CRUISE REPORT

WAITT INSTITUTE
Plan b Expedition
Pulley Ridge Mesophotic Reef, Gulf of Mexico
May 4-11, 2016

Principal Investigators

John Reed, Research Professor
The Cooperative Institute for Ocean Exploration, Research, and Technology (CIOERT)
Harbor Branch Oceanographic Institute, Florida Atlantic University

Sandra Brooke, Research Faculty
Florida State University, Coastal and Marine Lab

May 24, 2016

Photo Album- Corals of Pulley Ridge

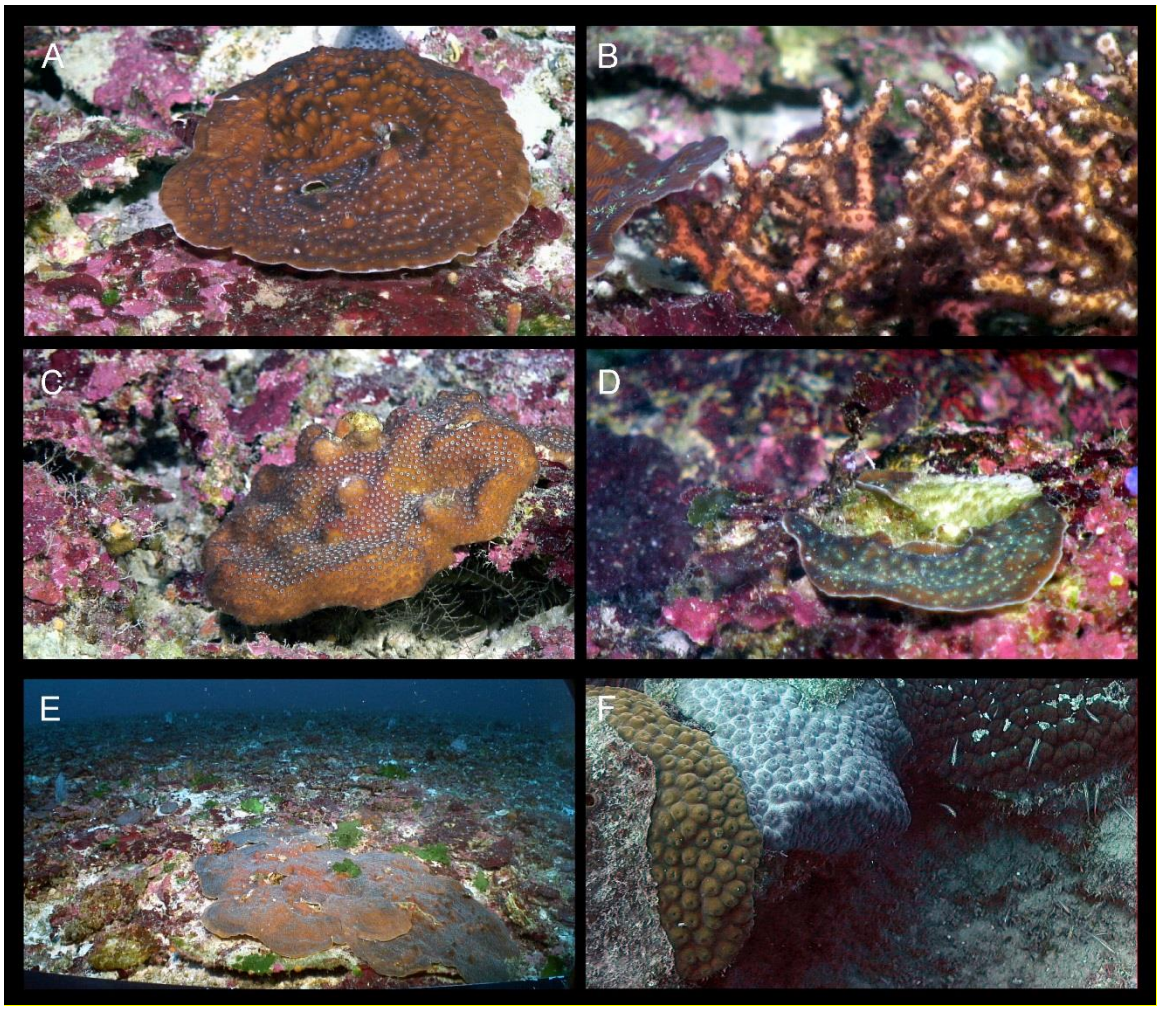

Plate 1. Photo Album - Corals of Pulley Ridge. A. *Leptoseris cucullata*, Block 30, depth 74.2 m; B. *Madracis brueggemanni*, Block 30, depth 73.8 m; C. *Madracis decactis*, Block 76, depth 81.7 m; D. bleached or diseased *Agaricia* sp. coral, Block 31, depth 76.5 m; E. *Agaricia grahamae*, Block 83, depth 82.5 m; F. three color morphs of *Montastraea cavernosa*, Block 61, 29.2 m, Tortugas. (from Reed et al. 2014)

Photo Album- Sponges of Pulley Ridge

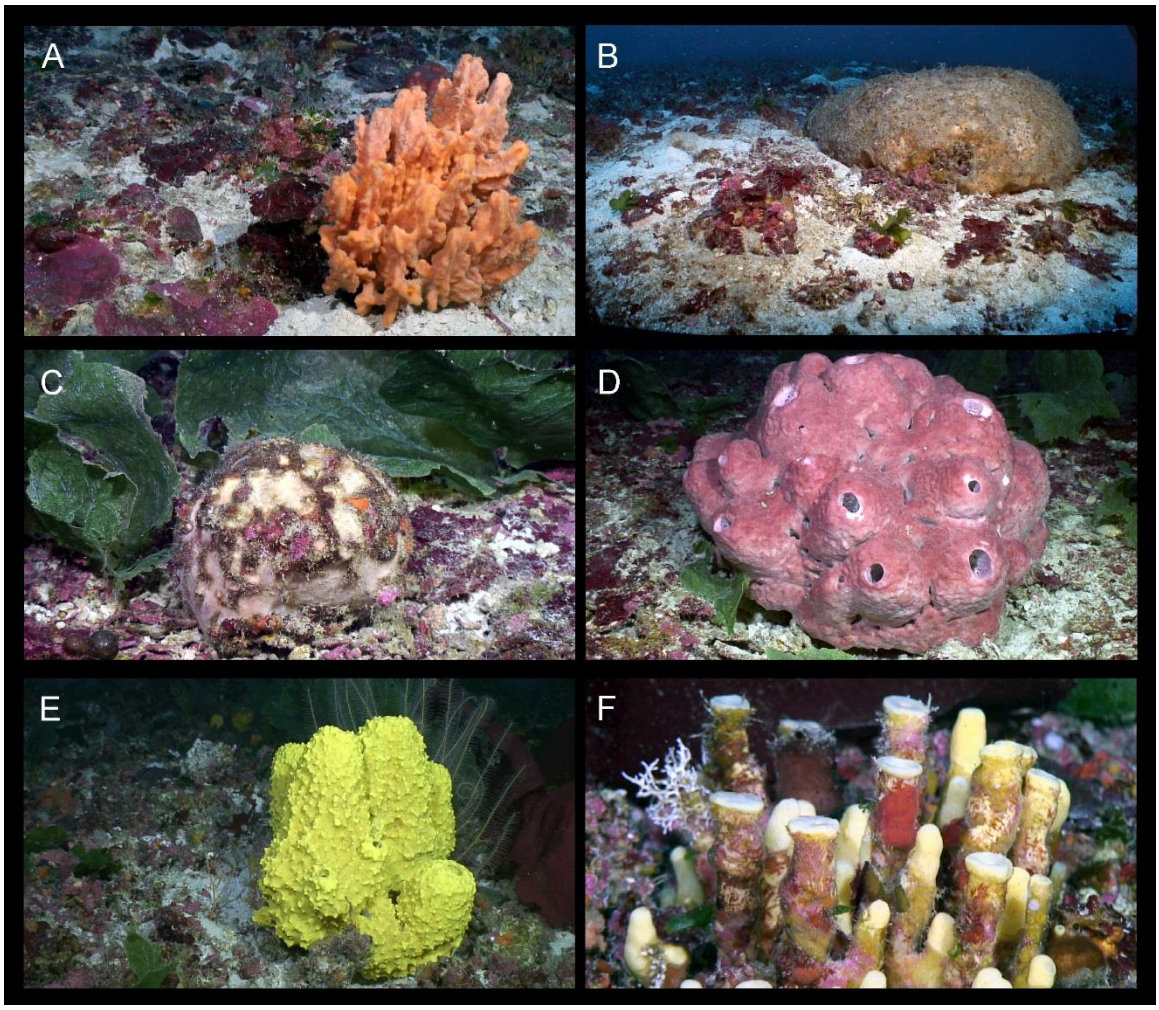

Plate 2. Photo Album - Sponges of Pulley Ridge. A. *Bubaris* sp., Block 25, depth, 79.4 m; B. *Spongosorites siliquaria*, Block 25, depth 77.3 m; C. *Geodia neptuni* complex, Block 30, depth 73.2 m; D. Petrosiidae, Block 30, depth 73.8 m; E. *Aiolochroia crassa*, Block 35, depth 79.3 m; F. *Oceanapia* sp., Block 35, depth 79.2 m. (from Reed et al. 2014)

Photo Album- Soft Corals and Black Corals of Pulley Ridge

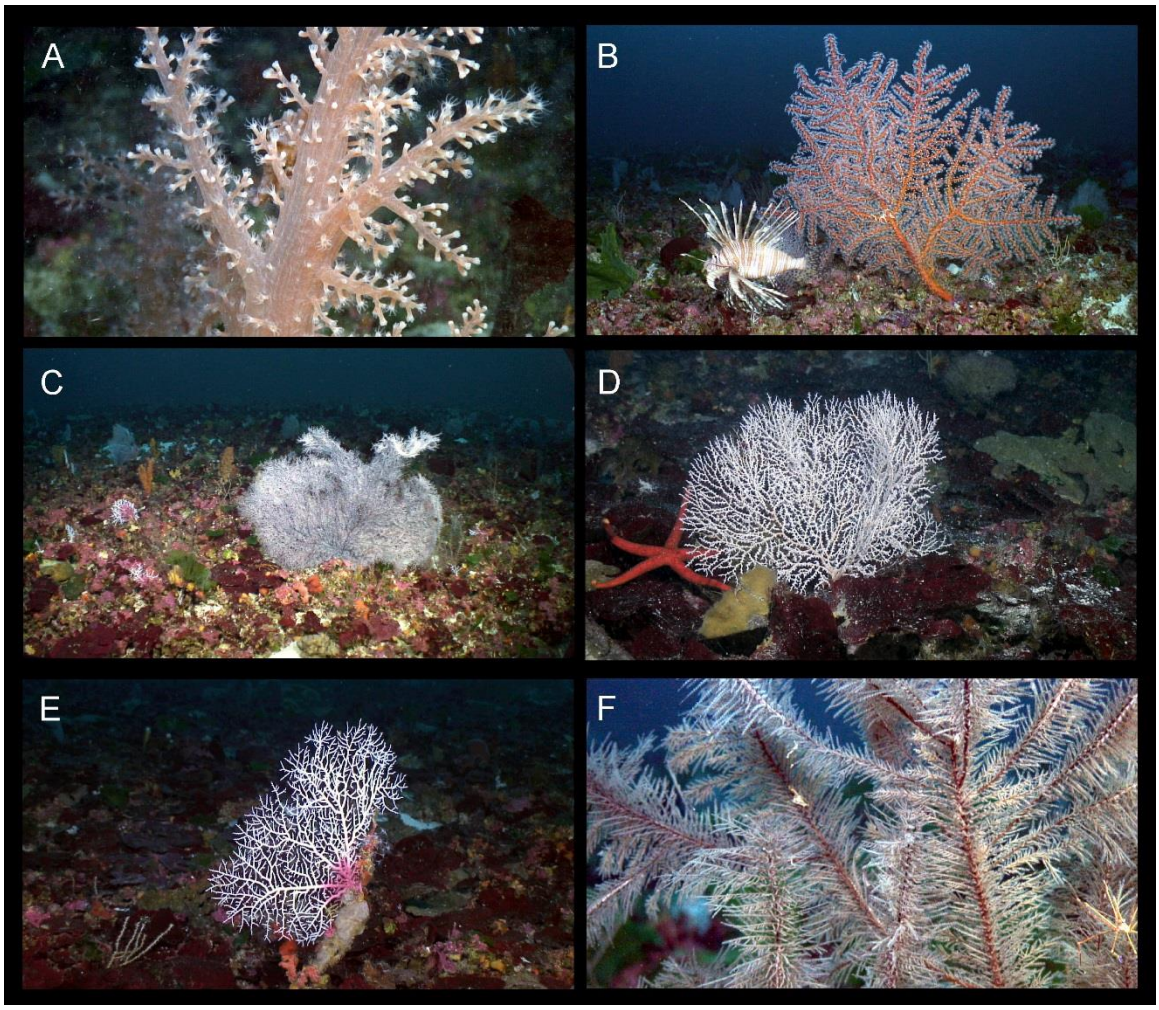

Plate 3. Photo Album- Soft Corals and Black Corals of Pulley Ridge. A. *Chironephthya caribaea*, Block 35, depth 79.6 m; B. *Swiftia exerta* (with lionfish), Block 35, depth 79.3 m; C. *Antipathes atlantica*, Block 34, depth 82.1 m; D. Primnoidae gorgonian, Block 34, depth 83.2 m; E. *Sylaster filogranus*, Block 34, depth 83.7 m; F. Antipatharia, Block 36, depth 79. (from Reed et al. 2014)

