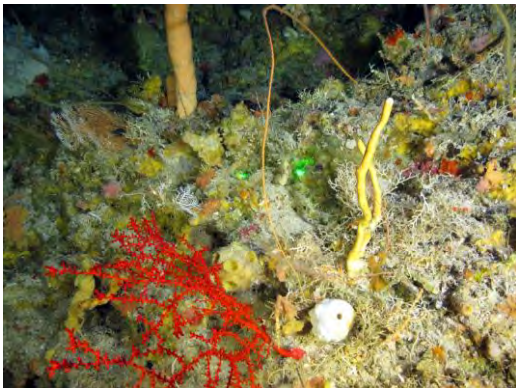


Figure 1: 21°41.0886'N;77°9.8927'W: -98.2 m
Red octocoral- *Swiftia exserta*, whip coral- *Ellisella* sp.,
and finger sponge- *Aplysina cf. sciophila*



Figure 2: 21°41.0885'N;77°9.8938'W: -94.9 m
Xestospongia sp. Cu-01, and many yellow and orange
sponge crusts on lower wall



Figure 3: 21°41.09'N;77°9.8926'W: -67.9 m
School of Anchovies and Silversides- Atherinidae,
Engraulidae, in mouth of cave on the 'Wall'



Figure 4: 21°41.0873'N;77°9.8841'W: -59.3 m
Vase sponge- *Callyspongia plicifera*, and *Swiftia*
exserta octocoral



Figure 5: 21°41.0814'N;77°9.8772'W: -46.8 m
Finger coral- *Madracis auretenra*, and holothurian-
Eostichopus arnesoni on deep fringing reef

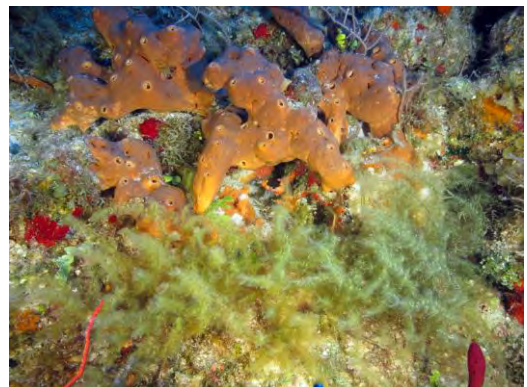


Figure 6: 21°41.0474'N;77°9.8115'W: -45.8 m
Demosponge- *Agelas* sp., and brown algae-
Sporochnus pedunculatus

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-38; 7-VI-17-4

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 7-VI-17-4; ROV 17-38, UNCW Dive 444; Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Shipboard CTD broke; no data for June 4-7; just water samples.

Same site as dive ROV 17-37. Objectives to collect and fish survey; no photo transects.

Site Description/Habitat:

Depth range: 90- 31 m.

Transect heading up slope- 260°, 1.5 nmi offshore.

15:49- Launch. Wind- 16 kn from 082°, current- 0.1 kn to 131°, seas- 0.5 m from E, water temperature- 28.27 °C, salinity- 36.56.

15:57 - On bottom; visibility- 50 m, current- ½ kn from W.

17:40- End dive.

90 m: vertical wall, overhanging buttresses, eroded rock, karst topography, ledges, caves, what appears as stalagmites.

74 m: 90° eroded rock wall

67 m: cave with dense school of anchovies?

65 m: first *Agaricia*.

59 m: first *Swiftia exserta*.

Fish video survey (with interruptions for collections), 45-31 m, 17:10- 17:40; along top edge of deep fringing reef.

Number of Samples- 8

Disease and Human Impacts:

None.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-38; 7-VI-17-4

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-38. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Notes	Samples
Northeast Coast ROV 17-38 C-56		
Algae		4
Chlorophyta		1
Chlorophyta- bright	X	
Chlorophyta- palida	X	
<i>Halimeda</i> sp.	X	
<i>Microdictyon</i> sp.	X	
<i>Valonia ventricosa</i>		1
Ochrophyta		2
<i>Dictyota</i> sp.	X	1
<i>Lobophora</i> sp.	X	1
<i>Sargassum hystrix</i>	X	
Rhodophyta		1
Crustose coralline (CCA)	X	
<i>Dasya</i> sp.		1
<i>Peyssonnelia</i> sp.	X	
Rhodophyta	X	
Porifera		3
Calcarea		1
Calcarea unid. sp.		1
Demospongiae		2
<i>Callyspongia plicifera</i>		1
<i>Clathria</i> sp.		1
<i>Clathria</i> sp. Cu-02	X	
<i>Niphates erecta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Cnidaria		1
Hydrozoa		
Hydroidolina	X	
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-38; 7-VI-17-4

<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Muricea</i> sp.	X	
<i>Nicella</i> sp.	X	
Plexauridae	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		1
Antipathidae	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
<i>Tanacetipathes tanacetum</i>	X	1
Scleractinia		
<i>Agaricia</i> sp.	X	
<i>Madracis</i> sp.	X	
<i>Meandrina meandrites</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Porites astreoides</i>	X	
<i>Porites divaricata</i>	X	
<i>Siderastrea siderea</i>	X	
<i>Stephanocoenia intersepta</i>	X	

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-38; 7-VI-17-4

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-38. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Northeast Coast ROV 17-38 C-56	
Phylum/Class/Order/Scientific Name - Common Name	Notes
Commercially Important Species	8
Actinopterygii	8
Perciformes	6
<i>Cephalopholis fulva</i> - Coney	2
<i>Epinephelus guttatus</i> - Red Hind	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	3
Scorpaeniformes	2
<i>Pterois volitans</i> - Lionfish	2
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Apogon</i> sp. - Cardinalfish	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Coryphopterus personatus</i> - Masked/Glass Goby	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Microspathodon chrysurus</i> - Yellowtail Damselfish	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Sabinal MPA, Station C-56; ROV 17-38; 7-VI-17-4

<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyaena barracuda</i> - Great Barracuda	X
<i>Stegastes leucostictus</i> - Beaugregory	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58; ROV 17-39; 8-VI-17-1

General Location and Dive Track:

Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58; ROV 17-39; 8-VI-17-1

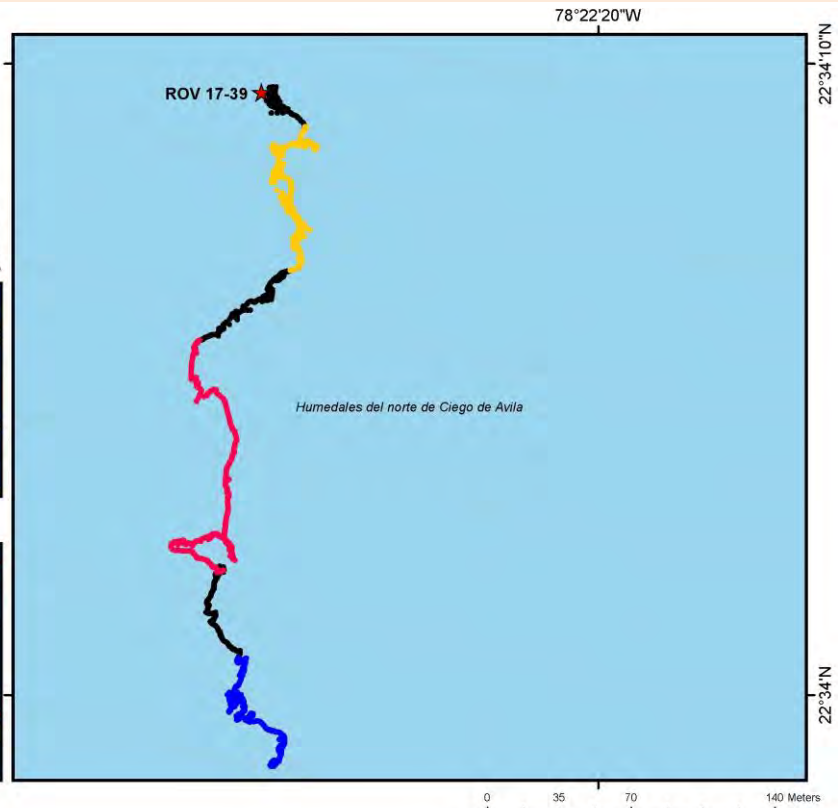
- ★ ROV 17-39
- ★ Mohawk ROV
- Transect Name
- 201706081 - Transect 01
- 201706081 - Transect 02
- 201706081 - Transect 03
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



0 130 260 520 Kilometers



0 5 10 20 Kilometers



Site Overview:

Project: CUBA 2017

Principal Investor: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/8/2017

Specimens: 22

Digital Photos: 930

No. DVD: 2

Hard Drive No.: 1

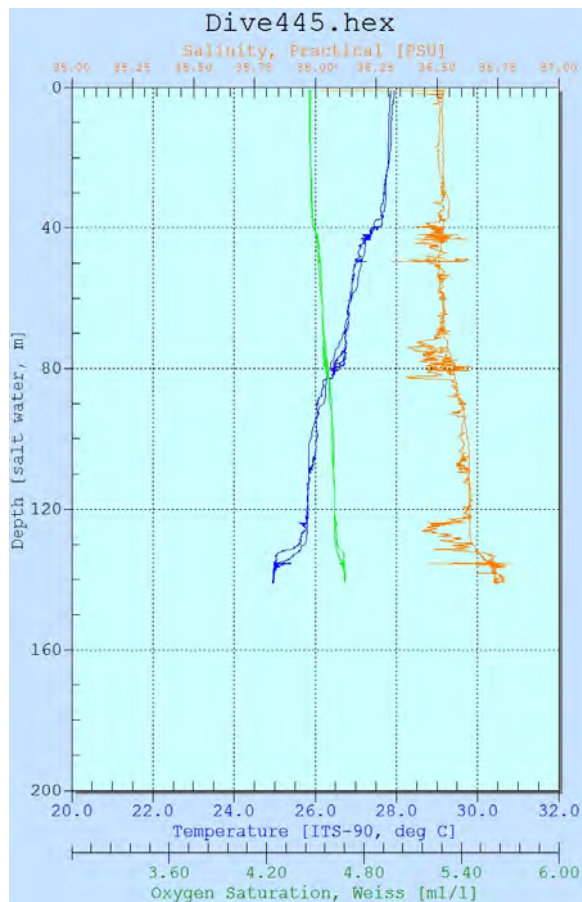
Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58; ROV 17-39; 8-VI-17-1

Dive Data:

Minimum Bottom Depth (m): 42	Total Transect Length (km): 0.517
Maximum Bottom Depth (m): 140	Surface Current (kn): 0.5
On Bottom (Time- GMT): 10:36	On Bottom (Lat/Long): 22.5693°N; -78.3737°W
Off Bottom (Time- GMT): 12:23	Off Bottom (Lat/Long): 22.5664°N; -78.3738°W
Physical (bottom); Temp (°C): 25	Salinity: 36.74 Visibility N/A Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-39 are as follows: Depth Maximum: 141.1 m, Temperature: 24.9-28 °C, Salinity: 36.3-36.8 PSU, and Oxygen Saturation: 4.5-4.7 ml/l.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58;
ROV 17-39; 8-VI-17-1

Dive Imagery:



Figure 1: 22°34.1454'N;78°22.4117'W: -141.6 m
Lionfish- *Pterois volitans/miles* on barren deep island slope



Figure 2: 22°34.1186'N;78°22.4131'W: -137.2 m
Elephant ear sponge- *Agelas* sp., white demersal sponge, and crinoid- *Davidaster discoideus*

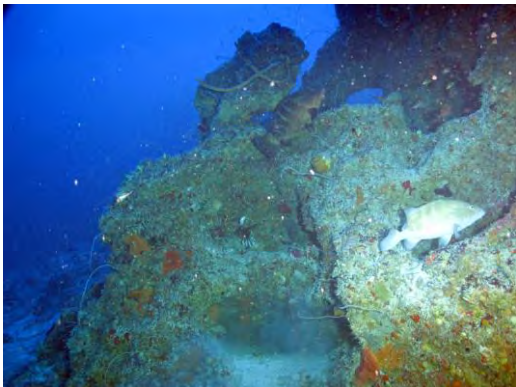


Figure 3: 22°34.0402'N;78°22.4312'W: -82.3 m
Nassau Grouper- *Epinephelus striatus* on rugged, eroded wall



Figure 4: 22°34.0523'N;78°22.4306'W: -91.3 m
Yellow massive demersal sponge, green sponge- *Iotrochota birotulata*; whip octocoral- *Ellisella elongata*, fan octocoral- *Iciligorgia schrammi*



Figure 5: 22°34.0092'N;78°22.4267'W: -50.5 m
Shaving brush algae- *Penicillus dumetosus*, and *Halimeda* sp. on deep fore reef



Figure 6: 22°33.9968'N;78°22.4267'W: -44.1 m
Green algae- *Halimeda* sp. and *Rhipocephalus phoenix*, and brown algae- *Styopodium zonale*

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58; ROV 17-39; 8-VI-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 8-VI-17-1; ROV 17-39, UNCW Dive 445; Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Propose C-58 as MPA- dense, diverse fish, large grouper.