Photo Album- Algae of Pulley Ridge

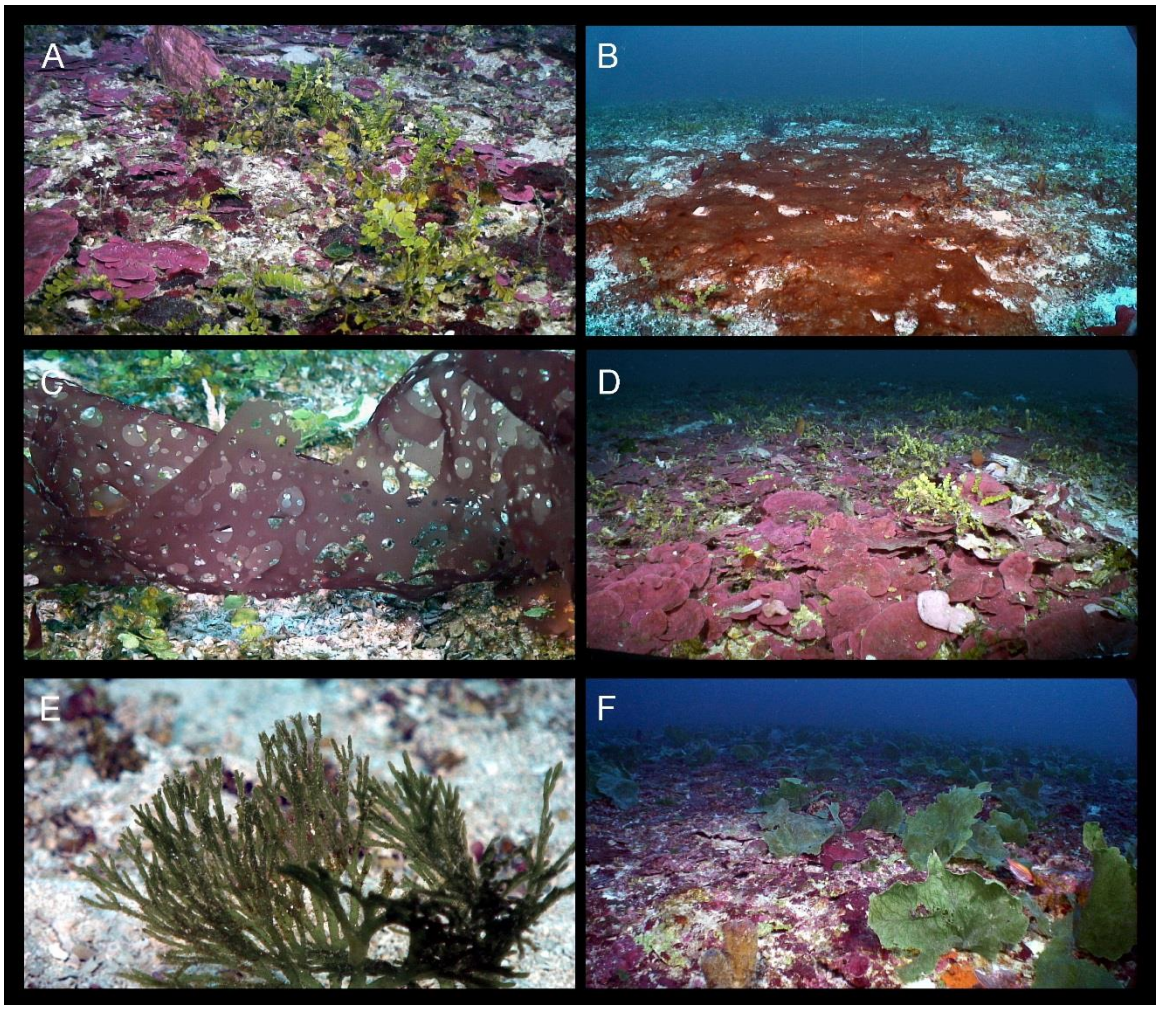

Plate 4. Photo Album - Algae of Pulley Ridge. A. *Halimeda* sp., Block 29, depth 79.1 m; B. Cyanobacterial mat; Block 27, depth 68.6 m; C. *Kallymenia* sp., Block 27, depth 67.9m; D. Crustose coralline algae, Block 28, depth 79.8 m; E. *Codium* sp., Block 32, depth 64 m; F. *Anadyomene menziesii* (leafy green), Block 30, depth 74.1 m. (from Reed et al. 2014)

Photo Album- Fishes of Pulley Ridge

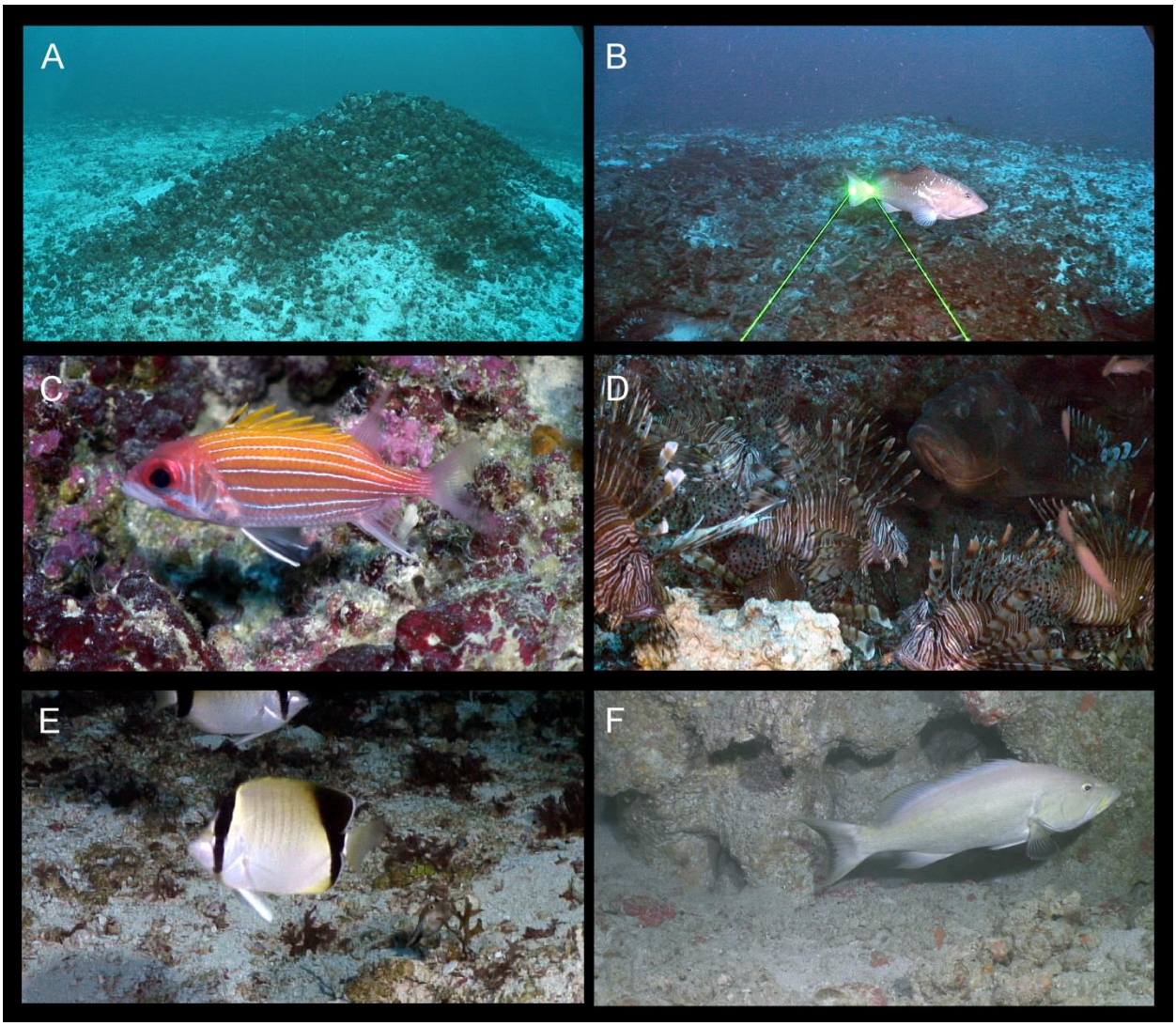

Plate 5. Photo Album - Fishes of Pulley Ridge. A. Sand tilefish burrow, Block 27, depth, 68.6 m; B. large red grouper (*Epinephelus morio*) guarding its burrow, Block 28, depth 79.8 m, laser scale- 10 cm; C. Longspine squirrelfish (*Holocentrus rufus*), Block 28, depth 80.1 m; D. school of lionfish (*Pterois volitans*) in red grouper burrow, Block 34, depth 81.6 m; E. Reef butterflyfish (*Chaetodon sedentarius*), Block 23, depth 67.1; F. Scamp grouper (*Mycteroperca phenax*), Block 75, depth 106.9 m (Miller's Ridge). (from Reed et al. 2014)

Photo Album- Miscellaneous Fauna of Pulley Ridge

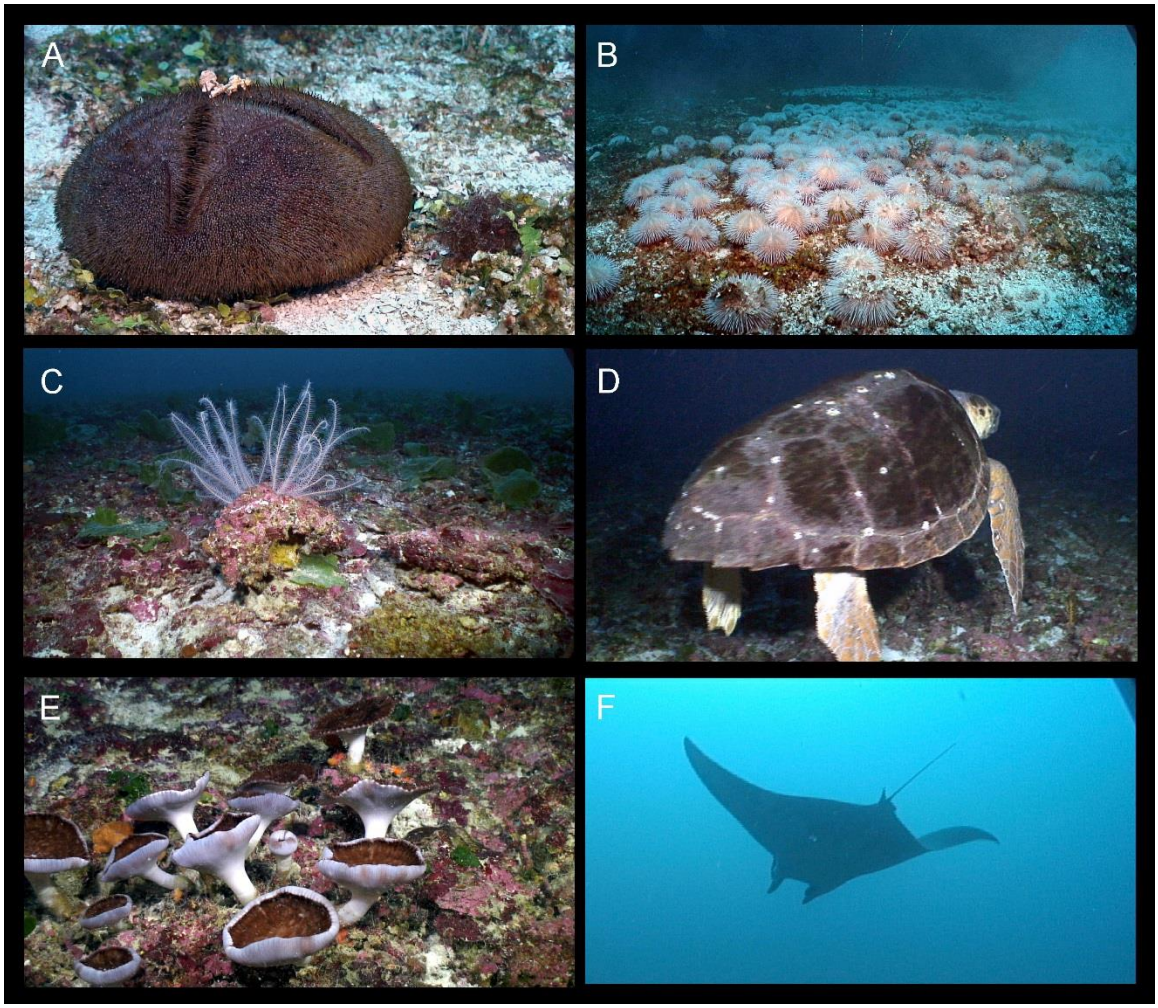

Plate 6. Photo Album- Miscellaneous fauna of Pulley Ridge. A. Sea biscuit (*Meoma ventricosa*), Block 27, depth 69.3 m; B. Aggregation of sea urchins (*Echinus* sp.), Block 27, 66.9 m; C. Long-armed crinoid (*Davidaster discoideus*), Block 30, depth 74.8 m; D. Loggerhead turtle (*Caretta caretta*), Block 79, depth 85.7 m; E. Sea pansies, Corallimorpharia, Block 77, depth 81.1 m; F. Manta ray (*Cephalopterus manta*), Block 76, depth 78.6 m. (from Reed et al. 2014)

Photo Album- Miscellaneous Biota of Tortugas Mesophotic Reefs

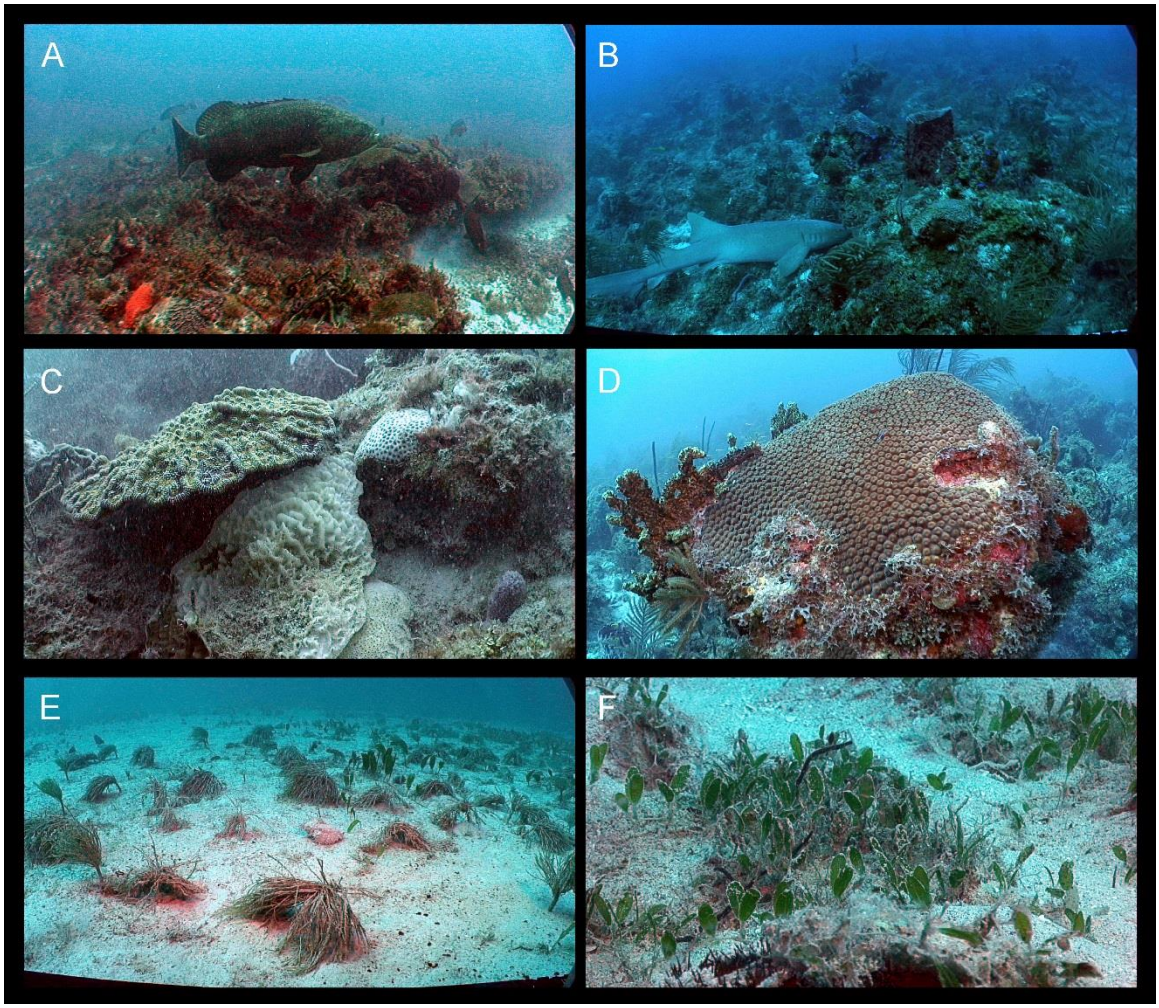

Plate 7. Photo Album - Miscellaneous biota of Tortugas mesophotic reefs. A. Large goliath grouper (*Epinephelus itajara*) with large spawning aggregation of grey snapper on newly discovered patch reef; Block 66, depth 23.5 m; B. Nurse shark, *Montastraea cavernosa* coral, *Xestospongia muta* sponges, and *Pseudoptgerogorgia* gorgonians on fringing reef off north Tortugas Ecological Reserve, Block 46, depth 27.9 m; C. *Mycetophyllia aliciae* and bleached *Undaria* sp. coral on patch reef, Block 61, depth 30.8 m; D. Giant star coral (*Montastraea cavernosa*) on fringing reef, Block 46, depth 27.9 m; E. soft bottom with field of green algae-bottle brush algae (*Penicillus dumetosus*), feather algae (*Caulerpa sertularioides*), Block 61, depth 30.7 m; F. Seagrass (*Halophila decipiens*), Block 69, depth 31.2 m. (from Reed et al. 2014)

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EXECUTIVE SUMMARY

This cruise was funded by the Waitt Institute and conducted in collaboration with the Waitt Institute, Marine Conservation Institute, National Geographic, Woods Hole Oceanographic Institute, Florida State University, and the Cooperative Institute for Ocean Exploration, Research, and Technology (CIOERT) at Harbor Branch Oceanographic Institute, Florida Atlantic University.