Site Description/Habitat:

Depth range: 140- 42 m.

Transect heading up slope- 210°, 1.3 nmi offshore, low sand beach.

10:29- Launch. Wind- 14 kn from 168°, current- 0.5 kn to 109°, seas- 0.2 m from SE, water temperature- 28.15 °C, salinity- 36.47.

10:36 - On bottom.

12:23- End dive.

141 m, deep island slope zone: 100% soft bottom, 15° slope, coarse sediment. Biota: thin encrusting sponge, few demosponges; *Tanacetipathes*, sabellid polychaete tubes, crinoids; Lionfish.

Vertical photo transect upslope, 141- 126 m , 10:44- 11:13; deep island slope zone.

137 m: 100% hard bottom pavement; *Agelas* fans, *Aplysina* rope sponges, *Agelas sceptrum*, *Xestospongia*; *Ellisella* whips; crinoids- *Davidaster*.

125 m: 15° rock pavement; dense, diverse sponges.

120 m, lower mesophotic reef zone: thin bladed Chlorophyta, Phaeophyceae, *Stichopathes*.

115 m: first CCA.

Vertical photo transect upslope, 110- 60 m, 11:26- 11:43; lower mesophotic zone.

110 m: 5-10° rock pavement, no ledges, 80% soft bottom; dense sponges.

107 m: 100% soft bottom, 5° slope; barren.

91 m: *Iciligorgia schrammi*.

85 m: base of rock outcrop, eroded rock, 60-90° slope, vertical escarpment 2-3 m tall, forming fringing deep reef. Biota: 2 Nassau grouper, many lionfish, dense fish; first CCA; sponges- thin encrusting yellow, orange sponges, *Cinachyra*, *Agelas*; whip coral.

72 m: still on rock escarpment; 7 lionfish in hole.

68 m: first *Halimeda*; straight *Stichopathes* no coil; Face of escarpment SW- NE orientation. Large scamp, numerous large grouper, dozens of lionfish.

60 m: continues 2 m relief ledge; 45° rock pavement above the ledge.

50 m, upper mesophotic zone: top of rock slope; smooth rock dome, pavement, no ledges. Dense algae- *Penicillus*, *Halimeda*, *Lobophora*; sponges- *Aiolochoxia crassa*, *Iciligorgia schrammi*.

Vertical photo transect upslope, 50- 42 m, 11:51- 12:23; upper mesophotic zone.

45 m- dense *Halimeda*, shallow water type gorgonians.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58;
ROV 17-39; 8-VI-17-1

45 m: first and only *Agaricia*.

42 m: flat, top of slope; dense algae- *Halimeda*, *Lobophora*, *Penicillus*, *Avrainvillea*; few gorgonians-
Iciligorgia schrammi; *Xestospongia*.

Maximum Depth Occurrences:

Lionfish- 141 (dense- 85-60 m)

Crustose coralline algae (CCA)- 115 m

Halimeda- 68 m

Agaricia- 45 (one only)

Number of Samples- 22

Disease and Human Impacts:

None.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58; ROV 17-39; 8-VI-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-39. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

		Northeast Coast ROV 17-39 C-58	
Phylum/Class/Scientific Name	Notes	Samples	
Algae		7	
Chlorophyta		5	
<i>Anadyomene stellata</i>		1	
<i>Avrainvillea</i> sp.		1	
<i>Caulerpa racemosa</i>	X		
Chlorophyta- green	X		
Chlorophyta- palida	X		
<i>Halimeda copiosa</i>	X		
<i>Halimeda</i> sp.	X	1	
<i>Penicillus dumetosus</i>	X	1	
<i>Rhipocephalus phoenix</i>	X		
<i>Udotea dixonii</i>	X	1	
Ochrophyta		2	
<i>Dictyota</i> sp.	X		
<i>Lobophora</i> sp.	X	2	
Ochrophyta	X		
Rhodophyta			
Crustose coralline (CCA)	X		
<i>Peyssonnelia</i> sp.	X		
Porifera		9	
Demospongiae		8	
<i>Aptos</i> sp. Cu-01	X		
<i>Agelas sceptrum</i>	X		
<i>Agelas</i> sp.		1	
<i>Aiolochoxia crassa</i>	X		
<i>Amphimedon cf. caribica</i>	X		
<i>Amphimedon compressa</i>	X		
<i>Aplysina archeri</i>	X		
<i>Aplysina bathyphila</i>	X		
<i>Aplysina cauliformis</i>	X		
<i>Aplysina</i> sp. Cu-01	X		
<i>Axinella corrugata</i>	X		

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58; ROV 17-39; 8-VI-17-1

<i>Callyspongia plicifera</i>	X	
<i>Callyspongia</i> sp. Cu-02	X	
<i>Cinachyrella</i> sp. Cu-03	X	
<i>Clathria</i> sp. Cu-04	X	
Clathriidae		1
<i>Cribrochalina vasculum</i>	X	
Demospongiae sp. Cu-25	X	
Demospongiae unid. sp.	X	2
Dictyoceratida unid. sp.		1
<i>Ircinia</i> sp. Cu-02	X	
<i>Ircinia strobilina</i>	X	
<i>Neopetrosia carbonaria</i>	X	
<i>Niphates alba</i>	X	
<i>Niphates cf. erecta</i>	X	
<i>Oceanapia</i> sp. Cu-04	X	
<i>Phakellia folium</i>	X	
<i>Polymastia</i> sp. Cu-02	X	
<i>Ptilocaulis walpersi</i>	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Spirastrella coccinea</i>	X	
Spirastrellidae unid. sp.	X	
<i>Tedania ignis</i>		1
<i>Terpios belindae</i>	X	
Tetractinellida		1
Verongiida Cu-05	X	
<i>Verongula cf. rigida</i>	X	
<i>Verongula gigantea</i>	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	1
Homoscleromorpha		1
<i>Plakinastrella onkodes</i>	X	
Plakinidae unid. sp.		1
<i>Plakortis</i> sp. Cu-02	X	
Cnidaria		1
Anthozoa- non coral		
Actiniaria	X	
Alcyonacea - gorgonian		
<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Nicella</i> sp.	X	
<i>Plexaura</i> sp.	X	

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58; ROV 17-39; 8-VI-17-1

Antipatharia		
Antipathidae	X	
<i>Elatopathes abietina</i>	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
<i>Tanacetipathes tanacetum</i>	X	
Scleractinia		1
<i>Agaricia</i> sp.	X	
Scleractinia- unid cup		1
<i>Stephanocoenia intersepta</i>	X	
Other		4
Echinodermata		
Comatulida		3
<i>Davidaster discoideus</i>		1

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58; ROV 17-39; 8-VI-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-39. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Northeast Coast ROV 17-39 C-58 Notes
Commercially Important Species	60
Actinopterygii	60
Perciformes	22
<i>Cephalopholis cruentata</i> - Graysby	6
<i>Epinephelus guttatus</i> - Red Hind	5
<i>Epinephelus striatus</i> - Nassau Grouper	4
<i>Lutjanus jocu</i> - Dog Snapper	1
<i>Mycteroperca phenax</i> - Scamp	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	3
Serranidae - Grouper	2
Scorpaeniformes	38
<i>Pterois volitans</i> - Lionfish	38
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Actinopterygii- Larval - Larval UNID Fish	X
Beryciformes	
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Myripristis jacobus</i> - Blackbar Soldierfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Bodianus pulchellus</i> - Spotfin Hogfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Halichoeres bathyphilus</i> - Greenband Wrasse	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58; ROV 17-39; 8-VI-17-1

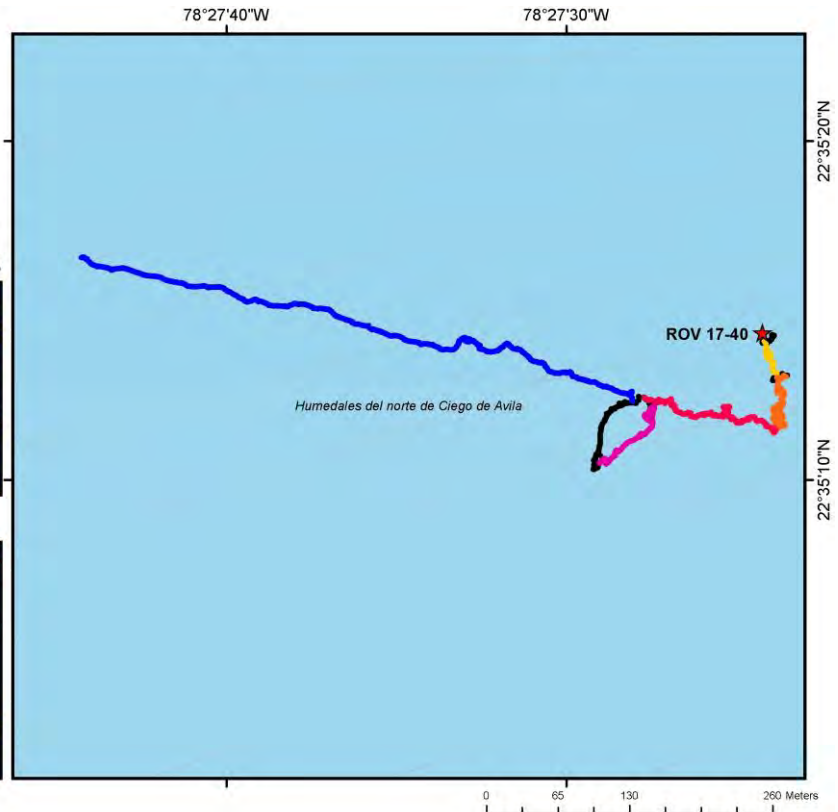
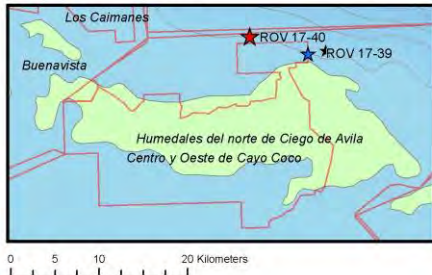
<i>Pomacanthus paru</i> - French Angelfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Ptereleotris helenae</i> - Hovering Dartfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Serranus phoebe</i> - Tattler	X
<i>Serranus tigrinus</i> - Harlequin Bass	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
<i>Thalassoma bifasciatum</i> - Bluehead Wrasse	X
Tetraodontiformes	
<i>Balistes vetula</i> - Queen Triggerfish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A; ROV 17-40; 8-VI-17-3

General Location and Dive Track:

Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA, Station C-58A; ROV 17-40; 8-VI-17-3

- ★ ROV 17-40
- ★ Mohawk ROV
- Transect Name
- 201706083 - Transect 01
- 201706083 - Transect 02
- 201706083 - Transect 03
- 201706083 - Transect 04
- 201706083 - Transect 05
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/8/2017

Specimens: 20

Digital Photos: 976

No. DVD: 3

Hard Drive No.: 1

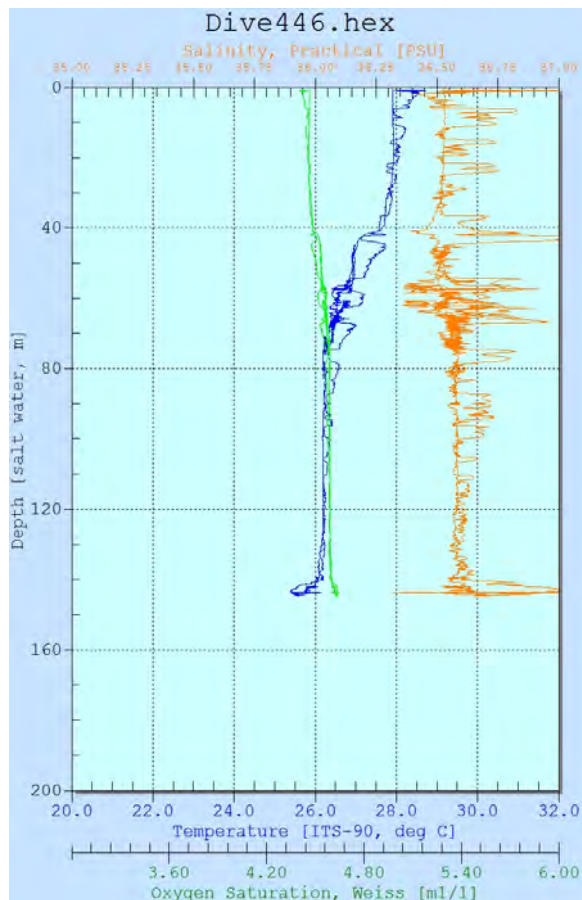
Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A; ROV 17-40; 8-VI-17-3

Dive Data:

Minimum Bottom Depth (m): 46	Total Transect Length (km): 0.956
Maximum Bottom Depth (m): 144	Surface Current (kn): 0.4
On Bottom (Time- GMT): 15:06	On Bottom (Lat/Long): 22.5873°N; -78.4567°W
Off Bottom (Time- GMT): 17:48	Off Bottom (Lat/Long): 22.588°N; -78.4625°W
Physical (bottom); Temp (°C): 26.1	Salinity: 36.32 Visibility 15 Current (kn): 0.75

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-40 are as follows: Depth Maximum: 144.7 m, Temperature: 25.4-28.6 °C, Salinity: 36.3-37.1 PSU, and Oxygen Saturation: 4.4-4.6 ml/l.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A; ROV 17-40; 8-VI-17-3

Dive Imagery:



Figure 1: 22°35.2124'N;78°27.3958'W: -109.2 m
Yellow fan- *Agelas* sp., black coral- *Tanacetipathes* sp.