The purpose of this cruise was to obtain visual and scientific documentation supporting permanent protection of pristine areas in the Gulf of Mexico (Pulley Ridge), and expanded protection for areas adjacent to the Tortugas Ecological Reserve.

Ultimately, data from various cruises will be used to characterize and document the habitat, benthic communities, and fish populations inside and outside the Pulley Ridge Habitat Area of Particular Concern (PR HAPC) and between the North and South Tortugas Ecological Reserves (TER). These data may then be compared to future research cruises to better understand the long-term health and status of these important mesophotic ecosystems. These data will be of value to the Gulf of Mexico Fishery Management Council (GMFMC), the Florida Keys National Marine Sanctuary (FKNMS), NOAA Fisheries, NOAA Mesophotic Reef Ecosystem Program, and the NOAA Coral Reef Conservation Program (CRCP) to inform management decisions on these habitats and managed key species.

A total of five ROV dives were conducted with the Waitt Saab *Seaeye Falcon* ROV. Unfortunately weather and sea conditions were not conducive for the extensive on-bottom surveys, photography and sample collections that were planned. However, new areas of Pulley Ridge and Tortugas were surveyed (see Appendix 1 for complete documentation of each dive) and new areas of coral were discovered that will be useful to the management agencies (FKNMS and GMFMC).

ACKNOWLEDGEMENTS

We thank the Waitt Foundation for their support, and particularly Mike Dessner for organizing the cruise and supervising logistics at sea.

We also thank the FSU Coastal and Marine Lab and CIOERT at Harbor Branch Oceanographic Institute, Florida Atlantic University for their support. The crew of the Waitt ship *Plan b* provided excellent support for the ROV operations. The Operations Director Joe Lepore and ROV pilot Steve Firman are especially thanked for their support and efforts.

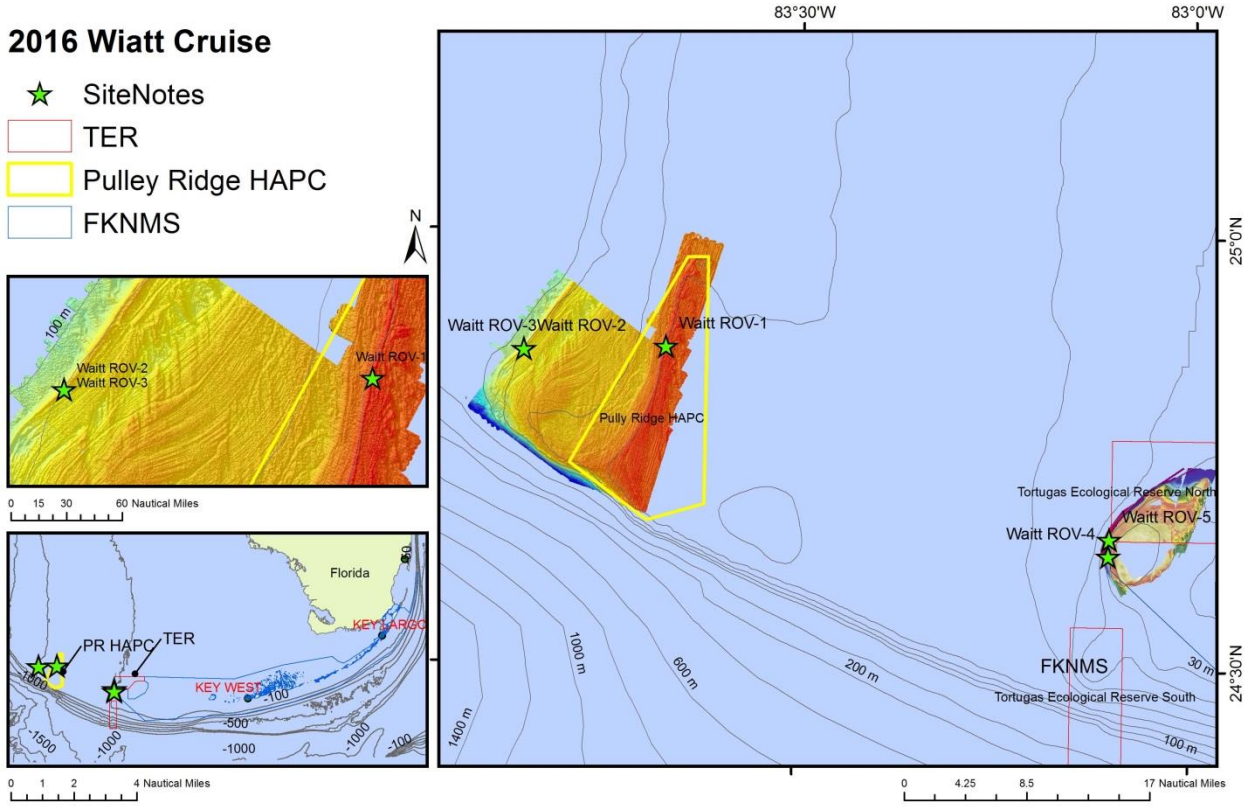

Figure 1. ROV dive sites during the 2016 Waitt cruise at Pulley Ridge mesophotic reef in the Gulf of Mexico and near the Tortugas Ecological Reserve.

BACKGROUND

President Obama Is Likely by January, 2017 to Establish New Marine Protected Areas as Part of the Centennial Celebration of the U.S. National Parks

In the next twelve months –before the next president is inaugurated on January 20, 2017- President Obama and his administration have committed to a number of executive branch environmental initiatives, including the establishment of new and expanded marine conservation areas. The President and staff have already used the Antiquities Act and other statutes like the Outer Continental Shelf Lands Act to establish more new and expanded conservation areas than any prior chief executive -- they've designated over 260 million acres of land and ocean in 19 separate places. For example, 1) the expansion of the Pacific Remote Islands Marine National Monument created the largest no-take marine reserve in the world when President Obama took

this action in 2014. 2) Some of these prospective actions are likely to be connected to the 100th Anniversary of the National Park Service in 2016, an event in full swing that is sometimes called the Parks or Green Centennial. 3) The marine world is calling for an analogous blue centennial to celebrate oceans in the same timeframe. There are three other 'action forcing events' planned for 2016 that could serve as platforms for big announcements by the administration: World Ocean Day in early June, the World Conservation Congress in Honolulu in early September 2016 and the State Department's Our Ocean Conference in late fall of 2016. The November elections could delay some announcements which will be made after they are over.

The National Geographic Magazine, working with renowned underwater photographer Brian Skerry, intends to cover the President's possible actions creating marine conservation areas as part of its series of stories (one in each issue of the magazine) celebrating the Parks' Centennial. The magazine story on possible "blue parks" is slated to appear in the February, 2017 issue, which publishes on January 15, 2017. It will also use digital and social media platforms for any announcements of new marine areas that the President makes prior to the appearance of the magazine in January 2017. In addition, Brian Skerry will be taking pictures of several places that the President may consider for special status. For this proposal, National Geographic Society and Marine Conservation Institute would like to focus on two areas: • An area off southwest Florida from the Dry Tortugas National Park and Ecological Reserves over to Pulley Ridge, the northernmost mesophotic coral reef in US waters; and • Several areas in New England – one in the Gulf of Maine (80 miles east of Portland, Maine) called Cashes Ledge and the others being seamounts and submarine canyons. The *Plan B* would be used by National Geographic and scientific researchers recruited by Marine Conservation Institute to document these two areas, conduct scientific exploration for the purposes of educating decision makers about the importance of increased conservation for these places. Each area requires 1-2 weeks of ship time, depending on weather conditions and water clarity, starting on May 4th. Plans are for the ship to be on the Dry Tortugas-Pulley Ridge leg from May 4-12 and on the Cashes Ledge leg from May 21-29/30 when it will return to Boston harbor for a potential event with decision makers, scientists and the public.

Background of Pulley Ridge and Tortugas Dive Sites: Brief Description & Justification for Special Status at Pulley Ridge/Dry Tortugas

Despite decades of heavy commercial and recreational fishing, land based pollution, oil and gas drilling and other extractive activities, there are still places in the Gulf of Mexico that support rich, productive marine ecosystems. In some cases, these areas are also unique biologically. Two such places that are relatively close together and are very likely to be connected biologically are: the Dry Tortugas National Park (DTNP, approximately 120 sq. miles) and Tortugas Ecological Reserves (TER, 220 sq. miles) and to the northwest of the national park an area called Pulley Ridge. The marine resources of the DTNP and surrounding ecological reserves are abundant and diverse. The coral reefs of the park are some of the most biodiverse in the Caribbean with over 75 species of corals. The islands provide some of the only light free nesting areas for green sea turtles and loggerheads in Florida. Over 330 species of fish have been identified in the park, including many sought after gamefishes. Spiny lobsters and pink shrimp are also found in the park and because of the park's location in the Florida Current, it has been shown to be a source of larval and juvenile fish to as far away as Tampa Bay on the west coast of Florida and Cape Canaveral on the Atlantic Coast.

Approximately 35-40 miles west of the Dry Tortugas across the relatively shallow west Florida shelf lies another remarkable marine feature –a series of drowned barrier islands- called Pulley Ridge which was discovered in the 1950's but has only been explored and studied since 1999. Pulley Ridge, the deepest known photosynthetic coral reef off the continental U.S, is approximately 180 miles in length, 3-9 miles wide and 180 to 295 feet deep; but we are concerned here with only the southern end of the ridge where the shallow water corals grow in abundance at the very edge of their ability to collect enough light to survive. These corals are often called mesophotic corals because they live in the meso or middle depths, too deep for easy scuba diving and not deep enough to draw the attention of researchers using submarines and ROVs. The existence of the Loop Current that flows from Pulley Ridge towards the DTNP and Florida Keys National Marine Sanctuary, has suggested to scientists that Pulley Ridge might serve as an upstream source of coral and fish larvae for the reefs along the Florida Keys. If so, these mesophotic corals could replenish or reseed areas of damaged shallow water corals with the same species protected by the cooler, more remote waters. There is a 5 year effort underway with the aim of understanding whether these and other connections exist between Pulley Ridge and the Dry Tortugas.

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http://oceanexplorer.noaa.gov/explorations/13pulleyridge/background/mce/mce.html

Ana C. Vaz, Claire B. Paris, M. Josefina Olascoaga, Villy H. Kourafalou, Heesook Kang, John K. Reed. 2016. The perfect storm: match-mismatch of bio-physical events drives larval reef fish connectivity between Pulley Ridge mesophotic reef and the Florida Keys. Abstract. 2016 International Coral Reef Symposium.

John Reed, Stephanie Farrington, Joshua Voss, Villy Kourafalou , Ryan Smith, Keith Spring , Dennis Hanisak. 2016. Resilience of a unique mesophotic reef in the Gulf of Mexico, USA: A 30-Year historical perspective of the coral communities at Pulley Ridge Reef. Abstract. 2016 International Coral Reef Symposium.

METHODS

ROV Operations

ROV video and photographic surveys were planned at each site to obtain high quality, digital still images for the National Geographic magazine, and to characterize the benthic habitats, benthic macrobiota, fish populations, and coral/sponge/algal cover. Also collections of coral specimens were planned for studies of gametogenesis in selected scleractinian species.

ROV

Saab *Seaeye Falcon* DR with two hydraulic arms; a single function claw and a five-function Hydrolek HLK-43000 manipulator. During this cruise, a Hobotemp datalogger was attached to the vehicle to record temperature during each dive.

ROV Video Camera

Video was recorded continuously throughout each dive with a high-definition video camera. High-definition digital still images were also recorded by Brian Skerry for National Geographic. The high-definition video was recorded to external hard drives and used as the primary data source for viewing by the science team.

Customized camera system

During most of the dives, a customized HD camera was integrated with the ROV for the purpose of taking high quality images for Mr. Skerry (National Geographic). This system was designed and operated by Luis Lamar (Woods Hole Oceanographic Institution).

ROV Navigation

The Waitt ROV uses an integrated navigation system consisting of an Imagenex 881A Sonarand Tracklink navigation system. ROV position data (including latitude, longitude and time/date) were logged every 2-5 seconds during each dive, and later exported as 'dat' files to Excel and imported into the HBOI CIOERT Access database and plotted on multibeam maps in ArcGIS.

RESULTS

A total of five ROV dives were conducted during the cruise; three at Pulley Ridge mesophotic reef and two at Tortugas (Fig. 1, Table 1). One dive was within the Pulley Ridge protected Habitat Area of Particular Concern and two were on the West Ridge of Pulley Ridge which is currently unprotected but is under consideration for proposed expansion of the HAPC or of the Florida Keys National Marine Sanctuary (FKNMS). Two dives were conducted on the western fringing reef of the Tortugas which is also unprotected and outside of the Tortugas Ecological Reserve North. These sites are also under consideration for expansion of the FKNMS.

Unfortunately weather and sea conditions were not conducive for extensive on-bottom surveys, photography and sample collections that were planned. Much of the time the wind was 15-20 kn, seas 3-6 ft, and surface current of 1-2 kn. Thanks to the valiant efforts of the Captain and ROV crew, we were able to get five dives completed; however, poor conditions did not allow for high-quality video footage or digital still images that we had hoped for since the ROV was often too high or could not stop in the current.

On a positive note, new areas of Pulley Ridge and Tortugas were surveyed for the first time, and new areas of coral were discovered that will be useful to the management agencies (FKNMS and GMFMC). Appendix 1 provides detailed data for each dive site including: metadata of dive, map showing ROV dive track overlaid on multibeam sonar map, location and coordinates of dive site, temperature profile of dive from HOBO temperature recorder attached to the ROV, descriptive summary of habitat and biota, species list of benthic macrobiota and fish observed, and detailed dive notes characterizing the habitat and biota throughout each dive.

Table 1. ROV dive sites during the 2016 Waitt cruise at Pulley Ridge mesophotic reef in the Gulf of Mexico, and adjacent to the NorthTortugas Ecological Reserve.