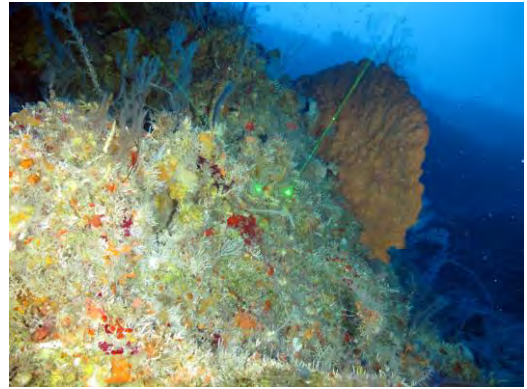


Figure 2: 22°35.1975'N;78°27.3979'W: -91.4 m
Elephant ear sponge- *Agelas* sp.



Figure 3: 22°35.193'N;78°27.3972'W: -76.7 m
Dense *Agaricia* spp. coral zone on the 'Wall'

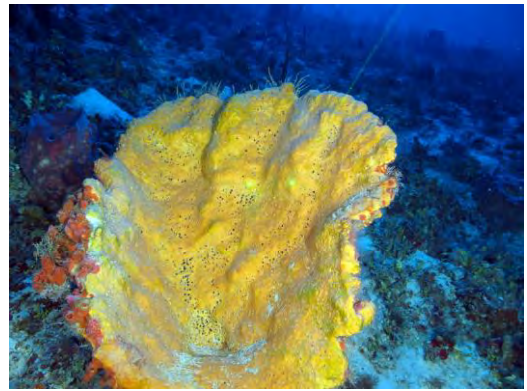


Figure 4: 22°35.205'N;78°27.459'W: -65.5 m
Large elephant ear sponge- *Agelas citrina*



Figure 5: 22°35.2352'N;78°27.577'W: -67.6 m
Aggregation of Dog Snapper- *Lutjanus jocu* on the upper wall



Figure 6: 22°35.2027'N;78°27.457'W: -62.3 m
Siphonaceous red alga- *Chrysomenia enteromorpha*, and green algae- *Penicillus* sp. and *Halimeda* sp.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A; ROV 17-40; 8-VI-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 8-VI-17-3; ROV 17-40, UNCW Dive 446; Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Proposed to add site to extend boundary of existing MPA. Essential fish habitat- large schools of dog snapper.

Site Description/Habitat:

Depth range: 144- 46 m.

Transect heading up slope- 163°, 2.0 nmi offshore, sand beach, low coastline.

14:56- Launch. Wind- 9 kn from 251°, current- 0.4 kn to 093°, seas- calm, water temperature- 28.29 °C, salinity- 36.49.

15:00 - On bottom, visibility- 15 m, current- ½- ¾ kn from W.

17:50- End dive.

144 m, deep island slope zone: 70° slope, rock pavement, sediment veneer, no ledges; dense and diverse sponges- thin encrusting yellow Verongiida sponges, *Agelas* fans, spherical orange, *Xestospongia*, *Asteropus*, *Ellisella* whips.

Vertical photo transect upslope, 144-120 m, 15:10- 15:16; deep island slope zone.

130 m: *Tanacetipathes*; *Agelas sceptrum*, *Aplysina* goblets.

120 m, lower mesophotic zone: few 30 cm crevices. First CCA, dense sponges, *Xestospongia*, *Nicella goreau*.

110 m: 30° rock slope, pavement, 100% hard bottom; dense black coral- 15 cm *Antipathes* fans.

Vertical photo transect upslope, 100- 70 , 15:18- 15:55; lower mesophotic zone.

100 m: dense CCA.

90 m: 45-80° slope, 2 m relief spurs, rugged karst-like eroded rock facies. Rope or anchor line. *Agelas flabelliformis*.

86 m: first *Halimeda*, *Peyssonnelia*.

83 m: first *Agaricia*.

77 m: 45-60°, eroded rock, caves, 1 m ledges; 1 m *Agaricia*.

Quantitative horizontal photo transect, 70-73 m, 15:55- 16:17 (30 images), face of buttresses, no sand chutes, *Agaricia* common.

65 m: upper brow of buttresses, 45° slope, flat rock, low rugosity, low relief.

58 m, upper mesophotic zone: flat hard bottom, low relief; dense algae and *Xestospongia*.

Vertical photo transect upslope, 58- 46 m, 16:20- 17:02; upper mesophotic zone.

48-46 m: 100% sediment over pavement, flat bottom; algae common- *Halimeda*, *Udotea*, cyanobacterial mats on sediment; *Manicina areolata*.

Fish video survey (with interruptions for collections), 65-70 m, 17:10- 17:50; along upper fore reef slope,

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A; ROV 17-40; 8-VI-17-3

hundreds of dog snapper.

Maximum Depth Occurrences:

Crustose coralline algae (CCA)- 120 m

Halimeda, Peyssonnelia- 86 m

Agaricia- 77 m (70-77 m common)

Manicina areolata- 48 m

Orbicella- none.

Number of Samples- 20

Disease and Human Impacts:

Anchor line.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A; ROV 17-40; 8-VI-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-40. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Notes	Samples
Northeast Coast ROV 17-40 C-58A		
Algae		12
Cyanobacteria	X	1
Chlorophyta		6
<i>Avrainvillea</i> sp.	X	
Chlorophyta- bright	X	
Chlorophyta- palida	X	
<i>Halimeda copiosa</i>	X	
<i>Halimeda goreau</i>		1
<i>Halimeda</i> sp.	X	
<i>Halimeda tuna</i>		1
<i>Microdictyon umbilicatum</i>		1
<i>Penicillus dumetosus</i>	X	
<i>Penicillus</i> sp.	X	
<i>Udotea cyathiformis</i>	X	1
<i>Udotea dixonii</i>	X	1
<i>Udotea</i> sp.	X	
<i>Valonia macrophysa</i>		1
<i>Valonia ventricosa</i>	X	
Ochrophyta		
<i>Lobophora</i> sp.	X	
Rhodophyta		5
<i>Botryocladia</i> sp.		1
<i>Chrysomenia enteromorpha</i>		1
<i>Chrysomenia</i> sp.		1
Corallinophycidae		2
Crustose coralline (CCA)	X	
<i>Peyssonnelia</i> sp.	X	
Porifera		2
Calcarea		1
Calcarea unid. sp.		1
Demospongiae		1
<i>Agelas cervicornis</i>	X	

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A; ROV 17-40; 8-VI-17-3

<i>Agelas cf. flabelliformis</i>	X	
<i>Agelas citrina</i>	X	
<i>Agelas clathrodes</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas</i> sp. Cu-06	X	
<i>Aiolochoxia crassa</i>	X	
<i>Amphimedon compressa</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina cf. fulva</i>	X	
<i>Aplysina</i> sp. Cu-01	X	
<i>Ceratoporella nicholsoni</i>	X	
<i>Cinachyrella</i> sp. Cu-01	X	
<i>Cliona delitrix</i>	X	
Demospongiae sp. Cu-25	X	
Demospongiae unid. sp.	X	1
<i>Geodia neptuni</i>	X	
<i>Igernella</i> sp.	X	
<i>Ircinia</i> sp. Cu-02	X	
<i>Ircinia strobilina</i>	X	
<i>Monanchora arbuscula</i>	X	
<i>Niphates digitalis</i>	X	
<i>Niphates erecta</i>	X	
<i>Petrosia weinbergi</i>	X	
Petrosiidae Cu-06	X	
<i>Phakellia folium</i>	X	
<i>Spirastrella coccinea</i>	X	
<i>Spirastrella hartmani</i>	X	
Verongiida Cu-01	X	
<i>Verongula gigantea</i>	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Homoscleromorpha		
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria 2		
Hydrozoa		
Hydroidolina	X	
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		1

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A; ROV 17-40; 8-VI-17-3

<i>Ellisella barbadensis</i> (Duchassaing & Michelotti, 1864) syn. <i>elongata</i> (Pallas, 1766)	X	
<i>Ellisella</i> sp.	X	
<i>Eunicea</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Lignella richardi</i>		1
<i>Nicella</i> sp.	X	
Plexauridae	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		1
<i>Antipathes furcata</i>	X	
Antipathidae	X	
<i>Plumapathes</i> sp.	X	1
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
<i>Tanacetipathes tanacetum</i>	X	
Scleractinia		
<i>Agaricia</i> sp.	X	
<i>Madracis</i> sp.	X	
<i>Montastraea cavernosa</i>	X	
Scleractinia- unid colonial	X	
Other		1
Bryozoa		1

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A; ROV 17-40; 8-VI-17-3

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-40. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Northeast Coast ROV 17-40 C-58A Notes
Commercially Important Species	11
Actinopterygii	11
Perciformes	10
<i>Cephalopholis cruentata</i> - Graysby	5
<i>Lutjanus jocu</i> - Dog Snapper	1
<i>Malacanthus plumieri</i> - Sand Tilefish	1
<i>Mycteroperca bonaci</i> - Black Grouper	1
Serranidae - Grouper	2
Scorpaeniformes	1
<i>Pterois volitans</i> - Lionfish	1
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Bodianus pulchellus</i> - Spotfin Hogfish	X
<i>Caranx lugubris</i> - Black Jack	X
<i>Caranx</i> sp. - Jack	X
<i>Chaetodon sedentarius</i> - Reef Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Equetus lanceolatus</i> - Jacknife Fish	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon</i> sp. - Grunt	X
<i>Haemulon striatum</i> - Striped Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Coco, proposed MPA (just north of NW edge of MPA), Station C-58A; ROV 17-40; 8-VI-17-3

<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
<i>Hypoplectrus unicolor</i> - Butter Hamlet	X
Labridae - Wrasse	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Pomacanthus paru</i> - French Angelfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Serranus annularis</i> - Orangeback Bass	X
<i>Serranus phoebe</i> - Tattler	X
<i>Serranus</i> sp. - Sea Bass	X
<i>Serranus tigrinus</i> - Harlequin Bass	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes adustus</i> - dusky damselfish	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
Tetraodontiformes	
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Xanthichthys ringens</i> - Sargassum Triggerfish	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A; ROV 17-41; 9-VI-17-1

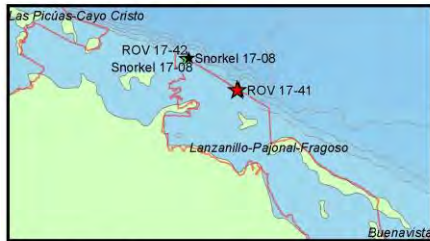
General Location and Dive Track:

Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A; ROV 17-41; 9-VI-17-1

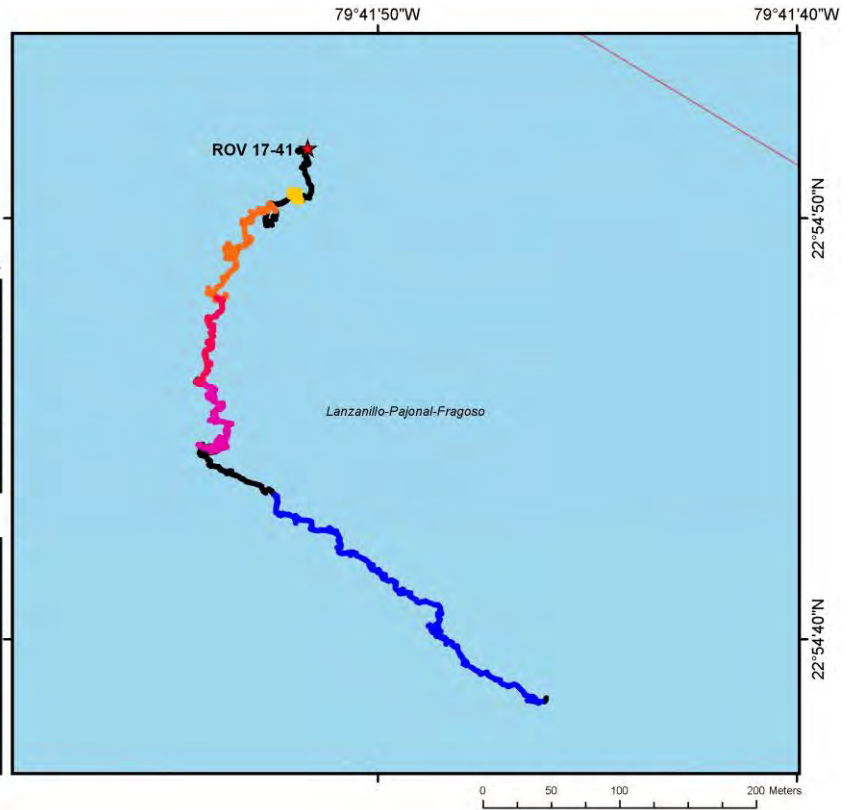
- ★ ROV 17-41
- ★ Mohawk ROV
- Transect Name
- 201706091 - Transect 01
- 201706091 - Transect 02
- 201706091 - Transect 03
- 201706091 - Transect 04
- 201706091 - Transect 05
- ROV Track
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



0 130 260 520 Kilometers



0 12.5 25 50 Kilometers



Site Overview:

Project: CUBA 2017

Principal Investigator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/9/2017

Specimens: 5

Digital Photos: 662

No. DVD: 3

Hard Drive No.: 1

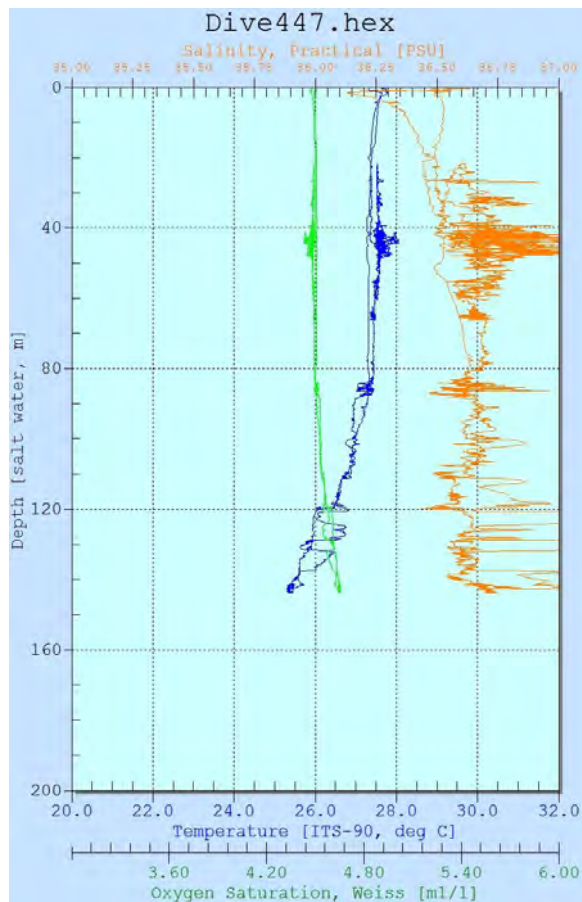
Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A; ROV 17-41; 9-VI-17-1

Dive Data:

Minimum Bottom Depth (m): 22	Total Transect Length (km): 0.776
Maximum Bottom Depth (m): 143	Surface Current (kn): 0.4
On Bottom (Time- GMT): 8:36	On Bottom (Lat/Long): 22.9144°N; -79.6977°W
Off Bottom (Time- GMT): 11:09	Off Bottom (Lat/Long): 22.9109°N; -79.6961°W
Physical (bottom); Temp (°C): 25.9	Salinity: 36.57 Visibility 20 Current (kn): N/A

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-41 are as follows: Depth Maximum: 143.8 m, Temperature: 25.3-28.1 °C, Salinity: 36.1-37.4 PSU, and Oxygen Saturation: 4.4-4.7 ml/l.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A; ROV 17-41; 9-VI-17-1

Dive Imagery:

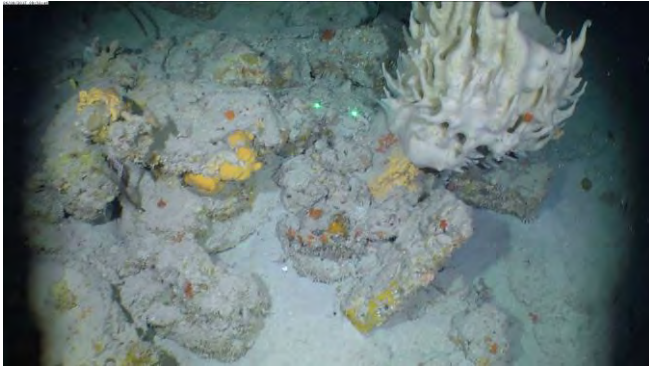


Figure 1: 22°54.8419'N;79°41.8673'W: -121.4 m
Spikey *Xestospongia* sp. on deep island slope



Figure 2: 22°54.8256'N;79°41.884'W: -86 m
Silty upper slope of buttress



Figure 3: 22°54.8023'N;79°41.8933'W: -63.8 m
Longline wrapped on the vertical wall



Figure 4: 22°54.8254'N;79°41.8844'W: -87.8 m
An albino *Aplysina* sp., spherical- *Geodia* sp., and yellow finger demosponge



Figure 5: 22°54.7408'N;79°41.8997'W: -33.7 m
Large (>1 m diam.) black coral- *Antipathidae* on deep fringing reef



Figure 6: 22°54.7093'N;79°41.8498'W: -43.9 m
Yellow sponge- *Aiolochoxia crassa*, tube- *Agelas* sp., red finger- *Amphimedon compressa*

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A; ROV 17-41; 9-VI-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 9-VI-17-1; ROV 17-41, UNCW Dive 447; Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Site Description/Habitat:

Depth range: 143- 22 m.

Transect heading up slope- 244°, 1.4 nmi offshore deserted islands.

08:30- Launch. Wind- 4 kn from 204°, current- 0.4 kn to 160°, seas- calm, water temperature- 27,64 °C, salinity- 36.43.

08:37 - On bottom, visibility- 20 m, current- downwelling, down the wall face.

11:10- End dive.

143 m, deep island slope zone: 80-90° slope, rock with horizontal layering, rugged, eroded surface, scalloped surface, sediment veneer on horizontal surfaces. Biota: fairly barren, mostly sponges- yellow encrusting Verongiida, *Agelas* fans, *Oceanapia*, *Asteropus*; *Ellisella* whips, *Nicella goreaui*.

Vertical photo transect upslope, 143- 120 m, 8:41- 8:52, deep island slope zone.

128 m: 60-70° slope, smooth rock pavement, more barren.

120 m, lower mesophotic zone: *Xestospongia*, *Polymastia*, *Cinachyra*.

110 m: 60° slope, rock pavement; demosponges; gorgonians- *Ellisella* whips, 30 cm yellow fan gorgonians, Paramuriceidae; black coral- *Stichopathes*, bushy *Antipathes*.

Vertical photo transect upslope, 110- 65 m, 8:59- 9:3s; lower mesophotic zone.

107 m: Sample S-1, *Lignella richardi*, Keroeidae gorgonian, rare, new distribution record?

100 m: mostly sand sediment; no CCA, low density biota.

95 m: start denser sponge zone: *Xestospongia*, *Aplysina* rope sponges, *Agelas* plates, *Aplysina* tubes.

88 m: vertical rock buttresses, eroded karst-like rock, ledges; dense, diverse sponges.

85 m: first lionfish. 60-80° rock pavement, eroded rock, 2 m ledges, caves. Biota- sparse CCA, dense sponges, rope sponges; gorgonians, *Antipathes*, no coral.

80 m: 90° wall, eroded, no chutes or overhanging buttresses.

Quantitative horizontal photo transect, 65 m, 09:39- 09:54 (30 images); across face of vertical rock wall, no chutes or overhanging buttresses. Fishing net on wall.

66 m: first *Solenastrea* (5 cm, 20 cm), no *Agaricia*, dense *Stichopathes*.

Vertical photo transect upslope, 60- 33 m, 9:55- 10:24; upper mesophotic zone.

59 m: first *Agaricia* (30 cm). Upper brow of wall, 45-60° slope. Several 50 cm-1 m *Agaricia*; several *Agaricia* 70% dead.

54 m: 45° slope, few sand chutes. 30 cm *Agaricia*, no *Halimeda*.

50 m: buttresses with sand chutes.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A; ROV 17-41; 9-VI-17-1

47 m: 90° wall and sand chutes; dense uncoiled *Stichopathes*-like whips; no *Halimeda* or *Lobophora*.

43 m: first and only *M. cavernosa*.

40 m, upper mesophotic zone: upper brow of wall, 45° slope, 2-3 m deep sand chutes through buttresses; sponges, *Stichopathes*, shallow water gorgonians, 30 cm *Agaricia*.

30 m: rugged fore reef of deep fringing reef.

32 m: first *Halimeda copiosa*.

30-22 m: deep fore reef slope, few shallow sand chutes, 1 m relief, high rugosity; dense gorgonians, few corals, dense *Halimeda*, and *Lobophora*.

22 m: still on fore reef slope, end transect up slope, still not on crest of reef.

Fish video survey (with interruptions for collections), 45 m, 10:40- 11:10; upper brow of deep fringing fore reef slope.

Maximum Depth Occurrences:

Lignella richardi- 107 m (new distribution record?)

Crustose coralline algae (CCA)- 85 m

Lionfish- 85 m

Solenastrea- 66 m

Agaricia- 59 m

Montastraea cavernosa- 43 m (one only)

Halimeda, *Lobophora*- 32 m.

Number of Samples- 5

Disease and Human Impacts:

Fishing net on wall.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A; ROV 17-41; 9-VI-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-41. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

		Northeast Coast ROV 17-41 C-59A	
Phylum/Class/Scientific Name	Notes	Samples	
Algae		2	
Chlorophyta		1	
Chlorophyta- palida	X		
<i>Halimeda copiosa</i>	X	1	
<i>Halimeda</i> sp.	X		
<i>Penicillus dumetosus</i>	X		
Ochrophyta		1	
<i>Lobophora</i> sp.	X	1	
Rhodophyta			
Crustose coralline (CCA)	X		
<i>Peyssonnelia</i> sp.	X		
Porifera		1	
Demospongiae		1	
<i>Aaptos</i> sp. Cu-01	X		
<i>Agelas</i> cf. <i>flabelliformis</i>	X		
<i>Agelas sceptrum</i>	X		
<i>Agelas tubulata</i>	X		
<i>Aiolochoiria crassa</i>	X		
<i>Aiolochoiria</i> sp. Cu-01	X		
<i>Amphimedon</i> sp. Cu-01	X		
<i>Aplysina archeri</i>	X		
<i>Aplysina bathyphila</i>	X		
<i>Aplysina cauliformis</i>	X		
<i>Aplysina</i> cf. <i>fulva</i>	X		
<i>Aplysina sciophila</i>	X		
<i>Aplysina</i> sp.		1	
<i>Aplysina</i> sp. Cu-04	X		
<i>Asteropus</i> sp. Cu-01	X		
<i>Axinella</i> cf. <i>corrugata</i>	X		
Axinellidae Cu-01	X		
<i>Callyspongia plicifera</i>	X		
<i>Callyspongia</i> sp. Cu-02	X		

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A; ROV 17-41; 9-VI-17-1

<i>Callyspongia vaginalis</i>	X
<i>Ceratoporella nicholsoni</i>	X
<i>Cinachyrella kuekenthali</i>	X
<i>Cinachyrella</i> sp. Cu-01	X
<i>Cinachyrella</i> sp. Cu-02	X
<i>Cinachyrella</i> sp. Cu-03	X
<i>Cinachyrella</i> sp. Cu-05	X
<i>Cliona delitrix</i>	X
<i>Cribrachalina vasculum</i>	X
Demospongiae sp. Cu-01	X
Demospongiae sp. Cu-22	X
Demospongiae sp. Cu-25	X
Demospongiae unid. sp.	X
<i>Diplastrella megastellata</i>	X
<i>Diplastrella</i> sp.	X
<i>Ectyoplasia ferox</i>	X
<i>Iotrochota birotulata</i>	X
<i>Ircinia</i> sp. Cu-02	X
<i>Mycale</i> cf. <i>laevis</i>	X
<i>Mycale laxissima</i>	X
<i>Niphates arenata</i>	X
<i>Oceanapia</i> sp. Cu-01	X
<i>Oceanapia</i> sp. Cu-04	X
<i>Oceanapia</i> sp. Cu-05	X
<i>Petrosia weinbergi</i>	X
Petrosiidae Cu-06	X
<i>Phakellia folium</i>	X
<i>Polymastia</i> sp. Cu-01	X
<i>Siphonodictyon coralliphagum</i>	X
<i>Spirastrella coccinea</i>	X
<i>Spirastrella hartmani</i>	X
<i>Stylissa caribica</i>	X
<i>Stylissa</i> sp.	X
<i>Svenzea zeai</i>	X
Verongiida Cu-01	X
Verongiida Cu-05	X
Verongiida Cu-09	X
<i>Verongula</i> cf. <i>rigida</i>	X
<i>Verongula rigida</i>	X
<i>Verongula</i> sp. Cu-01	X
Xestospongia sp. Cu-01	X
Homoscleromorpha	