Site No. (DD-MM-YY-#)	Method	Location	Latitude	Longitude	Depth Range (m)
6-V-16-1	Waitt ROV-1	Gulf of Mexico, Pulley Ridge HAPC; Main Ridge middle, Block 80	24°52.0670'N	83°40.1230'W	64-69
8-V-16-1	Waitt ROV-2	Gulf of Mexico, Pulley Ridge, West Ridge, Block 38	24°51.7180'N	83°50.9330'W	80-100
8-V-16-2	Waitt ROV-3	Gulf of Mexico, Pulley Ridge, West Ridge, Block 38	24°51.7180'N	83°50.9330'W	77-90
9-V-16-1	Waitt ROV-4	Gulf of Mexico, West Slope of Tortugas Ecological Reserve North; outside TER	24°37.9812'N	83°06.2014'W	22-34
10-V-16-1	Waitt ROV-5	Gulf of Mexico, NW Slope of Tortugas Ecological Reserve North; outside TER	24°39.1510'N	83°06.1520'W	35-45

MARINE PROTECTED AREAS

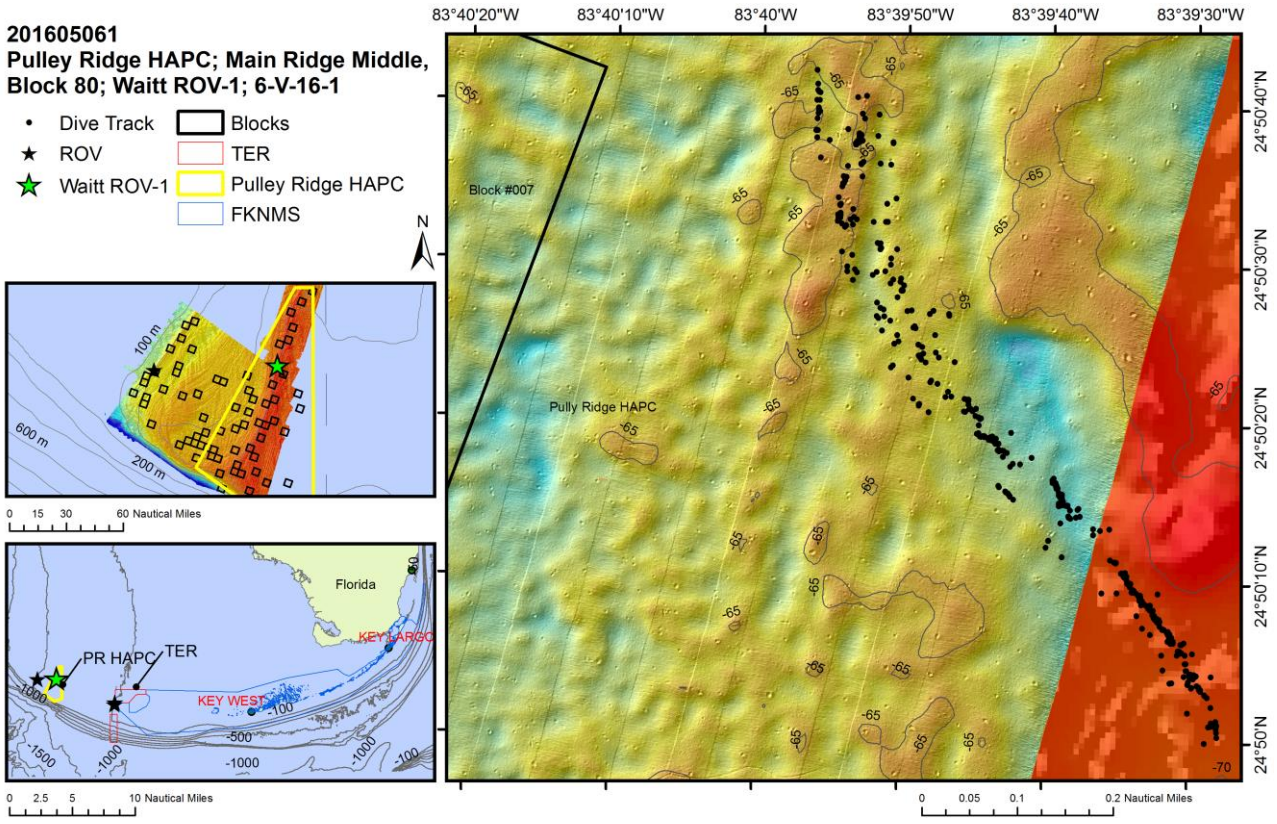
In August 2015, the data compiled from HBOI CIOERT cruises to Pulley Ridge, including CIOERT cruises of 2010 and 2011 (FloSEE I and II), and the University of Miami cruises of 2012-2015, were presented to the Coral Scientific and Statistical Committee of the Gulf of Mexico Fishery Management Council as a proposal to extend the boundaries of the Pulley Ridge HAPC to the west to include the coral rich Central Basin and the West Ridge. Also data compiled on the mesophotic reefs at Tortugas were presented to the Florida Keys National Marine Sanctuary as a proposal for extending the boundaries of the sanctuary to include these areas.

APPENDIX 1

Appendix 1 provides detailed data for each dive site including: metadata of dive, map showing ROV dive track overlaid on multibeam sonar bathymetry, location and coordinates of dive site, temperature profile of dive from HOBO temperature recorder attached to the ROV, descriptive summary of habitat and biota, species list of benthic macrobiota and fish observed, and detailed dive notes characterizing the habitat and biota throughout each dive.

Dive Site: Gulf of Mexico, Pulley Ridge HAPC; Main Ridge middle, Block 80; Waitt ROV-1

General Location and Dive Track:



Site Overview:

Project:	Waitt Pulley Ridge Cruise
Principal Investator:	John Reed
PI Contact Info:	5600 U.S. 1, North, Fort Pierce, FL 34946
Website:	www.nationalgeographic.com
Scientific Observers:	John Reed, Sandra Brooke
Data Management:	Access Database
ROV Navigation Data:	None
Ship Position System:	
Report Analyst:	John Reed
Date Compiled:	5/17/2016

Dive Overview:

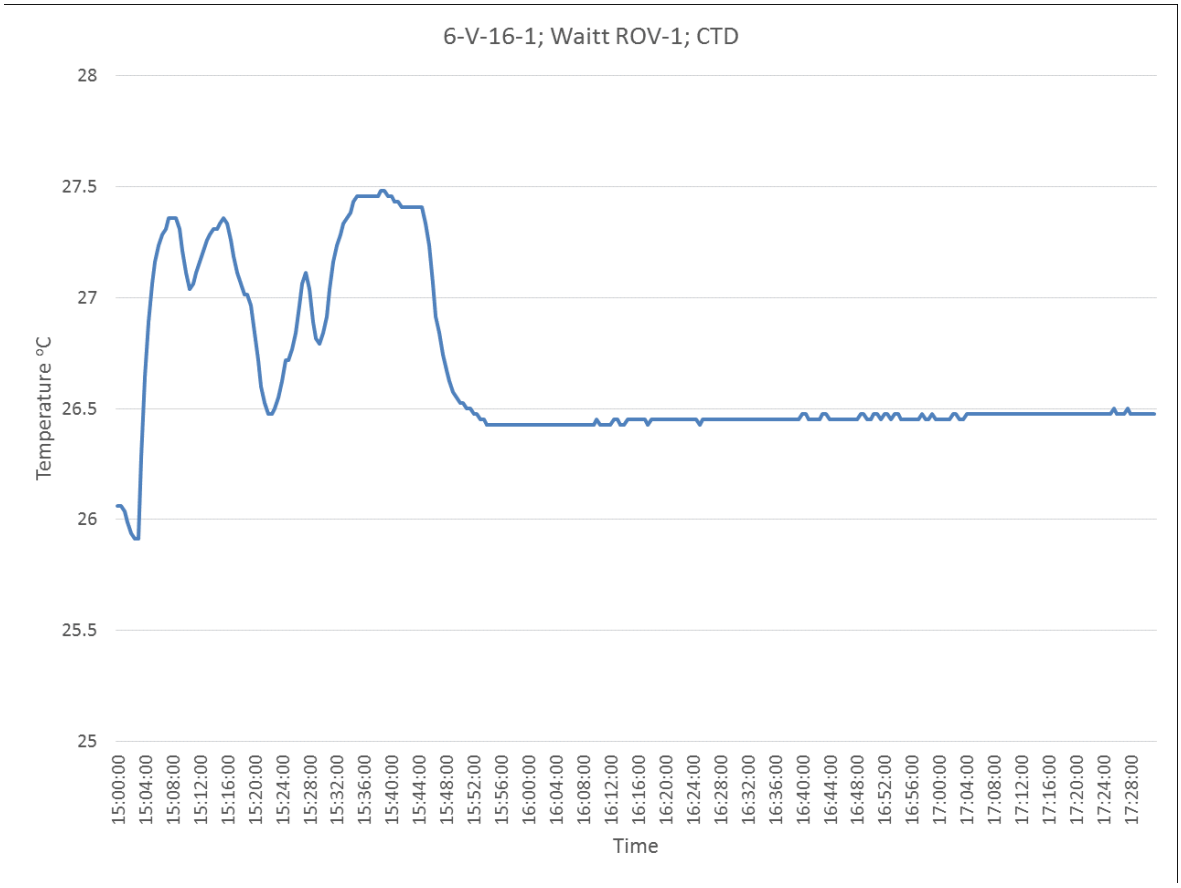
Vessel:	Plan b Waitt Yacht
Sonar Data:	Nancy_Pulley_Middle_UTM17N
Purpose:	National Geographic Photography and Coral Collections
ROV:	Waitt ROV Saab Falcon
ROV Sensors:	Temperature (°C)
Date of Dive:	5/6/2016
Specimens:	
Digital Photos:	
DVD:	0
Hard Drive:	1

Dive Site: Gulf of Mexico, Pulley Ridge HAPC; Main Ridge middle, Block 80; Waitt ROV-1

Dive Data:

Minimum Bottom Depth (m):	64	**Total Transect Length (km):**	0.936				
Maximum Bottom Depth (m):	69	**Surface Current (kn):**	2				
On Bottom (Time- GMT):	15:20	**On Bottom (Lat/Long):**	24.86°N; -83.67°W				
Off Bottom (Time- GMT):	17:31	**Off Bottom (Lat/Long):**	24.83°N; -83.66°W				
Physical (bottom); Temp (°C):	26.45	**Salinity:**		**Visibility (ft):**	60	**Current (kn):**	0.1

Physical Environment:



Plot of temperature from a HOBO Temperature Logger attached to the ROV (Y axis = Temperature, X Axis = Time).

Dive Site: Gulf of Mexico, Pulley Ridge HAPC; Main Ridge middle, Block 80; Waitt ROV-1

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:
Gulf of Mexico, Pulley Ridge HAPC; Main Ridge middle, Block 80, Block 6, and off MB to east; Waitt ROV-1.
Objectives- Conduct photo/video transect to document habitat and biota with hi-definition digital still images for National Geographic; collect coral samples for reproductive analysis. The target site was Block 80 which is a random 1 km x 1 km block on top of the Main Ridge which was surveyed by Reed et al. 2014. This site which is within the protected Habitat Area of Particular Concern was selected due to its high density and diversity of benthic biota, including sponges, algae and corals, as well as large densities of breeding red grouper. The dive also crossed Block 6 which is off the Main Ridge but has large concentrations of red grouper burrows (>350 / km2) which are visible in multibeam sonar maps (Reed et al. 2011). The dive also extended into areas to the east of the Main Ridge and outside of the multibeam sonar map which had never been surveyed before. This will provide new and additional data for the management and conservation of the area by the Florida Keys National Marine Sanctuary and Gulf of Mexico Fishery Management Council.

ROV Setup/Dive Events:
Waitt Saab SeaEye Falcon DR ROV; Pilot- Steve Firman; Camera- high-def video, Konigsberg OE 14-502F; Hobo temperature sensor; lasers- 8.4 cm. ROV Track data plotted, depth incorrect.
On site at 730 am; seas 4-6', 20 kn from NW. Dives delayed. Back on site at 2:00 pm, winds and seas subsiding. Drifted 2.4 nmi during dive to SE, crossed Block 6, and then off the MB to the SE. 2 knot surface current to 170 dg, difficult to get to bottom, but second half of dive were able to stay close to bottom <1 m, and drifting 1/4 kn. However, unable to station keep, could not stop for National Geographic photos or to collect coral. Good video when close.

Site Description/Habitat/Biota:
Landed on bottom east of Main Ridge target site and drifted SE for 2.4 nmi. 100% hard bottom, mostly rock cobble/rubble and plate rock with high density of macrobiota including algae, sponges and coral. Part of dive on high def MB then drifted off MB to the east. Much of dive was in Block 6- with high density grouper burrows in MB (350 pits in 1 km2). Crossed 5 pits, all with 50+cm red grouper, some with scamp, and black grouper. Sand tilefish mounds common. Only saw few lionfish; some pits had no lionfish. The dive also extended into areas to the east of the Main Ridge and outside of the multibeam sonar map which had never been surveyed before. Here we discovered numerous flat, dark brown, very healthy looking Montastraea cavernosa corals, 20-30 cm diam. Agaricia corals- 30 cm A. grahamae corals and 10-20 cm A. fragilis.