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A; ROV 17-41; 9-VI-17-1

<i>Oscarella</i> sp. Cu-02	X	
<i>Plakortis dariae</i>	X	
<i>Plakortis</i> sp. Cu-01	X	
Cnidaria		2
Hydrozoa		
Hydroidolina	X	
Stylasteridae	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		1
<i>Ellisella</i> sp.	X	
<i>Eunicea</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Nicella</i> sp.	X	
<i>Paramuricea</i> sp.	X	
Paramuriceidae		1
Plexauridae	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		1
Antipatharia unid. sp.		1
<i>Antipathes</i> sp.	X	
Antipathidae	X	
<i>Plumapathes</i> sp.	X	
<i>Stichopathes</i> sp.	X	
<i>Tanacetipathes</i> sp.	X	
<i>Tanacetipathes tanacetum</i>	X	
Scleractinia		
<i>Agaricia</i> sp.	X	
<i>Madracis</i> sp.	X	
<i>Montastraea cavernosa</i>	X	
<i>Solenastrea bournoni</i>	X	
<i>Stephanocoenia intersepta</i>	X	

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A; ROV 17-41; 9-VI-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-41. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Northeast Coast ROV 17-41 C-59A Notes
Commercially Important Species	13
Actinopterygii	13
Perciformes	10
<i>Cephalopholis cruentata</i> - Graysby	1
<i>Lutjanus apodus</i> - Schoolmaster	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	6
Serranidae - Grouper	2
Scorpaeniformes	3
<i>Pterois volitans</i> - Lionfish	3
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Aulopiformes	
<i>Synodus</i> sp. - Lizardfish	X
<i>Synodus synodus</i> - Red Lizardfish	X
Beryciformes	
<i>Neoniphon marianus</i> - Longjaw Squirrelfish	X
Perciformes	
<i>Acanthurus chirurgus</i> - Doctorfish	X
<i>Acanthurus coeruleus</i> - Blue Tang	X
<i>Anisotremus virginicus</i> - Porkfish	X
<i>Bodianus pulchellus</i> - Spotfin Hogfish	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish	X
<i>Chaetodon sedentarius</i> - Reef Butterflyfish	X
Chaetodontidae - Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Gramma loreto</i> - Fairy Basslet	X
<i>Gramma melacara</i> - Blackcap Basslet	X
<i>Haemulon flavolineatum</i> - French Grunt	X
<i>Haemulon plumierii</i> - White Grunt	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo La Vela MPA, Station C-59A; ROV 17-41; 9-VI-17-1

<i>Haemulon sciurus</i> - Bluestriped Grunt	X
<i>Haemulon striatum</i> - Striped Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus</i> sp. - Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus nigricans</i> - Black Hamlet	X
Labridae - Wrasse	X
<i>Lachnolaimus maximus</i> - Hogfish	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Mulloidichthys martinicus</i> - Yellow goatfish	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Pseudupeneus maculatus</i> - Spotted Goatfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Sparisoma aurofrenatum</i> - Redband Parrotfish	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damsel fish	X
Tetraodontiformes	
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X
<i>Melichthys niger</i> - Black Durgon	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, no MPA, Station C-59B; Snorkel 17-08; 9-VI-17-3

General Location and Dive Track:

Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, no MPA, Station C-59B; Snorkel 17-08; 9-VI-17-3

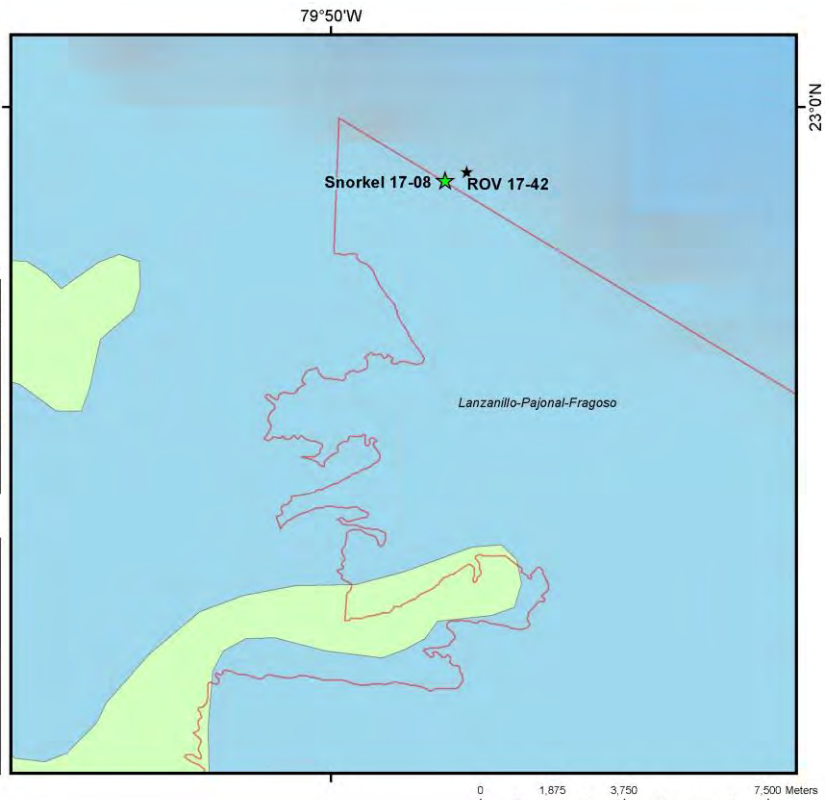
- ★ Snorkel 17-08
- ★ Mohawk ROV
- ★ ADCP
- ★ CTD
- ★ Snorkel
- MPA
- Bathymetry



0 130 260 520 Kilometers



0 12.5 25 50 Kilometers



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: N/A

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Snorkel

Sensors: GoPro

Data Management: Access Database

Date of Dive: 6/9/2017

Specimens: 46

Digital Photos: 110

No. DVD:

Hard Drive No.:

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, no MPA, Station C-59B;
Snorkel 17-08; 9-VI-17-3

Dive Data:

Minimum Bottom Depth (m): 1	Total Transect Length (km): 0.000
Maximum Bottom Depth (m): 2	Surface Current (kn): 0.1
On Bottom (Time- GMT): 13:00	On Bottom (Lat/Long): 22.9826°N; -79.8066°W
Off Bottom (Time- GMT):	Off Bottom (Lat/Long): 22.9826°N; -79.8066°W
Physical (bottom); Temp (°C): N/A	Salinity: N/A Visibility: N/A Current (kn): N/A

Physical Environment:

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, no MPA, Station C-59B;
Snorkel 17-08; 9-VI-17-3

Dive Imagery:



Figure 1: 22°58.958'N;79°48.396'W: 2 m
Snokeler on *Acropora palmata* reef



Figure 2: 22°58.958'N;79°48.396'W: 2 m
Elkhorn coral- *Acropora palmata*

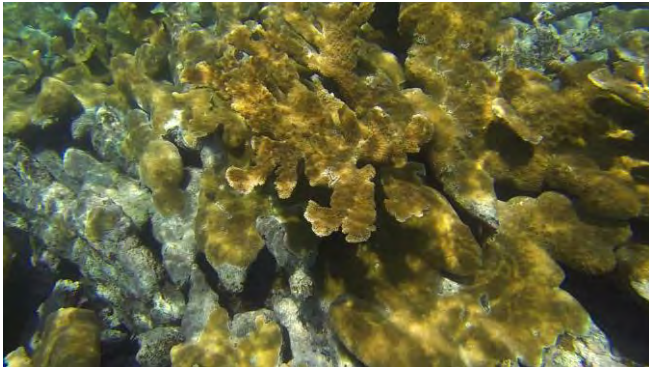


Figure 3: 22°58.958'N;79°48.396'W: 2 m
Acropora palmata



Figure 4: 22°58.958'N;79°48.396'W: 2 m
Dense *Acropora cervicornis* thickets



Figure 5: 22°58.958'N;79°48.396'W: 2 m
Staghorn coral thickets- *Acropora cervicornis*



Figure 6: 22°58.958'N;79°48.396'W: 2 m
Dense *Acropora cervicornis* thickets

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, no MPA, Station C-59B;
Snorkel 17-08; 9-VI-17-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 9-VI-17-3; Snorkel 17-08; Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, no MPA, Station C-59B.

Objectives- Snorkel dive for collections.

Site Description/Habitat:

Small islet off Cayo Jutias, ~75 m long, ~1m relief, eroded rock surface. Circumnavigated island. Depth 2-4 m: hard bottom with scattered small *Siderastrea*, *Pseudodiploria*, *Montastraea cavernosa*, *Styopodium*. Depth 1-2 m, all along north shore of island: dense thickets of *Acropora palmata*, 1-2 m diameter colonies, healthy, ~50% alive. 1-2 m depth, all along SE and E side of island: dense thickets of *Acropora cervicornis*, 80% alive, > 1 acre? Most *Acropora* that I have seen anywhere in Caribbean or Bahamas since 1970s.

Number of Samples- 46

Montastraea cavernosa- 13

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, no MPA, Station C-59B;
Snorkel 17-08; 9-VI-17-3

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic biota identified or collected from snorkel dive 17-08.

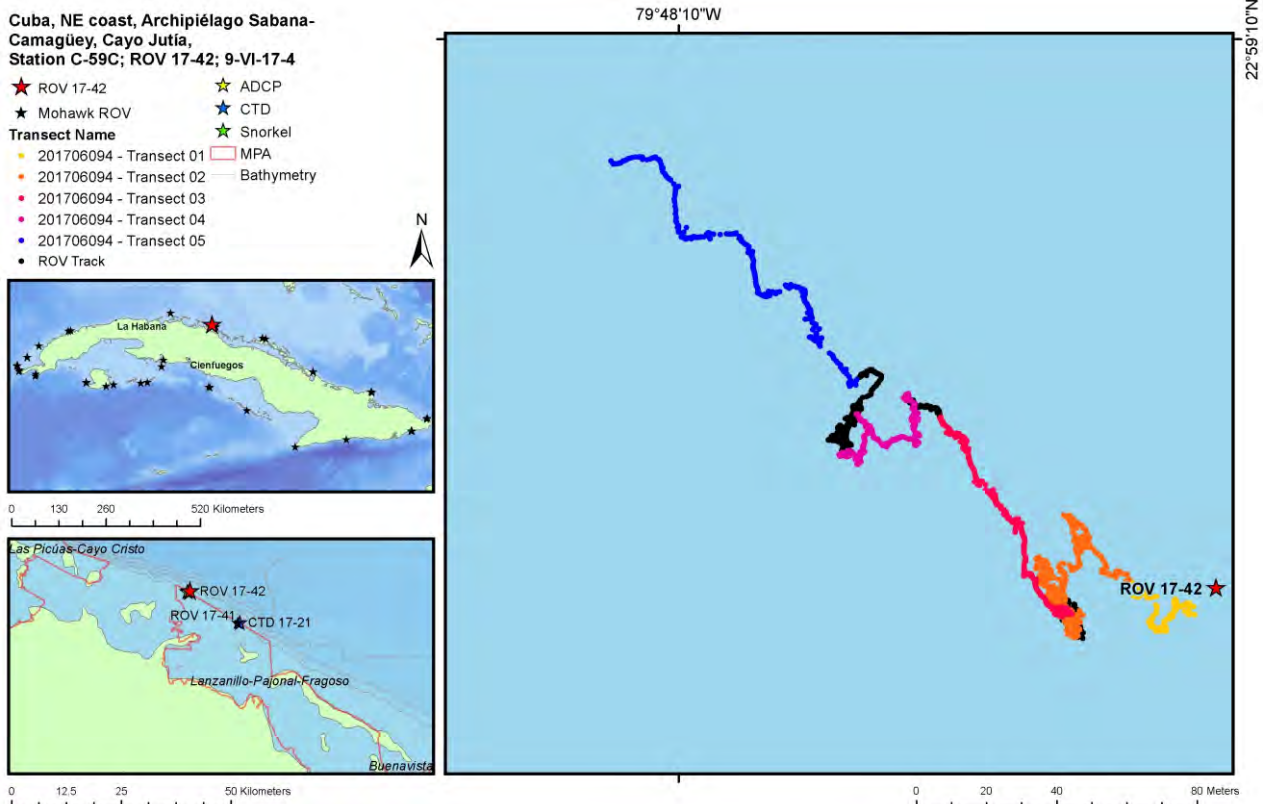
Northeast Coast Snorkel 17-08 C-59B		
Phylum/Class/Scientific Name	Notes	Samples
Algae		13
Chlorophyta		6
<i>Cladophora fuliginosa</i>		1
<i>Codium</i> sp.		1
<i>Halimeda monile</i>		1
<i>Halimeda</i> sp.		1
<i>Rhizocephalus phoenix</i>	X	1
<i>Udotea dixonii</i>	X	
<i>Udotea looensis</i>	X	
<i>Udotea luna</i>	X	1
Ochrophyta		2
<i>Canistrocarpus cervicornis</i>	X	
<i>Dictyota ciliolata</i>	X	
<i>Dictyota mertensii</i>	X	1
<i>Dictyota pulchella</i>	X	
<i>Dictyota</i> sp.		1
<i>Styopodium</i> sp.	X	
Rhodophyta		5
<i>Amphiroa beauvoisii</i>		1
<i>Amphiroa rigida</i>	X	
<i>Amphiroa tribulus</i>		1
<i>Dichotomaria obtusata</i>	X	
<i>Galaxaura</i> sp.		1
<i>Gelidiella acerosa</i>	X	
<i>Jania cubensis</i>	X	
<i>Jania pumila</i>	X	
<i>Laurencia</i> sp.		1
<i>Liagora</i> sp.		1
<i>Polysiphonia howeii</i>	X	
Cnidaria		13
Scleractinia		13
<i>Acropora cervicornis</i>	X	
<i>Acropora palmata</i>	X	

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, no MPA, Station C-59B;
Snorkel 17-08; 9-VI-17-3

<i>Montastraea cavernosa</i>	X	13
<i>Pseudodiploria</i> sp.	X	
<i>Siderastrea</i> sp.	X	

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, ¼ nmi N of snorkel Station, no MPA, Station C-59C; ROV 17-42; 9-VI-17-4

General Location and Dive Track:



Site Overview:

Project: CUBA 2017

Principal Investator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/9/2017

Specimens: 9

Digital Photos: 483

No. DVD: 2

Hard Drive No.: 1

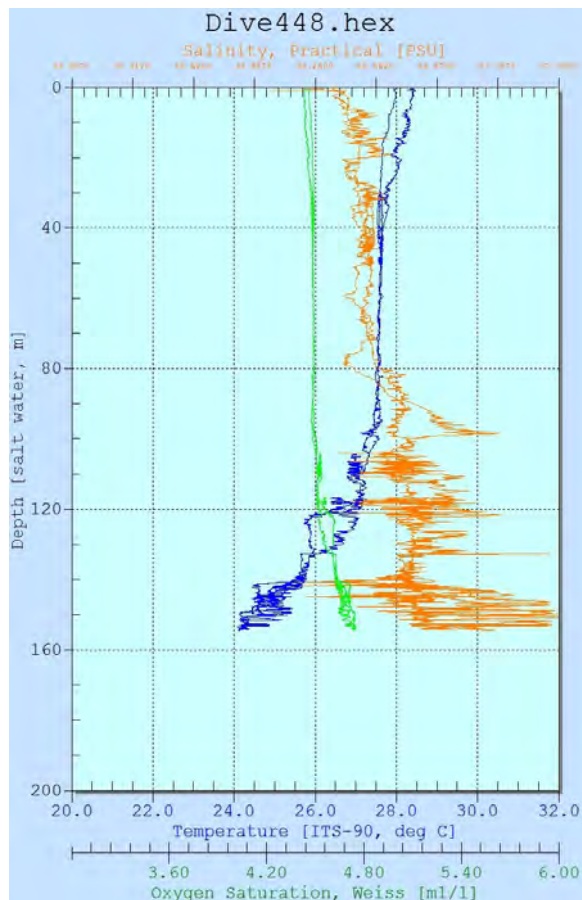
Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, ¼ nmi N of snorkel Station, no MPA, Station C-59C; ROV 17-42; 9-VI-17-4

Dive Data:

Minimum Bottom Depth (m): 30	Total Transect Length (km): 0.388
Maximum Bottom Depth (m): 147	Surface Current (kn): 0.3
On Bottom (Time- GMT): 16:13	On Bottom (Lat/Long): 22.9847°N; -79.8014°W
Off Bottom (Time- GMT): 17:41	Off Bottom (Lat/Long): 22.9859°N; -79.8029°W
Physical (bottom); Temp (°C): 24.7	Salinity: 36.9 Visibility 50 Current (kn): 0.75

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-42 are as follows: Depth Maximum: 154.6 m, Temperature: 24.1-28.5 °C, Salinity: 36.2-37.5 PSU, and Oxygen Saturation: 4.4-4.7 ml/l.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, ¼ nmi N of snorkel Station, no MPA, Station C-59C; ROV 17-42; 9-VI-17-4

Dive Imagery:

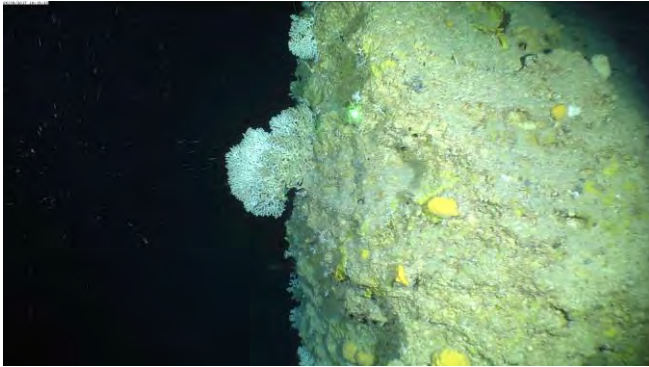


Figure 1: 22°59.0782'N;79°48.0906'W: -144.1 m
Azooxanthellate *Madracis myriaster*, and rock sponge- *Ceratoporella nicholsoni* on deep wall



Figure 2: 22°59.0786'N;79°48.1069'W: -70.8 m
Dense rope demosponge on buttress overhang



Figure 3: 22°59.077'N;79°48.1071'W: -68 m
Rugged, eroded wall with Lionfish- *Pterois volitans/miles* and sponges

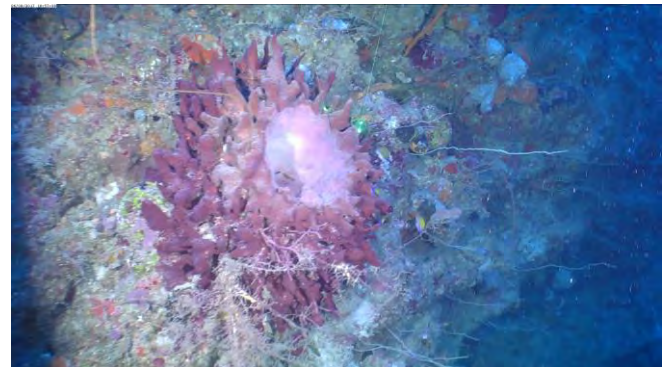


Figure 4: 22°59.0951'N;79°48.1178'W: -51.1 m
Spiky sturdy *Xestospongia* sp. on upper wall



Figure 5: 22°59.1116'N;79°48.1316'W: -49.7 m
Sheets of *Agaricia* sp. on deep fore reef slope

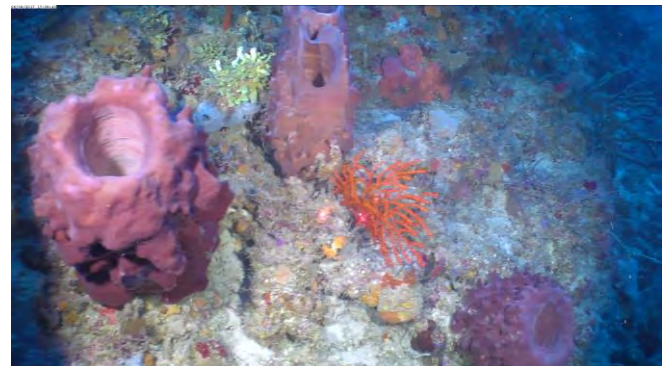


Figure 6: 22°59.1359'N;79°48.1655'W: -44.7 m
Several barrel sponges- *Xestospongia* sp., and *Swiftia exserta* octocoral

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, ¼ nmi N of snorkel Station, no MPA, Station C-59C; ROV 17-42; 9-VI-17-4

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 9-VI-17-4; ROV 17-42, UNCW Dive 448; Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, ¼ nmi N of snorkel Station, no MPA, Station C-59C.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Dive aborted early- lightning storm.

Site Description/Habitat:

Depth range: 147- 30 m.

Transect heading up slope- 225°, ¼ nmi offshore of snorkel site.

15:51- Launch. Wind- 12 kn from 054°, current- 0.3 kn to 121°, seas- 0.2 m from SE, water temperature- 28.67 °C, salinity- 36.35.

16:13- On bottom, visibility- 50 m, current- 1 kn from N.

17:41- End dive; dive aborted early, lightning storm.

147 m, deep island slope: 90° slope, rock wall, with vertical ridges, sand chutes, scalloped facies, stair-step ledges. Biota: 10-15 cm *Madracis asperula* common (new record for Cuba); *Stichopathes*, *Tanacetipathes*; *Agelas*, orange sponges.

Vertical photo transect upslope, 145- 125, 16:13- 16:20, deep island slope zone.

138 m: Rugged rock wall with karst-topography, sand chutes. Sponges- dense orange sclerosponges, *Asteropus*.

125 m, lower mesophotic zone: same habitat, caves. Fishing line. Sponges dominant- dense sclerosponges, *Oceanapia*, *Xestospongia*; *Stylaster*.

Vertical photo transect upslope, 120- 50 m , 16:20- 16:49; lower mesophotic zone.

110 m: same habitat, rugged, eroded wall. Mostly sponges- dense *Xestospongia* both with smooth wall and spiny wall; *Stichopathes*; no gorgonians, no fan *Antipathes*, no CCA.

100 m: same habitat and biota.

85 m: same habitat and biota, dominated by sponges.

82 m: first CCA; very eroded 90° wall.

80 m: first lionfish.

76 m: *Nicella goreau* fans.

73 m: same eroded wall; sponges, few gorgonians- *Ellisella* whips; uncoiled *Stichopathes* sp.

68 m: dense CCA, caves.

58 m: overhanging buttresses, *N. goreau*.

52 m: first *Agaricia* (20 cm); upper brow 70-80° slope.

Quantitative horizontal photo transect, 50 m, 16:49- 17:02 (30 images); along upper brow of buttresses, no sand chutes; dense *Agaricia* 20 cm- 1 m diameter.

51 m: first *Montastraea cavernosa*.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, ¼ nmi N of snorkel Station, no MPA, Station C-59C; ROV 17-42; 9-VI-17-4

50 m: first *Swiftia exserta*.

48 m: *Dictyota*, *Halimeda*.

Vertical photo transect upslope, 47- 30 m, 17:04- 17:14; upper mesophotic zone.

45 m, upper mesophotic zone: 60° slope, upper brow of wall, rock pavement, low rugosity, not eroded; dense sponges; many *Swiftia exserta*.

40 m: 45° slope, shallow sand chutes; *Halimeda*, CCA, sponges, shallow water gorgonians.

30 m: flat top, rock pavement, low relief, low rugosity; sponges, shallow gorgonian spp., *Penicillus*, *Halimeda*; few corals- *Agaricia*, *M. cavernosa*.

Fish video survey, 40-50 m, 17:33- 17:41; upper brow of deep fringing fore reef slope.

Dive aborted early due to lightning storm.