Benthic biota:
Algae: Anadyomene menziesii- dense to common; Codium, Crustose Coralline Algae (CCA)- dense
Scleractinian Coral: Agaricia fragilis- common, A. grahamae- common 30 cm diam, Madracis formosa- 15 cm diam, uncommon; Montastraea cavernosa- patch with 20-30 cm diam colonies common, dark brown, flat, healthy
Octocorallia: Primnoidae- common, Plexauridae- few
Antipatharia: Antipathes atlantica, A. furcata, Stichopathes lutkeni
Hydroida
Porifera: dense and abundant- Xestospongia muta, Agelas numerous spp, A. clathrodes, A. conifera, Aplysina, Geodia sp., Geodia neptuni, Polymastia, Spongosorites, Ircinia campana, I. Strobilina, Niphates erecta, Callyspongia vaginalis
Crinoidea: Analcidometra armata
Chordata: Aplidium sp.- white ascidiacea

Dive Site: Gulf of Mexico, Pulley Ridge HAPC; Main Ridge middle, Block 80; Waitt ROV-1

Fish:
Red grouper, sand tilefish, scamp grouper, black grouper, lionfish, bicolor damselfish, squirrel fish

Dive Site: Gulf of Mexico, Pulley Ridge HAPC; Main Ridge middle, Block 80; Waitt ROV-1

Dive Notes:

Date/Time	Latitude	Longitude	Depth (m)	Habitat and Dive Notes
	Seadesc Slope	Relief	Rugosity	
5/6/2016 3:05:05 PM				Launch 3:04; Pulley Ridge, Main Ridge, PR HAPC; Waitt ROV-1
5/6/2016 3:15:45 PM				ROV depth 39 m, drifting south
5/6/2016 3:18:24 PM				48 m, bottom in sight
5/6/2016 3:20:36 PM				Start recording hi def video
5/6/2016 3:20:54 PM				Near bottom; drifting fast, can not station keep, can not stop for photos or collections; too high to take photos
5/6/2016 3:29:36 PM				Cannot get to bottom, ship drifting 1+ kn to 170 dg; bring ROV up to reset cable counter; not sure how much cable out
5/6/2016 3:31:16 PM				Stop hi def video recording
5/6/2016 3:34:23 PM				5 m depth; start descent again
5/6/2016 3:44:37 PM				4 m depth; drifted 500 m southeast of target waypoint
5/6/2016 3:46:39 PM	24°50.8802'N,	83°39.9967'W		Near bottom; 54 m, bottom in sight
5/6/2016 3:52:45 PM	24°50.6588'N, R SL-0	83°39.9323'W LO	LRu	Start video recording; went over ged grouper pit; 100% hard bottom
5/6/2016 3:57:25 PM				Gulf of Mexico, Pulley Ridge HAPC; Main Ridge middle, Block 80, Block 6, and off MB to east; Waitt ROV-1

Dive Site: Gulf of Mexico, Pulley Ridge HAPC; Main Ridge middle, Block 80; Waitt ROV-1

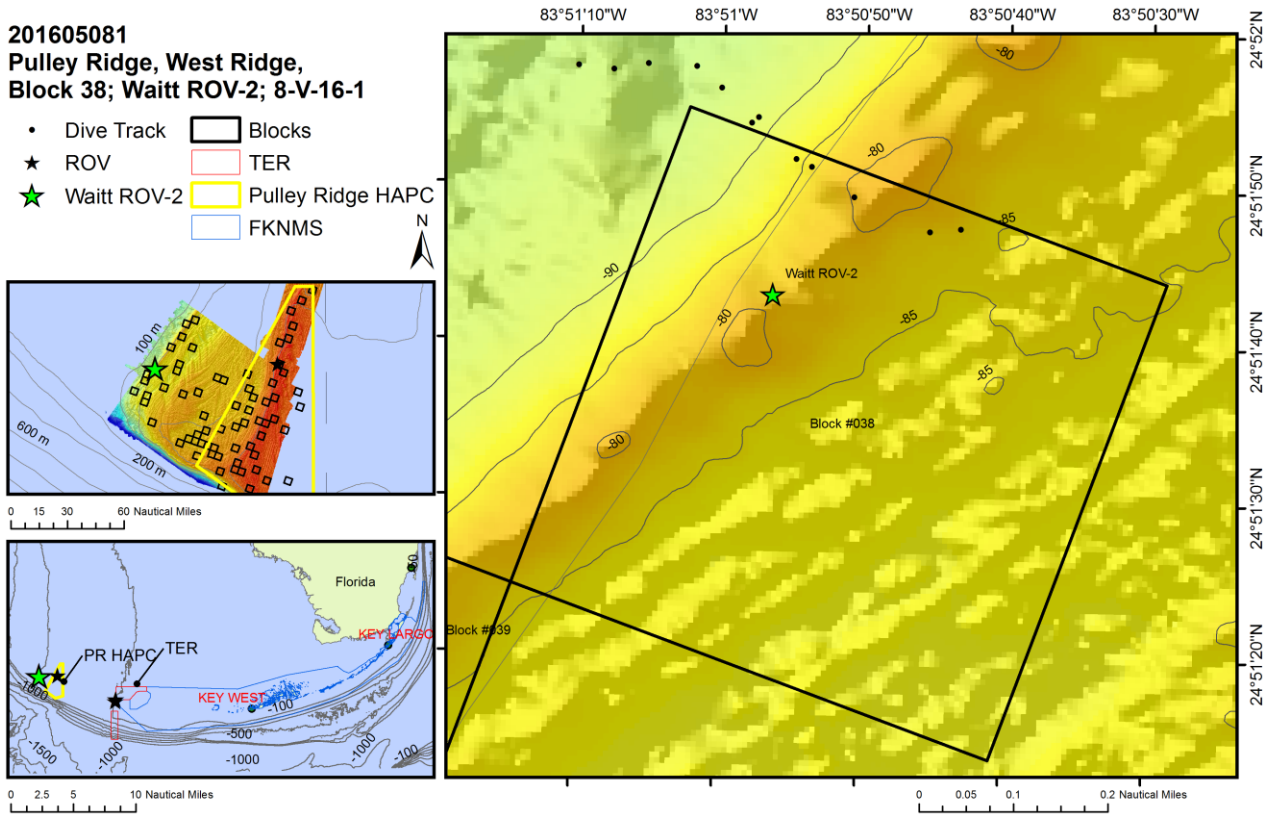
Date/Time	Latitude	Longitude	Depth (m)	Habitat and Dive Notes
	Seadesc Slope	Relief	Rugosity	
5/6/2016 3:59:31 PM				Finally near enough to the bottom to see, 3-5 m above bottom, drifting fast, can not station keep, can not stop for photos or collections. East of main ridge; drifted 1 km from target Waypoint and to SE of Main Ridge. 100% hard bottom- rock cobble, pavement, coral plates; dense Anadyomene; sponges- Agelas conifera, Agelas sp., Iricinia, Xestospongia muta- common; dense crustose coralline algae, some Agaricia coral- 20 cm diameter
5/6/2016 4:03:56 PM				Agaricia coral- 30 cm
5/6/2016 4:09:12 PM	24°50.5140'N,	83°39.8490'W		Drifting SE about 1/2 kn cannot stop; same habitat 100% hard bottom, rock cobble, pavement; CCA plates; dense Anadyomone, X. muta, Geodia, Agelas, bicolor damsels; Agelas clathrodes, Cirrhipathes black coral
5/6/2016 4:14:40 PM				Madracis formosa coral, partly white; bleached Agaricia coral 20 cm; white tunicate- Aplydium
5/6/2016 4:22:01 PM	24°50.4174'N,	83°39.8424'W		Still drifting SE, unable to station keep, or stop; unable to take still images for National Geographic or collect coral samples. Same habitat; more rubble; open areas of rubble w/o biota
5/6/2016 4:27:59 PM	24°50.3655'N,	83°39.7721'W		Same habitat; Anadyomene- 20% cover; X. muta common, Geodia, Agelas, Polymastia
5/6/2016 4:36:54 PM	24°50.3037'N,	83°39.7131'W		Red grouper pit- 10 m diameter with 1 red grouper (50+ cm); dense small reef fish, only a few lionfish
5/6/2016 4:48:14 PM	24°50.1923'N,	83°39.6450'W		100% rock cobble; Anadyomene, X. muta, sand tilefish mound; Geodia, Niphates
5/6/2016 4:51:33 PM				Red grouper and burrow, squirrel fish; tracking may be out
5/6/2016 4:57:46 PM	24°50.1331'N,	83°39.5545'W		Same habitat
5/6/2016 5:06:44 PM	24°50.1399'N,	83°39.5358'W		Same habitat

Dive Site: Gulf of Mexico, Pulley Ridge HAPC; Main Ridge middle, Block 80; Waitt ROV-1

Date/Time	Latitude	Longitude	Depth (m)	Habitat and Dive Notes
	Seadesc Slope	Relief	Rugosity	
5/6/2016 5:12:31 PM	24°50.1190'N,	83°39.5220'W		Montastraea cavernosa coral- 30-50 cm diameter, numerous colonies seen in area, may be record for deepest (68.3 m) and furthest east M. cavernosa found on Pulley Ridge. This is new data outside of the multibeam map area but inside PR HAPC, previously thought to only have sediment and rubble here. 1 red grouper and burrow, black grouper; no lionfish; 6 large grouper- scamp?; fishing line
5/6/2016 5:26:10 PM	24°50.0500'N,	83°39.4720'W		Finally are slowing down (maybe 1/4 kn drift) and fairly close to the bottom (1-2 m), but still cannot station keep, or stop for National Geographic photos or to collect coral. Same habitat; more primnoid gorgonians, Antipatharia black coral; 50 cm diameter Agaricia grahamae coral; 10% cover Anadyomene, Geodia neptuni, Niphates, X. muta, CCA, sand tilefish mounds, Codium
5/6/2016 5:31:07 PM	24°50.0043'N,	83°39.4632'W		
5/6/2016 5:31:50 PM	24°50.0043'N,	83°39.4632'W		End of dive, off bottom; red grouper pit, scamp grouper

Dive Site: Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-2

General Location and Dive Track:



Site Overview:

Project:	Waitt Pulley Ridge Cruise
Principal Investator:	John Reed
PI Contact Info:	5600 U.S. 1, North, Fort Pierce, FL 34946
Website:	www.nationalgeographic.com
Scientific Observers:	John Reed, Sandra Brooke
Data Management:	Access Database
ROV Navigation Data:	None
Ship Position System:	
Report Analyst:	John Reed
Date Compiled:	5/17/2016

Dive Overview:

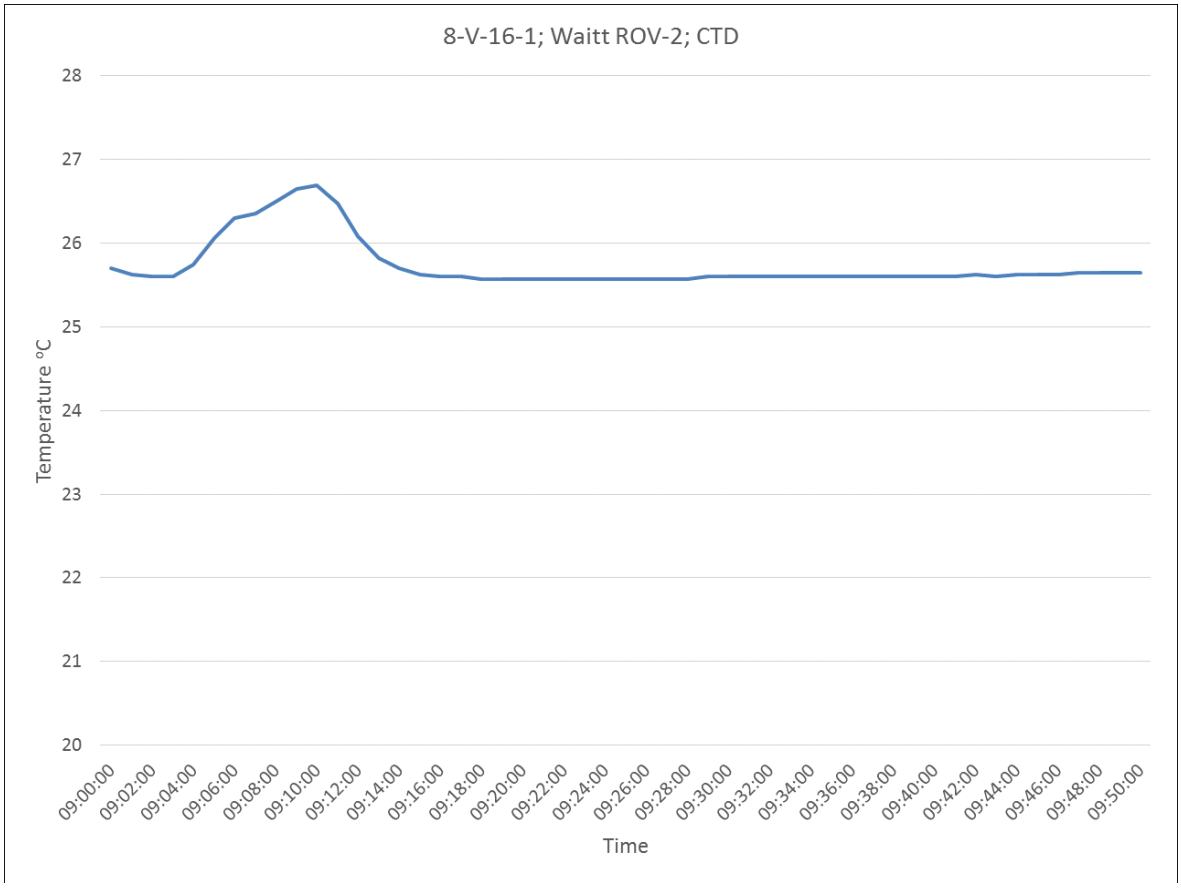
Vessel:	Plan b Waitt Yacht
Sonar Data:	Donahue_2003_PulleyRidge_MB
Purpose:	National Geographic Photography and Coral Collections
ROV:	Waitt ROV Saab Falcon
ROV Sensors:	Temperature (°C)
Date of Dive:	5/8/2016
Specimens:	
Digital Photos:	
DVD:	0
Hard Drive:	1

Dive Site: Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-2

Dive Data:

Minimum Bottom Depth (m):	80	**Total Transect Length (km):**	0.880				
Maximum Bottom Depth (m):	100	**Surface Current (kn):**	2.1				
On Bottom (Time- GMT):	8:58	**On Bottom (Lat/Long):**	24.87°N; -83.85°W				
Off Bottom (Time- GMT):	9:53	**Off Bottom (Lat/Long):**	24.86°N; -83.85°W				
Physical (bottom); Temp (°C):	25.60	**Salinity:**		**Visibility (ft):**	60	**Current (kn):**	0.1

Physical Environment:



Plot of temperature from a HOBO Temperature Logger attached to the ROV (Y axis = Temperature, X Axis = Time).

Dive Site: Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-2

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:
Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-2.
Objectives- Conduct photo/video transect to document habitat and biota with hi-definition (20+ MB) digital still images for National Geographic. The WHOI Sony digital still camera (20 mb) was attached to the Waitt ROV to take hi-def images; this precluded the use of the manipulator to collect coral samples for reproductive analysis. The target site was Block 38 which is a random 1 km x 1 km block on top of the West Ridge which was surveyed by Reed et al. 2014. This site is outside the protected Habitat Area of Particular Concern and is proposed by Reed and Farrington (2014) to be added to the Pulley Ridge HAPC protected area. This site was selected due to its high density and diversity of benthic biota, especially gorgonian corals, black corals, sponges, and algae. This will provide new and additional data for the management and conservation of the area by the Florida Keys National Marine Sanctuary and Gulf of Mexico Fishery Management Council.

ROV Setup/Dive Events:
Waitt Saab SeaEye Falcon DR ROV; Pilot- Pilot- Steve Firman; WHOI Sony digital still camera (20 mb);
Lew Lamar (WHOI); Brian Skerry (National Geographic photographer); Hobo temperature sensor; lasers- 8.4 cm;
Digital camera will be recording video, and take still pictures. Camera time/date was not set. Set at 1/250, F6.3, ISO 1250, manual mode. Camera set to Jan 14, 2014, time 13 minutes behind EDT. No ROV or ship track data.

May 7- Took all day to wire in the Digital WHOI camera into the ROV. No dive.
May 8- Dive; revise Milsortcode and Site Number to 8-V-16-1. Surface current 2.0 knot to 150 dg, so set the ship to drift to the SE; could only slow the ship to 1/2 kn; could not station keep to allow the ROV to stop for pictures or to get to the bottom.
Dive aborted when WHOI digital camera cable got wrapped in prop.

Site Description/Habitat/Biota:
Deployed ROV NW of West Ridge target site; depth ~100 m, drifting E at 1/2 kt. Could not stop or station keep. ROV was 3-5 m off bottom most of the time; finally drifted up the west slope and over the top of the ridge. Upper slope and ridge top with 100% hard bottom, rock rubble/cobble with dense cover of biota; to far up to identify fauna but could see sponges and gorgonians. Crossed 3 grouper pits, could not see if had grouper or lionfish. Saw one shark.
Dive aborted when fiber optic cable for the WHOI digital camera, which was separate from the main ROV umbilical, got caught and wound up in ship prop. The WHOI cable was only tie wrapped to the first 20 m of the cable from the down weight to the ROV, so the upper 80 m was not tie wrapped allowing it to get in prop. Not sure why.