Maximum Depth Occurrences:

Crustose coralline algae (CCA)- 82 m (dense CCA 68 m)

Lionfish- 80 m

Agaricia- 52 m

Montastraea cavernosa- 51 m

Swiftia exserta- 50 m

Halimeda, *Dictyota*- 48 m

Number of Samples- 9

Disease and Human Impacts:

Fishing line.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, ¼ nmi N of snorkel Station, no MPA, Station C-59; ROV 17-42; 9-VI-17-4

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-42. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

		Northeast Coast ROV 17-42 C-59C	
Phylum/Class/Scientific Name	Notes	Samples	
Algae		4	
Cyanobacteria	X		
Chlorophyta		1	
<i>Caulerpa prolifera</i>	X		
Chlorophyta- bright	X		
Chlorophyta- palida	X		
<i>Halimeda copiosa</i>	X		
<i>Halimeda</i> sp.	X		
<i>Microdictyon umbilicatum</i>		1	
Ochrophyta		2	
<i>Dictyota</i> sp.	X	1	
<i>Lobophora</i> sp.		1	
Rhodophyta		1	
Crustose coralline (CCA)	X		
<i>Dichotomaria marginata</i>		1	
<i>Hypoglossum involvens</i>	X		
<i>Jania adhaerens</i>	X		
<i>Melanothamnus pseudovillum</i>	X		
<i>Peyssonnelia</i> sp.	X		
Porifera		1	
Demospongiae		1	
<i>Aaptos</i> sp. Cu-01	X		
<i>Agelas cerebrum</i>	X		
<i>Agelas cervicornis</i>	X		
<i>Agelas</i> cf. <i>flabelliformis</i>	X		
<i>Agelas citrina</i>	X		
<i>Agelas conifera</i>	X		
<i>Agelas sceptrum</i>	X		
<i>Agelas tubulata</i>	X		
<i>Aiolochoxia crassa</i>	X		
<i>Amphimedon compressa</i>	X		
<i>Amphimedon</i> sp. Cu-02	X		

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, ¼ nmi N of snorkel Station, no MPA, Station C-59; ROV 17-42; 9-VI-17-4

<i>Aplysina archeri</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina</i> sp. Cu-04	X	
<i>Asteropus</i> sp. Cu-01	X	
<i>Callyspongia armigera</i>	X	
<i>Callyspongia plicifera</i>	X	
<i>Callyspongia</i> sp. Cu-02	X	
<i>Ceratoporella nicholsoni</i>	X	
<i>Cinachyrella kuekenthali</i>	X	
<i>Cinachyrella</i> sp. Cu-02	X	
<i>Cinachyrella</i> sp. Cu-03	X	
<i>Corallistes</i> sp.	X	
<i>Cribochalina vasculum</i>	X	
Demospongiae sp. Cu-23	X	
Demospongiae sp. Cu-25	X	
Demospongiae unid. sp.	X	
<i>Desmapsamma anchorata</i>	X	
<i>Diplastrella megastellata</i>	X	
<i>Diplastrella</i> sp.	X	
<i>Dysidea</i> sp.		1
<i>Geodia neptuni</i>	X	
<i>Iotrochota birotulata</i>	X	
<i>Ircinia strobilina</i>	X	
<i>Mycale</i> cf. <i>laevis</i>	X	
<i>Mycale laxissima</i>	X	
<i>Niphates alba</i>	X	
<i>Niphates digitalis</i>	X	
<i>Oceanapia</i> sp. Cu-01	X	
<i>Polymastia</i> sp. Cu-01	X	
<i>Ptilocaulis walpersi</i>	X	
<i>Siphonodictyon coralliphagum</i>	X	
<i>Sphaciospongia vesparium</i>	X	
<i>Spirastrella coccinea</i>	X	
<i>Spirastrella hartmani</i>	X	
Spirastrellidae unid. sp.	X	
<i>Svenzea zeai</i>	X	
Verongiida Cu-01	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	

Cnidaria

Hydrozoa

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, ¼ nmi N of snorkel Station, no MPA, Station C-59; ROV 17-42; 9-VI-17-4

Hydroidolina	X
Stylasteridae	X
Alcyonacea - Alcyoniina	
<i>Chironephthya caribaea</i>	X
Alcyonacea - gorgonian	
<i>Ellisella</i> sp.	X
Gorgoniidae	X
<i>Iciligorgia schrammi</i>	X
<i>Nicella</i> sp.	X
Plexauridae	X
<i>Pseudopterogorgia</i> sp.	X
<i>Swiftia exserta</i>	X
Antipatharia	
Antipathidae	X
<i>Stichopathes</i> sp.	X
<i>Tanacetipathes</i> sp.	X
<i>Tanacetipathes tanacetum</i>	X
Scleractinia	
<i>Agaricia</i> sp.	X
<i>Madracis asperula</i>	X
<i>Madracis formosa</i>	X
<i>Madracis</i> sp.	X
<i>Montastraea cavernosa</i>	X
<i>Solenastrea bournoni</i>	X
Non-Fauna	
Human debris	
Human debris- fishing line	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, ¼ nmi N of snorkel Station, no MPA, Station C-59; ROV 17-42; 9-VI-17-4

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-42. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Northeast Coast ROV 17-42 C-59C Notes
Commercially Important Species	16
Actinopterygii	16
Perciformes	6
<i>Cephalopholis cruentata</i> - Graysby	1
<i>Cephalopholis fulva</i> - Coney	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	3
Serranidae - Grouper	1
Scorpaeniformes	10
<i>Pterois volitans</i> - Lionfish	10
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Aulopiformes	
<i>Synodus</i> sp. - Lizardfish	X
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
<i>Myripristis jacobus</i> - Blackbar Soldierfish	X
Perciformes	
<i>Anisotremus virginicus</i> - Porkfish	X
<i>Calamus</i> sp. - Porgy	X
<i>Caranx ruber</i> - Bar Jack	X
<i>Centropyge argi</i> - Cherubfish	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon ocellatus</i> - Spotfin Butterflyfish	X
Chaetodontidae - Butterflyfish	X
<i>Chloroscombrus chrysurus</i> - Atlantic Bumper	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Clepticus parrae</i> - creole wrasse	X
<i>Grama loreto</i> - Fairy Basslet	X
<i>Grama melacara</i> - Blackcap Basslet	X
<i>Haemulon flavolineatum</i> - French Grunt	X
<i>Haemulon plumierii</i> - White Grunt	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Jutía, ¼ nmi N of snorkel Station, no MPA, Station C-59; ROV 17-42; 9-VI-17-4

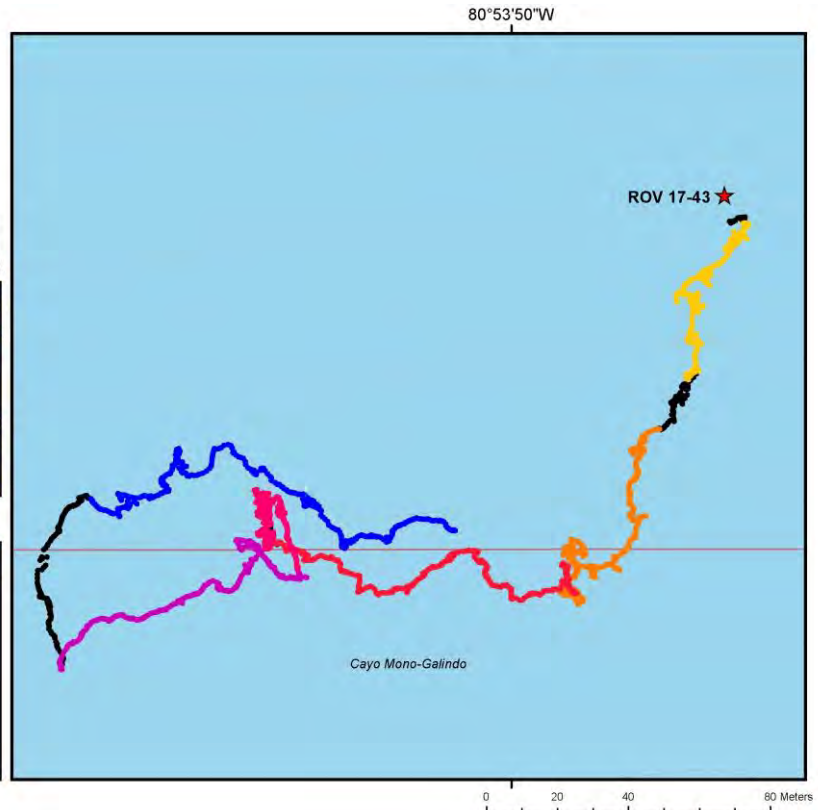
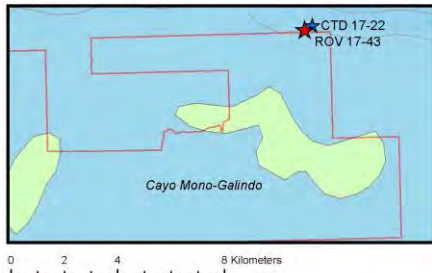
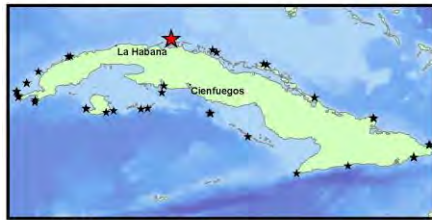
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus</i> sp. - Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
Labridae - Wrasse	X
<i>Lachnolaimus maximus</i> - Hogfish	X
<i>Liopropoma mowbrayi</i> - Cave Basslet	X
<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
<i>Rypticus saponaceus</i> - Greater Soapfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Scarus taeniopterus</i> - Princess Parrotfish	X
<i>Serranus tigrinus</i> - Harlequin Bass	X
<i>Sparisoma viride</i> - Stoplight Parrotfish	X
<i>Sphyraena barracuda</i> - Great Barracuda	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
Syngnathiformes	
<i>Aulostomus maculatus</i> - Atlantic Trumpetfish	X
Tetraodontiformes	
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA, Station C-60A; ROV 17-43; 10-VI-17-1

General Location and Dive Track:

Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA, Station C-60A; ROV 17-43; 10-VI-17-1

- ★ ROV 17-43
 - ★ Mohawk ROV
 - ★ ADCP
 - ★ CTD
 - ★ Snorkel
 - MPA
 - Bathymetry
- Transect Name**
- 201706101 - Transect 01
 - 201706101 - Transect 02
 - 201706101 - Transect 03
 - 201706101 - Transect 04
 - 201706101 - Transect 05
 - 201706101 - Transect 06
 - ROV Track



Site Overview:

Project: CUBA 2017

Principal Investigator: John Reed

PI Contact Info: 5600 U.S. 1, North, Fort Pierce, FL 34946

Website: <http://oceanexplorer.noaa.gov/explorations/17cuba-reefs/welcome.html>

Scientific Observers: J. Reed, S. Farrington, D. Hanisak, J. Voss, L. Horn, J. White, J.t González Méndez, A. García Rodríguez, L. Busutil López, D. Estrada Pérez, C. Diaz, F. Drummond, P. M. González Sánchez

ROV Navigation Data: TrackLink

Ship Position System: DGPS

Report Analyst: John Reed, Stephanie Farrington

Date Compiled: 10/26/2017

Dive Overview:

Vessel: University of Miami R/V *Walton Smith*

Sonar Data: None Available

Purpose: Mesophotic Reef Exploration of Cuba

Vehicle: Mohawk ROV

Sensors: Salinity (PPT), Temperature (°C), pH, Conductivity, Depth (m), CO2

Data Management: Access Database

Date of Dive: 6/10/2017

Specimens: 11

Digital Photos: 709

No. DVD: 2

Hard Drive No.: 1

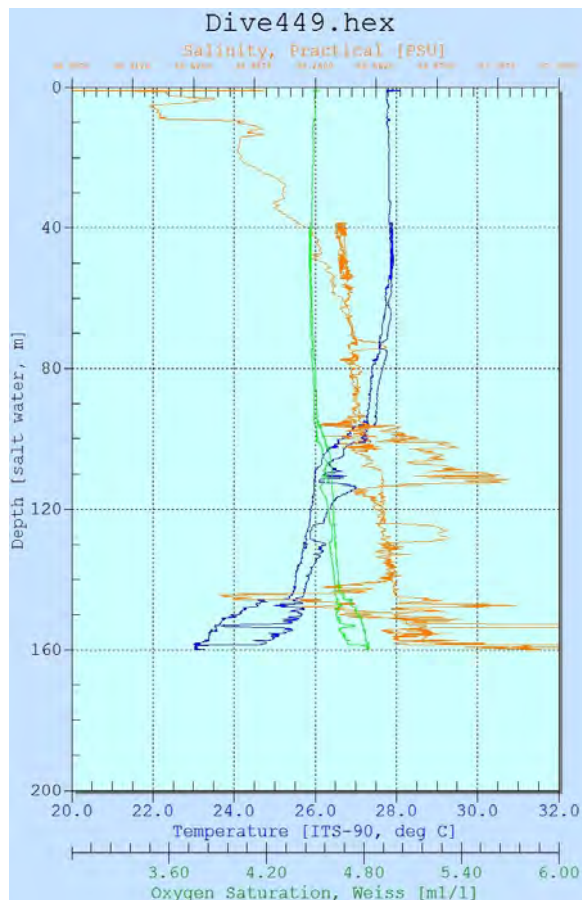
Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA, Station C-60A; ROV 17-43; 10-VI-17-1

Dive Data:

Minimum Bottom Depth (m): 40	Total Transect Length (km): 0.602
Maximum Bottom Depth (m): 161	Surface Current (kn): 0.4
On Bottom (Time- GMT): 8:41	On Bottom (Lat/Long): 23.2965°N; -80.8967°W
Off Bottom (Time- GMT): 10:38	Off Bottom (Lat/Long): 23.2956°N; -80.8974°W
Physical (bottom); Temp (°C): 23.1	Salinity: 37.41 Visibility 10 Current (kn): 0.1

Physical Environment:

Distance from Dive Site(km): 0.00



Temperature, Salinity 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 17-43 are as follows: Depth Maximum: 160 m, Temperature: 23-27.9 °C, Salinity: 35-38.1 PSU, and Oxygen Saturation: 4.5-4.8 ml/l.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA, Station C-60A; ROV 17-43; 10-VI-17-1

Dive Imagery:



Figure 1: 23°17.7824'N;80°53.7993'W: -157 m
Antipatharian and *Ellisella* sp. whip coral on deep island slope



Figure 2: 23°17.7772'N;80°53.803'W: -146.7 m
Lionfish- *Pterois volitans/miles* on deep island slope

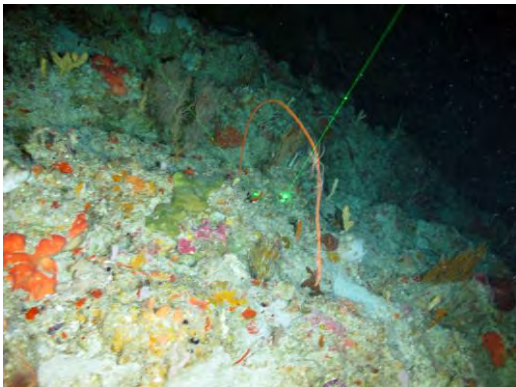


Figure 3: 23°17.7341'N;80°53.8241'W: -78.5 m
Whip coral- *Ellisella barbadensis*, and various demosponges and octocorals



Figure 4: 23°17.728'N;80°53.8819'W: -42 m
Sheets of *Agaricia* sp. coral and octocorals on deep fringing reef



Figure 5: 23°17.7293'N;80°53.8247'W: -54.6 m
Iciligorgia schrammi octocoral, and *Agaricia* sp. on deep fore reef slope



Figure 6: 23°17.7258'N;80°53.8863'W: -41.1 m
Finger coral- *Madracis aurentenra*, *Agaricia* sp., and various octocorals on deep fringing reef

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA, Station C-60A; ROV 17-43; 10-VI-17-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:

Site #- 10-VI-17-1; ROV 17-43, UNCW Dive 449; Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA, Station M-60A.