Dive Site: Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-2

Dive Notes:

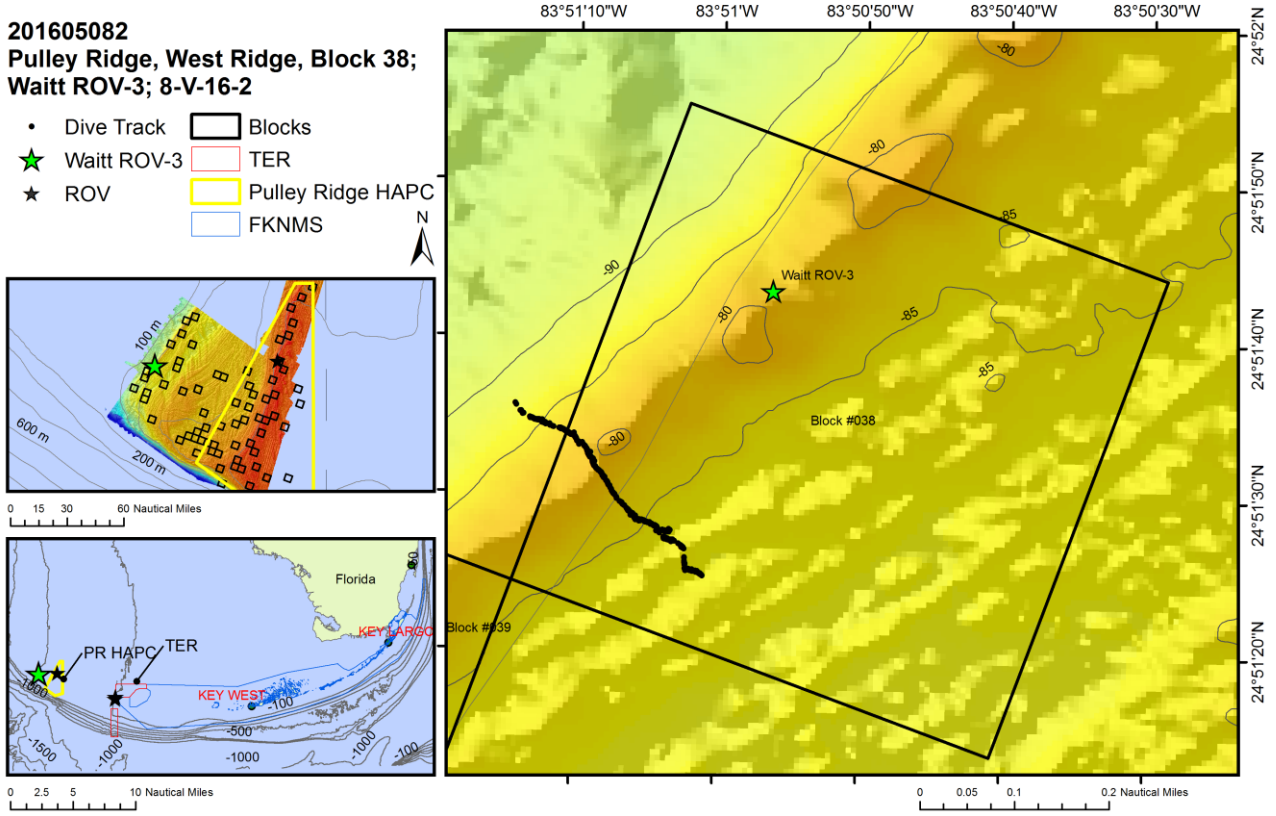
Date/Time	Latitude	Longitude	Depth (m)	Habitat and Dive Notes
	Seadesc Slope	Relief	Rugosity	
				Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-2
5/8/2016 8:52:27 AM				Descending
5/8/2016 8:54:15 AM				
5/8/2016 8:56:20 AM	RP SL-0	LO	LRu	Bottom in sight
5/8/2016 8:57:55 AM	R SL-0	LO	LRu	Near bottom. Flat 50% cover of rock rubble. ROV depth 95 m, ~ 5 m above bottom. West of West Ridge and target Waypoint
5/8/2016 9:03:40 AM				Drifting to SE at depth 80 m. Approx 15 m off bottom. Probably west of reef, no tracking. Unable to station keep, cannot stop or slow down, drifting >1 kn
5/8/2016 9:08:46 AM				Vehicle coms lost, and regained. ROV having trouble getting to seafloor
5/8/2016 9:11:20 AM				Tracking regained
5/8/2016 9:14:03 AM	24.86598 R SL-Lo	-83.85273 LO	95 LRu	Back near bottom, but still too high for photos. ROV depth 95 m, still drifting SE at ~ 0.5 kt, unable to station keep, stop or slow down for photos or collections. Habitat 50% sediment. Approx 200 m west of ridge target site
5/8/2016 9:17:03 AM	24.86591 R SL-Lo	-83.85205 LO	94.5 LRu	Same habitat, drifting SE towards West Ridge
5/8/2016 9:21:10 AM	24.86603 R SL-Lo	-83.85138 LO	87 LRu	Still transiting to dive target on top of West Ridge
5/8/2016 9:25:59 AM	24.86599 R SL-0	-83.85044 LO	87 LRu	Still drifting SE about 200 m from ridge heading east
5/8/2016 9:27:58 AM	24.86562 R SL-M	-83.84995 LO	86 LRu	Still transiting to ridge, coming up west slope of West Ridgte, 30-45 deg slope, getting closer to ridge. Possible grouper pit.

Dive Site: Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-2

Date/Time	Latitude Seadesc Slope	Longitude Relief	Depth (m) Rugosity	Habitat and Dive Notes
5/8/2016 9:30:28 AM	24.86511 RP SL-Lo	-83.84922 LO	 LRu	Transiting but heading east, still > 200 m from ridge
5/8/2016 9:35:08 AM	24.86501 RP SL-Lo	-83.84935 LO	83.5 LRu	Still transiting to ridge ~150 m from ridge. Approx 3-5 m off bottom. Gorgonians and sponges, not close enough to identify
5/8/2016 9:40:03 AM	24.86437 RP	-83.84847	87	100% hard bottom cover, rock rubble/cobble. Sponges and gorgonians appear dense, but 3 m off bottom and cannot identify
5/8/2016 9:43:43 AM	24.86424 RP SL-Lo	-83.84817 LO	85.5 LRu	Re grouper pit, too high to see if occupied. 100% cover rock cobble. Shark and black coral
5/8/2016 9:48:38 AM	24.86371	-83.84733	80	Coming up to ridge. Pavement 100% cover. Sponges dense and diverse
5/8/2016 9:53:04 AM	24.86312	-83.84585	79.6	Still drifting fast, unable to station keep, cannot stop for National Geographic photos or for sample collections. On west side of ridge. 100% cover of biota, some gorgonians ~20 cm tall. Probably Swiftia but too far off bottom to identify. Lost HD video at 09.55.
5/8/2016 9:55:54 AM	24.86318	-83.84525	80	Fiber caught in prop. Leaving bottom. Dive aborted.

Dive Site: Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-3

General Location and Dive Track:



Site Overview:

Project:	Waitt Pulley Ridge Cruise
Principal Investator:	John Reed
PI Contact Info:	5600 U.S. 1, North, Fort Pierce, FL 34946
Website:	www.nationalgeographic.com
Scientific Observers:	John Reed, Sandra Brooke
Data Management:	Access Database
ROV Navigation Data:	None
Ship Position System:	
Report Analyst:	John Reed
Date Compiled:	5/17/2016

Dive Overview:

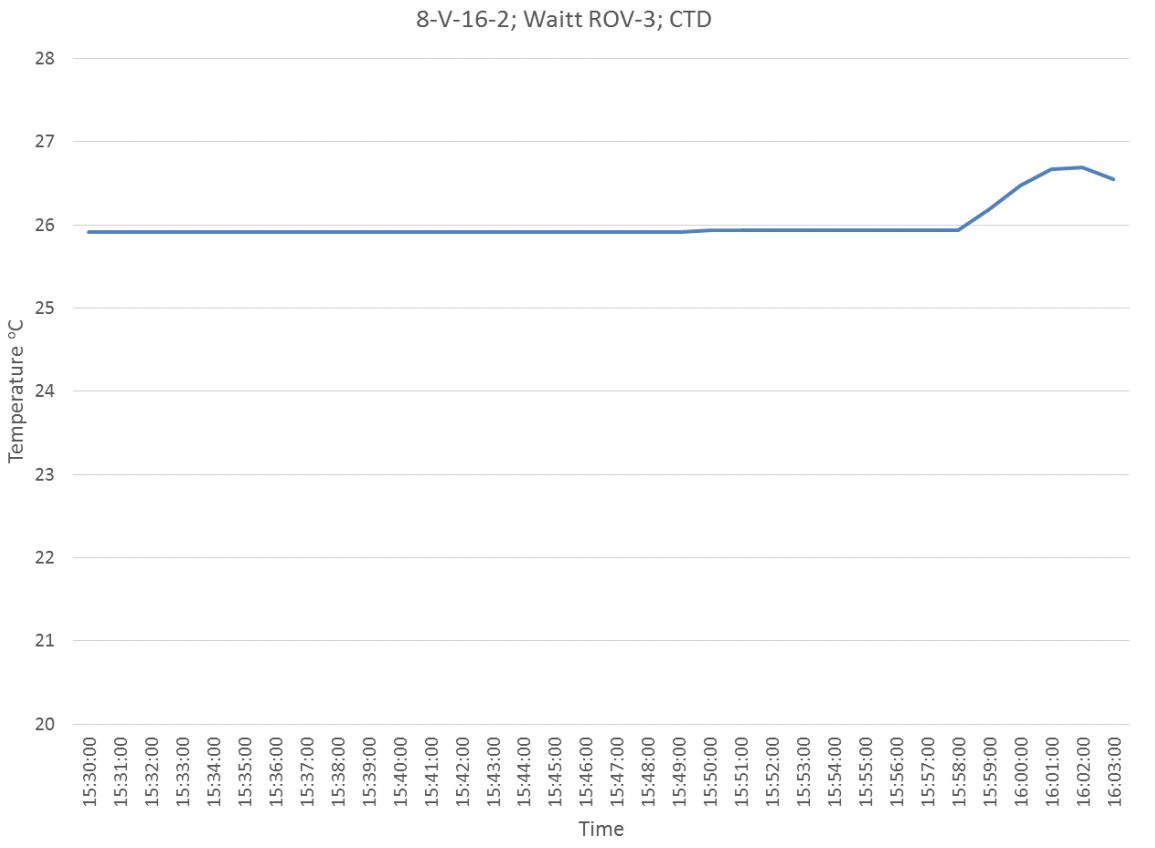
Vessel:	Plan b Waitt Yacht
Sonar Data:	Donahue_2003_PulleyRidge_MB
Purpose:	National Geographic Photography and Coral Collections
ROV:	Waitt ROV Saab Falcon
ROV Sensors:	Temperature (°C)
Date of Dive:	5/8/2016
Specimens:	
Digital Photos:	
DVD:	0
Hard Drive:	1

Dive Site: Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-3

Dive Data:

Minimum Bottom Depth (m):	77	**Total Transect Length (km):**	0.606				
Maximum Bottom Depth (m):	90	**Surface Current (kn):**	1.5				
On Bottom (Time- GMT):	15:25	**On Bottom (Lat/Long):**	24.86°N; -83.85°W				
Off Bottom (Time- GMT):	16:03	**Off Bottom (Lat/Long):**	24.86°N; -83.85°W				
Physical (bottom); Temp (°C):	25.90	**Salinity:**		**Visibility (ft):**	60	**Current (kn):**	0.1

Physical Environment:



Plot of temperature from a HOBO Temperature Logger attached to the ROV (Y axis = Temperature, X Axis = Time).

Dive Site: Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-3

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:
Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-3.
Objectives- Conduct photo/video transect to document habitat and biota with hi-definition (20+ MB) digital still images for National Geographic. The WHOI Sony digital still camera (20 mb) was attached to the Waitt ROV to take hi-def images. This was a repeat of the previous dive that was aborted early. The target site was Block 38 which is a random 1 km x 1 km block on top of the West Ridge which was surveyed by Reed et al. 2014. This site is outside the protected Habitat Area of Particular Concern and is proposed by Reed and Farrington (2014) to be added to the Pulley Ridge HAPC protected area. This site was selected due to its high density and diversity of benthic biota, especially gorgonian corals, black corals, sponges, and algae. This will provide new and additional data for the management and conservation of the area by the Florida Keys National Marine Sanctuary and Gulf of Mexico Fishery Management Council.

ROV Setup/Dive Events:
Waitt Saab SeaEye Falcon DR ROV; Pilot- Steve Firman; WHOI Sony digital still camera (20 mb);
Lew Lamar (WHOI); Brian Skerry (National Geographic photographer); Hobo temperature sensor; lasers- 8.4 cm;
Digital camera will be recording video, and take still pictures. Camera time/date was not set. Set at 1/250, F6.3, ISO 1250, manual mode. Camera set to Jan 14, 2014, time 13 minutes behind EDT. Computer synced to ROV Nav; WHOI digital camera being recorded- time of camera is 23 sec ahead of Nav time. ROV Track data plotted, depth incorrect.

Site Description/Habitat/Biota:
Drifted at speed over ground of 1/2 kn across ridge from west slope (90 m), across peak (80 m) and east slope to 85 m. Most of time was 2-5 m off bottom, unable to station keep, could not stop for National Geographic digital still images. Finally on east slope was able to stop briefly (1-2 seconds) for a few photos of Swiftia gorgonian and Xestospongia muta sponge. Habitat was 90-100% hard bottom, rock rubble/cobble, with very dense and diverse biota. Crossed 3 grouper pits but high up and could not see if grouper in the pit. Appeared to be clean and active, saw 1 lionfish with one.