Objectives- Characterize the mesophotic coral ecosystems (MCEs) of Cuba using a ROV. Conduct video transects, digital still photographic transects, and sample collections to document the benthic habitat, and the zonation and biodiversity of the benthic macrobiota (corals, gorgonian octocorals, black corals, sponges, algae) and fish communities of the MCEs.

ROV Setup/Data Collection/Dive Events:

See ROV Dive 01 notes.

Start dive outside MPA; enter MPA at 9:18, 77 m depth.

Dive aborted early, ROV electronic problems.

Site Description/Habitat:

Depth range: 161- 40 m.

Transect heading up slope- 218°, 1 nmi offshore, low relief beach, deserted.

08:31- Launch. Wind- 7.9 kn from 160°, current- 0.4 kn to 119°, seas- calm, water temperature- 28.13 °C, salinity- 35.99.

08:41- On bottom, visibility- 10 m, current- 0.1 kn; lots sediment, plankton in water column.

10:39- End dive; dive aborted early, ROV electronic problems.

161 m, deep island slope zone: 45° slope, rock pavement, vertical groove, light sediment veneer. Biota: fairly barren; few demosponges- thin encrusting yellow Verongiida sponges; *Stichopathes*, fan *Antipathes*; 10 cm Paramuriceidae, *Ellisella elongata*.

Vertical photo transect upslope, 161- 120 m, 8:43- 8:58; deep island slope zone.

147 m: lionfish, *Xestospongia*, *Oceanapia*; *Nicella goreau*.

130 m: 45° slope, rock pavement; denser sponges, *Stichopathes*. Fishing long line.

125 m, lower mesophotic zone: 60° slope; dense and diverse sponges; *Tanacetipathes*, bushy *Antipathes*, *Chironephthya*.

Vertical photo transect upslope, 110- 55 m, 9:03- 9:21; lower mesophotic zone.

115 m: 45° slope, rock pavement, low rugosity, 10-20 cm cobble; dense *Antipathes*, *Geodia*.

105 m: 90° slope, cave, 1 m wide ledge.

100 m: 45° slope, pavement; *Nicella* fans, *Antipathes*, *Oceanapia*, *Aplysina* rope sponges.

95 m: new habitat; 60-80° slope, rugged karst topography. Dense sponges, rope sponges, black coral, gorgonians.

87 m: first CCA; caves, *Agelas* fan sponges.

77 m: enter MPA boundary (09:18); 70-90° slope, karst topography.

60 m: lionfish, 70° slope, rugged, eroded.

Quantitative horizontal photo transect, 55-53 m, 09:20- 09:36 (30 images); along upper brow of wall, 70- 45° slope, rock pavement, low relief, low rugosity; small *Agaricia* (10-20 cm) uncommon.

55 m: first *Agaricia* (20 cm); *Halimeda* dense.

53 m: first *M. cavernosa* (10 cm).

50 m: *Dictyota*, *Geodia*, *Agelas*, *Ircinia* vase.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA, Station C-60A; ROV 17-43; 10-VI-17-1

45- 40 m, upper mesophotic zone: top of wall, reef flat, low relief <1/2 m; dense shallow water gorgonian species- *Pseudopterogorgia*, *Eunicea*; *Agaricia* common; *Dictyota*, *Halimeda*; sponges.

Vertical photo transect upslope, 55- 45 m, 9:37- 10:08; upper mesophotic zone.

Quantitative horizontal photo transect, 45-40 m, 10:08- 10:19 (25 images); top of wall, reef flat; *Agaricia* common.

Fish video survey, 50- 45m, 10:23- 10:38; upper brow and top of deep fringing fore reef slope. Dive aborted early due to ROV electronic failure.

Maximum Depth Occurrences:

Lionfish- 147 m

Crustose coralline algae (CCA)- 87 m

Agaricia- 55 m

Halimeda- 55 m

Montastraea cavernosa- 53 m

Dictyota- 50 m

Number of Samples- 11

Disease and Human Impacts:

Fishing long line.

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA, Station C-60A; ROV 17-43; 10-VI-17-1

Benthic Macro-Biota and Substrate:

Table 1. Species list of benthic macro-invertebrates and macro-algae identified from ROV video and from collected specimens at dive site ROV 17-43. Dive notes regarding observations of coral disease and bleaching, and lost fishing gear are also included.

Phylum/Class/Scientific Name	Notes	Samples
Northeast Coast ROV 17-43 C-60A		
Algae		5
Chlorophyta		3
Chlorophyta- palida	X	
<i>Halimeda copiosa</i>	X	
<i>Halimeda</i> sp.	X	1
<i>Microdictyon</i> sp.		1
<i>Microdictyon umbilicatum</i>		1
Ochrophyta		1
Dictyota sp.	X	1
Rhodophyta		1
Crustose coralline (CCA)	X	
<i>Cryptonemia</i> sp.		1
<i>Peyssonnelia</i> sp.	X	
Porifera		3
Demospongiae		3
<i>Agelas citrina</i>	X	
<i>Agelas conifera</i>	X	
<i>Agelas sceptrum</i>	X	
<i>Agelas sventres</i>	X	
<i>Aiolochoxia crassa</i>	X	
<i>Amphimedon</i> cf. <i>caribica</i>	X	
<i>Amphimedon compressa</i>	X	
<i>Amphimedon</i> sp. Cu-01	X	
<i>Aplysina archeri</i>	X	
<i>Aplysina bathyphila</i>	X	
<i>Aplysina cauliformis</i>	X	
<i>Aplysina</i> cf. <i>fulva</i>	X	
<i>Aplysina lacunosa</i>	X	
<i>Aplysina</i> sp. Cu-05	X	
<i>Axinella corrugata</i>	X	
<i>Callyspongia</i> sp. Cu-01	X	
<i>Cinachyrella</i> sp. Cu-03	X	

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA, Station C-60A; ROV 17-43; 10-VI-17-1

<i>Cinachyrella</i> sp. Cu-05	X	
Demospongiae unid. sp.	X	1
<i>Geodia neptuni</i>	X	
<i>Iotrochota birotulata</i>	X	
<i>Ircinia campana</i>	X	
<i>Ircinia</i> sp.		1
<i>Ircinia</i> sp. Cu-01	X	
<i>Ircinia strobilina</i>	X	
<i>Mycale</i> cf. <i>laevis</i>	X	
<i>Mycale laxissima</i>	X	
<i>Niphates arenata</i>	X	
<i>Niphates erecta</i>	X	
<i>Oceanapia</i> sp. Cu-01	X	
<i>Oceanapia</i> sp. Cu-05	X	
Petrosiidae Cu-14	X	
<i>Phakellia folium</i>	X	
<i>Polymastia</i> sp. Cu-01	X	
<i>Ptilocaulis walpersi</i>	X	
Spongia sp. Cu-02	X	
<i>Svenzea zeai</i>	X	
Tetractinellida		1
Verongiida Cu-01	X	
<i>Xestospongia muta</i>	X	
<i>Xestospongia</i> sp. Cu-01	X	
Cnidaria		3
Hydrozoa		
Hydroidolina	X	
Alcyonacea - Alcyoniina		
<i>Chironephthya caribaea</i>	X	
Alcyonacea - gorgonian		1
<i>Ellisella barbadensis</i> (Duchassaing & Michelotti, 1864) syn. <i>elongata</i> (Pallas, 1766)		1
<i>Ellisella</i> sp.	X	
Gorgoniidae	X	
<i>Iciligorgia schrammi</i>	X	
<i>Nicella</i> sp.	X	
<i>Pseudopterogorgia</i> sp.	X	
<i>Swiftia exserta</i>	X	
Antipatharia		1
<i>Antipathes</i> sp.	X	1
Antipathidae	X	
<i>Stichopathes</i> sp.	X	

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA, Station C-60A; ROV 17-43; 10-VI-17-1

<i>Tanacetipathes</i> sp.	X	
<i>Tanacetipathes tanacetum</i>	X	
Scleractinia		1
<i>Agaricia</i> sp.	X	1
<i>Madracis formosa</i>	X	
<i>Montastraea cavernosa</i>	X	
<i>Pseudodiploria strigosa</i>	X	

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA, Station C-60A; ROV 17-43; 10-VI-17-1

Fish:

Table 2. Species list of fish identified from video at ROV dive site 17-43. Counts are given for commercially important grouper/snapper species and lionfish. X= species observed but not quantified.

Phylum/Class/Order/Scientific Name - Common Name	Northeast Coast ROV 17-43 C-60A Notes
Commercially Important Species	10
Actinopterygii	10
Perciformes	5
<i>Cephalopholis cruentata</i> - Graysby	2
<i>Lutjanus buccanella</i> - Blackfin Snapper	1
<i>Ocyurus chrysurus</i> - Yellowtail Snapper	1
Serranidae - Grouper	1
Scorpaeniformes	5
<i>Pterois volitans</i> - Lionfish	5
Other	
Actinopterygii	
Actinopterygii - Unid Fish	X
Beryciformes	
<i>Holocentrus adscensionis</i> - Squirrelfish	X
<i>Holocentrus rufus</i> - Longspine Squirrelfish	X
Perciformes	
<i>Caranx</i> sp. - Jack	X
<i>Chaetodon capistratus</i> - Foureye Butterflyfish	X
<i>Chaetodon sedentarius</i> - Reef Butterflyfish	X
Chaetodontidae - Butterflyfish	X
<i>Chromis cyanea</i> - Blue Chromis	X
<i>Chromis insolata</i> - Sunshinefish	X
<i>Grama loreto</i> - Fairy Basslet	X
<i>Haemulon plumierii</i> - White Grunt	X
<i>Haemulon sciurus</i> - Bluestriped Grunt	X
<i>Haemulon striatum</i> - Striped Grunt	X
<i>Halichoeres garnoti</i> - Yellowhead Wrasse	X
<i>Holacanthus ciliaris</i> - Queen Angelfish	X
<i>Holacanthus tricolor</i> - Rock Beauty	X
<i>Hypoplectrus nigricans</i> - Black Hamlet	X
<i>Hypoplectrus puella</i> - Barred Hamlet	X
Labridae - Wrasse	X
<i>Lachnolaimus maximus</i> - Hogfish	X

Dive Site: Cuba, NE coast, Archipiélago Sabana-Camagüey, Cayo Cruz del Padre, inside and outside MPA, Station C-60A; ROV 17-43; 10-VI-17-1

<i>Lutjanus</i> sp. - Snapper	X
<i>Pomacanthus arcuatus</i> - Gray Angelfish	X
<i>Prognathodes aculeatus</i> - Longsnout Butterflyfish	X
Scaridae - Parrotfish	X
<i>Scarus iseri</i> - Striped Parrotfish	X
<i>Serranus annularis</i> - Orangeback Bass	X
<i>Serranus phoebe</i> - Tattler	X
<i>Stegastes adustus</i> - dusky damselfish	X
<i>Stegastes partitus</i> - Bicolor Damselfish	X
Tetraodontiformes	
<i>Canthidermis sufflamen</i> - Ocean Triggerfish	X
<i>Canthigaster rostrata</i> - Sharpnose Puffer	X