Benthic macrobiota:
Coral: Stylasteridae- common
CNI- Gorgonacea: common, mostly on top of ridge- Swiftia exerta, Nicella, Ellisellidae, Primnoidae
Antipatharia: common- Antipathes atlantica, Stichopathes lutkeni
Hydroida
Porifera: dense and diverse- Agelas, Aplysina, Aplysina conifera, Xestospongia muta, Agelas orange fan
Crinoidea: Davidaster discoideus
Algae- Crustose Coralline Algae (CCA), Verdigellas- dense

Fish- reef butterfly, lionfish, sand tilefish, red grouper

Dive Site: Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-3

Dive Notes:

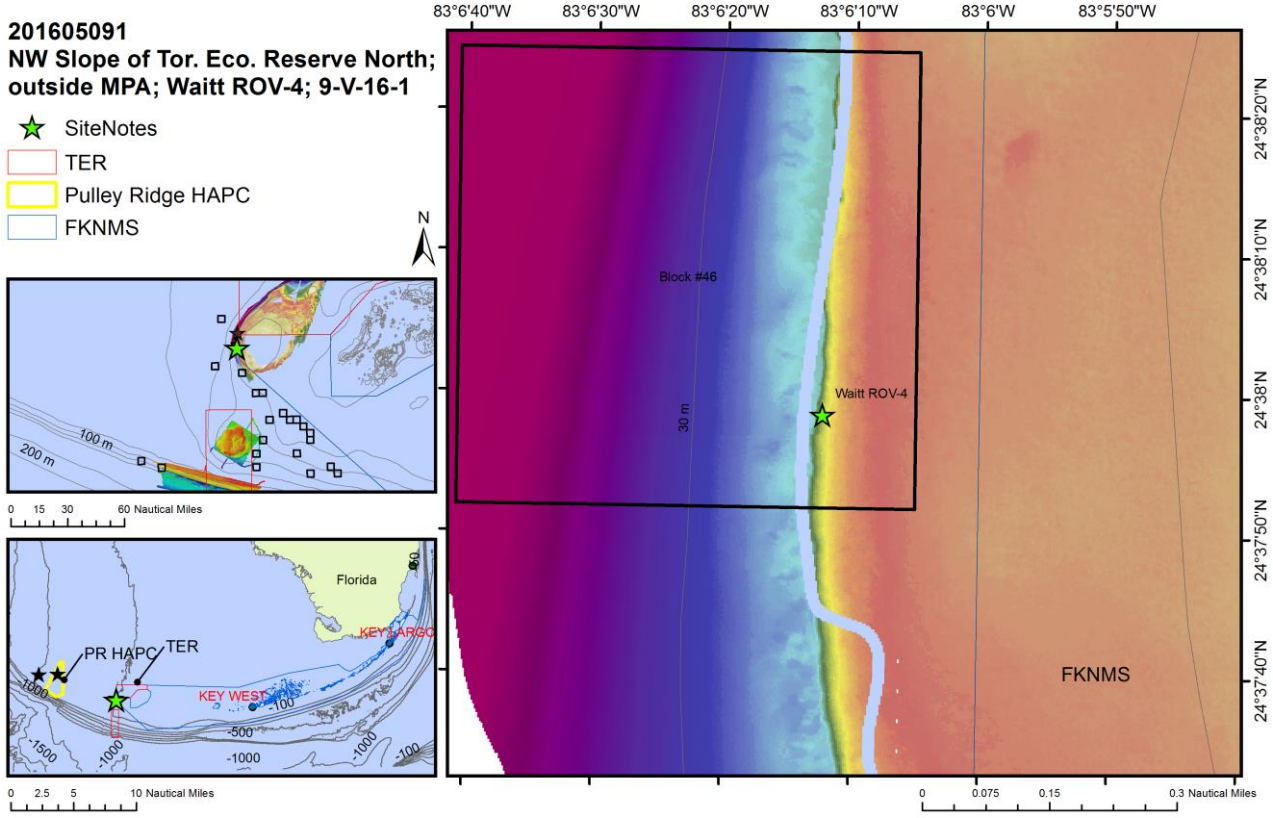
Date/Time	Latitude Seadesc	Slope	Longitude Relief	Depth (m) Rugosity	Habitat and Dive Notes
5/8/2016 3:08:16 PM					Launch. Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-3
5/8/2016 3:14:32 PM					Lost and regained ROV tracking coms
5/8/2016 3:22:41 PM					Bottom in sight
5/8/2016 3:26:54 PM	24.85963 R	SL-Lo	-83.85354 LO	80.12 LRu	On west slope of West Ridge, 90 m depth, west of target Waypoint, drifting fast to SE and high off bottom. Rock cobble/rubble pavement, 80% hard bottom. Dense cover of Verdigellas, Porifera, Antipathes black coral, gorgonacea
5/8/2016 3:31:29 PM	24.85946 R	SL-M	-83.85293	76.48	On west side of west ridge slope. Dense and diverse biota- Verdigellas, Agelas conifera, sand tilefish mound, dense Stylaster coral, dense sponges, octocorals, Davidaster crinoids, CCA, Xestospongia muta, Primnoid gorgonians
5/8/2016 3:36:00 PM	24.85900 R	SL-Lo	-83.85239 LO	75.42 LRu	On top of west ridge at 79 m. Still drifting too fast and too high, unable to station keep, cannot stop to take National Geographic photos. 100% cover hard bottom, rock cobble/rubble/pavement. Dense cover of biota- diverse gorgonians, sponges, algae
5/8/2016 3:39:09 PM	24.85852 R	SL-Lo	-83.85202 LO	74.36 LRu	ROV coms lost and regained. On top if ridge drifting east, unable to stop or slow down. Large gorgonians, Swiftia, Nicella, black coral Antipathes atlantica
5/8/2016 3:43:53 PM	24.85791		-83.85149	78.4	Above eastern slope of west ridge; still drifting, unable to stop. Dominant biota- Verdigellas, no Anadyomene, CCA, sponges- Aplysina, reef butterflyfish
5/8/2016 3:48:38 PM	24.85772 R	SL-0	-83.85104 LO	79.63 LRu	Continuing down east slope of West Ridge. Rubble cobble ~80% cover. Too far off bottom to identify fauna; Stichopathes black coral, Xestospongia muta, CCA crustose coralline algae

Dive Site: Gulf of Mexico, Pulley Ridge, West Ridge, Block 38; Waitt ROV-3

Date/Time	Latitude	Longitude	Depth (m)	Habitat and Dive Notes
	Seadesc Slope	Relief	Rugosity	
5/8/2016 3:54:10 PM	24.85764	-83.85099	78.2	
5/8/2016 3:55:18 PM	24.85752 R SL-0	-83.85083 LO	80.24 LRu	Continuing along eastern slope. Red grouper pit - can't reach it with ROV. Stichopathes, Antipathes, lionfish near pit
5/8/2016 3:58:48 PM	24.85720	-83.85051	63.31	Pulled off bottom. Decided to recover, end of dive

Dive Site: Gulf of Mexico, West Slope of Tortugas Ecological Reserve North; outside MPA; Waitt ROV-4

General Location and Dive Track:



Site Overview:

Project:	Waitt Pulley Ridge Cruise
Principal Investator:	John Reed
PI Contact Info:	5600 U.S. 1, North, Fort Pierce, FL 34946
Website:	www.nationalgeographic.com
Scientific Observers:	John Reed, Sandra Brooke
Data Management:	Access Database
ROV Navigation Data:	None
Ship Position System:	
Report Analyst:	John Reed
Date Compiled:	5/17/2016

Dive Overview:

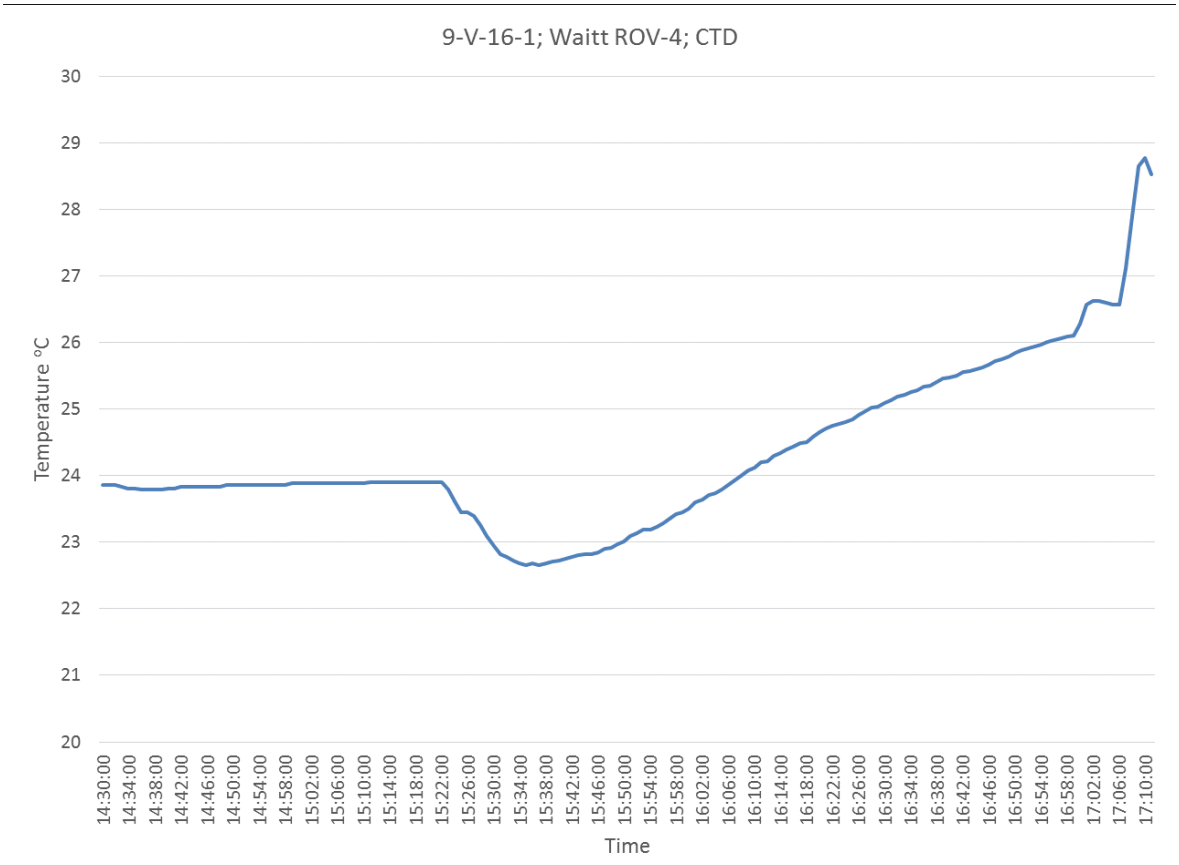
Vessel:	Plan b Waitt Yacht
Sonar Data:	NF-08-11-TER
Purpose:	National Geographic Photography and Coral Collections
ROV:	Waitt ROV Saab Falcon
ROV Sensors:	Temperature (°C)
Date of Dive:	5/9/2016
Specimens:	
Digital Photos:	
DVD:	0
Hard Drive:	1

Dive Site: Gulf of Mexico, West Slope of Tortugas Ecological Reserve North; outside MPA; Waitt ROV-4

Dive Data:

Minimum Bottom Depth (m):	22	**Total Transect Length (km):**					
Maximum Bottom Depth (m):	34	**Surface Current (kn):**	1				
On Bottom (Time- GMT):	14:29	**On Bottom (Lat/Long):**	24.63°N; -83.1°W				
Off Bottom (Time- GMT):	16:21	**Off Bottom (Lat/Long):**	24.63°N; -83.1°W				
Physical (bottom); Temp (°C):	23.80	**Salinity:**		**Visibility (ft):**	60	**Current (kn):**	0.5

Physical Environment:



Plot of temperature from a HOBO Temperature Logger attached to the ROV (Y axis = Temperature, X Axis = Time).

Dive Site: Gulf of Mexico, West Slope of Tortugas Ecological Reserve North; outside MPA; Waitt ROV-4

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:
Gulf of Mexico, mesophotic fringing reef west and outside of Tortugas Ecological Reserve North, near Block 46; Waitt ROV-4.
Objectives- Conduct photo/video transect to document habitat and biota with hi-definition (20+ MB) digital still images for National Geographic. The WHOI Sony digital still camera (20 mb) was attached to the Waitt ROV to take hi-def images. The target site was near Block 46 which is a random 1 km x 1 km block on the mesophotic fringing reef at the western edge of the Tortugas Bank which was surveyed by Reed et al. 2014. This site is outside the protected Tortugas Ecological Reserve North and is proposed by Reed and Farrington (2014) to be added to the Florida Keys National Marine Sanctuary. This fringing mesophotic reef extends nearly 4 nmi and is dominated by scleractian corals, gorgonian corals, sponges, algae and fish, including scamp grouper, black grouper and hogfish. This will provide new and additional data for the management and conservation of the area by the Florida Keys National Marine Sanctuary and Gulf of Mexico Fishery Management Council.

ROV Setup/Dive Events:
Waitt Saab SeaEye Falcon DR ROV; Pilot- Steve Firman; WHOI Sony digital still camera (20 mb);
Lew Lamar (WHOI); Brian Skerry (National Geographic photographer); Hobo temperature sensor; lasers- 8.4 cm;
Digital camera will be recording video, and take still pictures. Camera time/date was not set. Set at 1/250, F6.3, ISO 1250, manual mode. Camera set to Jan 14, 2014, time 13 minutes behind EDT. Computer synced to ROV Nav; WHOI digital camera being recorded- time of camera is 33 sec ahead of Nav time. Deploy ROV from ship anchored at base of reef, set 65 m west of reef, near south border of Block 46. No tracking. Strong current to south, about 1/2 knot on bottom. This prevented easy maneauvering by the ROV for digital still images. No ROV track data recorded.

Site Description/Habitat/Biota:
Landed on flat sand at 34 m depth, west of the reef; could not go too far being anchored and limited by the length of the cable and current; fauna on the sand included garden eels, trigger fish and loggerhead turtle.
33 m- at base of reef, low slope (5-10 dg) to top at 26 m. Flattens out on top but reef continues as far as field of view (20 m).
Slope 100% hard bottom, dominated by gorgonians- Pseudopterogoria, Eunicea; sponges- 3' Xestospongia muta, Agelas clathrodes, Niphates digitalis, Callyspongia vaginalis; corals- mostly 2-4' conical Montastraea cavernosa, eroded at base.

Macrobenthic Biota:
Coral- Montastraea cavernosa, Orbicella, Mycetophyllia
Gorgonacea- Pseudopterogorgia, Plexaurella, Plexaura, Eunicea, Erythropodium, Ellisella barbadensis, Gorgonia ventilina
Porifera- Xestospongia muta, Callyspongia vaginalis, C. plicifera, Niphates erecta, N. digitalis, Aplysina conifera

Fish:
Queen angelfish, french angelfish, black bar jack, bicolor damsel, black grouper, shark, spanish hogfish, hogfish, garden eels, grey triggerfish, doctorfish, squirrelfish, porkfish

Dive Site: Gulf of Mexico, West Slope of Tortugas Ecological Reserve North; outside MPA; Waitt ROV-4

Loggerhead (?) turtle

Dive Site: Gulf of Mexico, West Slope of Tortugas Ecological Reserve North; outside MPA; Waitt ROV-4

Dive Notes:

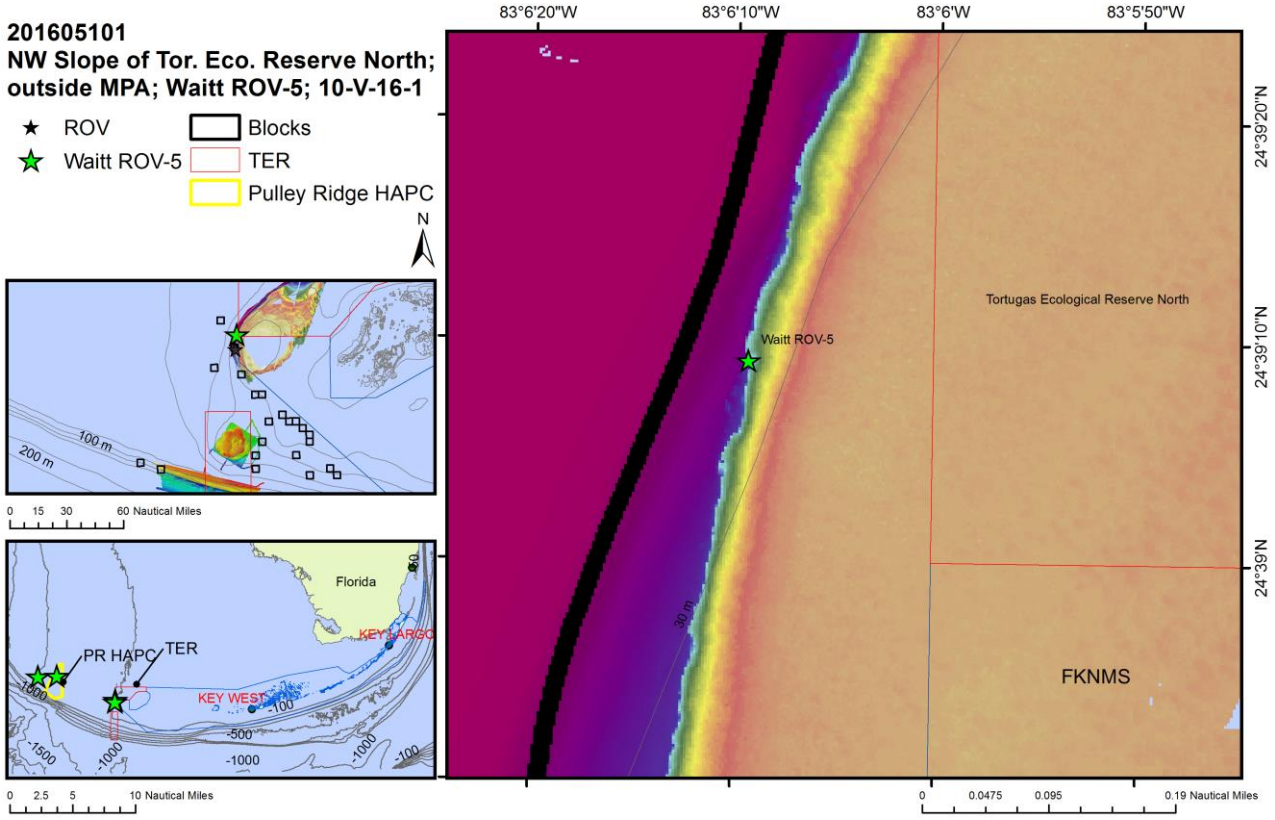
Date/Time	Latitude / Seadesc	Slope	Longitude / Relief	Depth (m) / Rugosity	Habitat and Dive Notes
					Launch. Gulf of Mexico, West Slope of Tortugas Ecological Reserve North; outside MPA; Waitt ROV-4. Conducted fathometer transect over reef dropoff prior to dive. Base of reef 33 m, top of reef flat 23 m. Ship anchored in sand ~65 m west of reef slope. ROV ops from anchor so have very limited access to reef slope.
5/9/2016 2:26:24 PM					Wind 15-20 kn from east, and current 1+ kn to south. Difficult for ROV to maneauver on bottom and to move against the current
5/9/2016 2:28:04 PM					On bottom. West of reef and target Waypoint. Flat sand with burrows and garden eels. Tiggerfish in water column
5/9/2016 2:33:40 PM	S	SL-0	LO	LRu	Sand with burrows, sparse algae, loggerhead turtle, garden eels
5/9/2016 2:37:25 PM	HC	SL-Lo	LO	HRu	Edge of reef in sight
5/9/2016 2:45:16 PM	24°37.9740'N, HC		83°06.2590'W		Reef at base of the wall, depth 32 m. Reef slope from 32 to 25 m on top. 5-10 dg slope, 90-100% hard bottom, low relief rock (1 m) outcrops, dominated by coral, sponges, gorgonians and algae. Dominant macrobiota and fish: Hogfish, tube sponge, Pseudopterogorgia, Eunicea, Xestospongia, Aplysina conifera, spanish hogfish, barjack, Plexaurella, Callyspongia vaginalis, Ellisella barbadensis, Montastraea cavernosa coral
5/9/2016 2:50:37 PM					Low relief coral reef at base of wall. Sponge, coral reef, 90% cover. Pseudopterogorgia, Montastraea cavernosa, Plexaurella, doctor fish, Pseudopterogorgia, squirrelfish, brain coral (Mycetophyllia sp.), Callospongia, Xestospongia muta
5/9/2016 3:01:38 PM					Low relief reef at base of wall - being pushed to south by current, can't get to wall. Boulder corals sparse, lots of rock outcrops. Lots of gorgonians and sponges. Pseudopterogorgia, Xestospongia, bar jacks, queen angel, Chaetodon sp.

Dive Site: Gulf of Mexico, West Slope of Tortugas Ecological Reserve North; outside MPA; Waitt ROV-4

Date/Time	Latitude	Longitude	Depth (m)	Habitat and Dive Notes
	Seadesc Slope	Relief	Rugosity	
5/9/2016 3:14:14 PM				Same reef as previous. Gorgonians. Pseudopterogorgia, Xestospongia muta, M. cavernosa, Pseudopterogorgia, black grouper, french angel
5/9/2016 3:21:20 PM				Same reef area. Taking photos for Nat Geo but difficult to maneauver ROV in current. M. cavernosa, Pseudopteragorgia, X. muta
5/9/2016 3:24:24 PM				Off bottom; back to surface to bait ROV with fish carcass
5/9/2016 3:34:13 PM				Back on bottom. On sand west of reef; soft sediment, bioturbation, some algae, garden eels
5/9/2016 3:41:25 PM				Coming up to reef, lots of gorgonians and sponges. 90% cover. Pseudopterogorgia, Xestospongia muta, M. cavernosa, Queen angel, porkfish, french angel, Gorgonia ventalina, Callospongia vaginalis, C. plicifera
5/9/2016 3:51:37 PM				Near top of reef. 90% cover, large sponges and coral heads, which are mostly dead. Fishing line
5/9/2016 3:58:27 PM				Still wandering around reef area. Looking for good photo ops. Bar jacks
5/9/2016 4:03:39 PM				Tether wrapped around piece of dead coral. Trying to untangle
5/9/2016 4:08:28 PM				Tether came free but will surface to add more floats
5/9/2016 4:21:30 PM				ROV recovered

Dive Site: Gulf of Mexico, NW Slope of Tortugas Ecological Reserve North; outside MPA; Waitt ROV-5

General Location and Dive Track:



Site Overview:

Project:	Waitt Pulley Ridge Cruise
Principal Investator:	John Reed
PI Contact Info:	5600 U.S. 1, North, Fort Pierce, FL 34946
Website:	www.nationalgeographic.com
Scientific Observers:	John Reed, Sandra Brooke
Data Management:	Access Database
ROV Navigation Data:	None
Ship Position System:	
Report Analyst:	John Reed
Date Compiled:	5/17/2016

Dive Overview:

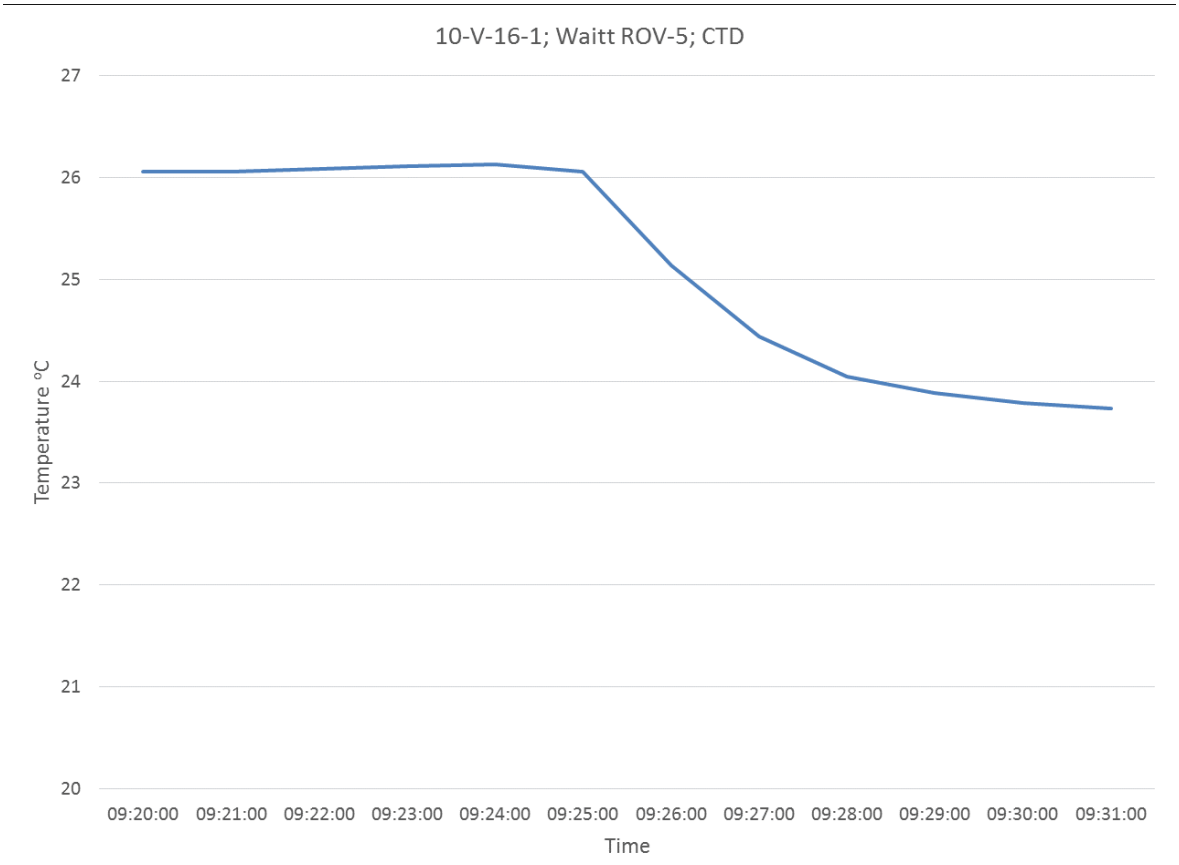
Vessel:	Plan b Waitt Yacht
Sonar Data:	NF-08-11-TER
Purpose:	National Geographic Photography and Coral Collections
ROV:	Waitt ROV Saab Falcon
ROV Sensors:	Temperature (°C)
Date of Dive:	5/10/2016
Specimens:	
Digital Photos:	
DVD:	0
Hard Drive:	1

Dive Site: Gulf of Mexico, NW Slope of Tortugas Ecological Reserve North; outside MPA; Waitt ROV-5

Dive Data:

Minimum Bottom Depth (m):	35	**Total Transect Length (km):**					
Maximum Bottom Depth (m):	45	**Surface Current (kn):**	1				
On Bottom (Time- GMT):	9:31	**On Bottom (Lat/Long):**	24.65°N; -83.1°W				
Off Bottom (Time- GMT):		**Off Bottom (Lat/Long):**	°N; °W				
Physical (bottom); Temp (°C):	23.73	**Salinity:**		**Visibility (ft):**	20	**Current (kn):**	1

Physical Environment:



Plot of temperature from a HOBO Temperature Logger attached to the ROV (Y axis = Temperature, X Axis = Time).

Dive Site: Gulf of Mexico, NW Slope of Tortugas Ecological Reserve North; outside MPA; Waitt ROV-5

Dive Notes:

Objectives, Site Description, Habitat, Fauna:

Site/Objectives:
Gulf of Mexico, mesophotic fringing reef northwest and outside of Tortugas Ecological Reserve (TER) North; Waitt ROV-5.
Objectives- Conduct photo/video transect to document habitat and biota with hi-definition (20+ MB) digital still images for National Geographic. The WHOI Sony digital still camera (20 mb) was attached to the Waitt ROV to take hi-def images. The target site is a new site that has never been surveyed before. It is at the northern end of the mesophotic fringing reef that is outside of the protected TER and is proposed by Reed and Farrington (2014) to be added to the Florida Keys National Marine Sanctuary. This fringing mesophotic reef extends nearly 4 nmi and is dominated by scleractian corals, gorgonian corals, sponges, algae and fish, including scamp grouper, black grouper and hogfish. This will provide new and additional data for the management and conservation of the area by the Florida Keys National Marine Sanctuary and Gulf of Mexico Fishery Management Council.

ROV Setup/Dive Events:
Waitt Saab SeaEye Falcon DR ROV; Pilot- Steve Firman; WHOI Sony digital still camera (20 mb);
Lew Lamar (WHOI); Brian Skerry (National Geographic photographer); Hobo temperature sensor; lasers- 8.4 cm;
Digital camera will be recording video, and take still pictures. Camera time/date was not set. Set at 1/250, F6.3, ISO 1250, manual mode. Camera set to Jan 14, 2014, time 13 minutes behind EDT. Computer synced to ROV Nav; WHOI digital camera being recorded- time of camera is 40 sec ahead of Nav time. Deploy ROV from ship anchored at base of reef, set 65 m west of reef, near NW border of North TER. No ROV track data recorded.
Bottom conditions very poor- 1 kn bottom current to S, parallel to wall, low visibility 10 m, greenish water, lots of particulates and sea snot. Unable to station keep or get close to bottom. Dive aborted early.

Site Description/Habitat/Biota:
Nice wall, base 45 m, top 22 m, facing west; steep slope 30-45 dg, large rock ourcrops, 1-2 m relief, undercut ledges 1-2 m, rugged, high rugosity.
Top of wall with lots of gorgonians; face of slope with sponges- Xestospongia muta, and coral, but ROV too far away to identify. Only spent a few minutes near the slope then aborted the dive due to current and poor visibility. Winds had be 20 kn from east several days, which pushed water and sediments off the shelf, reducing visibility.

Dive Site: Gulf of Mexico, NW Slope of Tortugas Ecological Reserve North; outside MPA; Waitt ROV-5

Dive Notes:

Date/Time	Latitude / Seadesc	Longitude / Slope	Depth (m) / Relief	Habitat and Dive Notes / Rugosity
				Gulf of Mexico, fringing reef northwest and outside of Tortugas Ecological Reserve (TER) North; Waitt ROV-5. Conducted fathometer transect across reef dropoff prior to dive. Reef very steep escarpment, from 45 m at base to 22 m at top reef flat. Ship anchored in sand ~65 m west of reef slope. ROV ops from anchor so have very limited access to reef slope.
5/10/2016 9:24:17 AM				
5/10/2016 9:24:18 AM				Launch
5/10/2016 9:24:26 AM				
5/10/2016 9:27:43 AM				Midwater- water green, turbid with lots of particulate organic material (sea snot)
5/10/2016 9:28:36 AM				On bottom; west of reef and target Waypoint. 1 kn current to S on bottom; very difficult to maneauver ROV. Flat sand bottom, lots of sea snot, green water
5/10/2016 9:33:58 AM	24°39.1510'N, HC	83°06.1520'W SL-M	MOD	HRu Arrived at reef. Visibility 10 m, green coastal water, lots of plankton and sea snot. Strong bottom current. Base of reef at 43 m; 45 dg slope of rugged, large rock outcrops, 1-2 m relief, undercut 1-2 m, high rugosity. Unable to maneauver ROV, cannot get close to reef to identify organisms or to get National Geographic photos. Can see top of reef with lots of gorgonians, and reef slope with corals, sponges and gorgonians. Could identify only- Pseudopterogorgia, Xestospongia muta, black grouper and porgy
5/10/2016 9:38:59 AM				Pulled off bottom, then back on bottom

Dive Site: Gulf of Mexico, NW Slope of Tortugas Ecological Reserve North; outside MPA; Waitt ROV-5

Date/Time	Latitude	Longitude	Depth (m)	Habitat and Dive Notes
	Seadesc Slope	Relief	Rugosity	
5/10/2016 9:43:18 AM				Dive aborted, recovering ROV. Currents too strong and vis too bad to be worth continuing dive. Dive has no tracking - too shallow. Last dive of cruise.