



## Ocean Exploration and Research

# Cruise Report: EX-19-07, 2019 Southeastern U.S. Deep-sea Exploration (Mapping & ROV)

Southeastern U.S. Continental Margin

Miami, Florida, to Key West, Florida  
(October 31-November 20, 2019)

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## Abstract

From October 31 to November 20, 2019 the NOAA Office of Ocean Exploration and Research (OER) conducted the 2019 Southeastern U.S. Deep-sea Exploration remotely operated vehicle (ROV) and mapping cruise (EX1907) from Miami, Florida, to Key West, Florida. Twelve ROV dives were completed, and over 12,700 square kilometers were mapped during this expedition. This report includes an expedition overview, participant lists, the methodology, clearance and permit information, the schedule, and results of dives, sampling, and mapping operations and education and outreach activities. All data will be archived and made publicly available.

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## 1. Introduction

The NOAA Office of Ocean Exploration and Research (OER) is the only U.S. federal program solely dedicated to exploring our deep ocean, closing the prominent gap in our basic understanding of U.S. deep waters and seafloor and delivering the ocean information needed to strengthen the economy, health, and security of our nation. Using the latest tools and technology, OER explores previously unknown areas of our deep ocean, making discoveries of scientific, economic, and cultural value. Through live video streams, online web coverage, on shore and ship training opportunities, and real-time outreach events, OER allows scientists, resource managers, students, members of the general public, and others to actively experience ocean exploration — expanding available expertise, cultivating the next generation of ocean explorers, and engaging the public in exploration activities. OER makes the collected data needed to understand our ocean publicly available, so we can maintain the health of our ocean, sustainably manage our marine resources, accelerate our national economy, and build a better appreciation of the value and importance of the ocean in our everyday lives.

NOAA Ship *Okeanos Explorer* is the only U.S. federal vessel dedicated to exploring our largely unknown ocean for the purpose of discovery and the advancement of knowledge. America’s future depends on understanding the ocean. The *Okeanos Explorer* exploration expeditions supports NOAA mission priorities and national objectives by providing a broad diversity of data and information about the deep ocean to anyone who needs it.

In close collaboration with government agencies, academic institutions, and other partners, OER conducts deep-sea exploration expeditions using advanced technologies on the *Okeanos Explorer*. From mapping and characterizing previously unseen seafloor to collecting and disseminating information about deep waters and seafloor — and the resources they hold — this work establishes a foundation of information and fills data gaps. Data collected on the ship adhere to federal open-access data standards and are publicly available shortly after a cruise ends. This ensures the delivery of reliable scientific data needed to identify, understand, and manage key elements of the ocean environment. As the only federal program dedicated to ocean exploration, OER is uniquely situated to lead partners in delivering critical deep-ocean information to managers, decision makers, scientists, and the public, leveraging federal investments to meet national priorities.

## 2. Expedition Overview

The 2019 Southeastern U.S. Deep-sea Exploration (EX1906 and EX1907) was part of a series of expeditions that will contribute to NOAA’s Atlantic Seafloor Partnership for Integrated Research and Exploration (ASPIRE) (<https://oceanexplorer.noaa.gov/explorations/aspire/welcome.html>), a major multiyear, multinational collaborative field campaign focused on

raising collective knowledge and understanding of the North Atlantic. This campaign provides timely, actionable information to support decision-making based on reliable and authoritative data. It also serves as an opportunity for the nation to highlight the uniqueness and importance of these deepwater environments. ASPIRE builds on the momentum of past U.S. campaigns and international initiatives to support ecosystem-based management of marine resources. This reports focuses on Remotely Operated Vehicle operations and summarizes mapping operations. There will be mapping data reports for EX1906 and EX1907 which summarize mapping operations in detail and can be accessed by requesting the reports from [ncei.info@noaa.gov](mailto:ncei.info@noaa.gov).

## **2.1 Southeast U.S. Continental Margin**

During the expedition, NOAA worked with the scientific and management community to gather exploration data to characterize unknown and poorly known areas of the Southeastern U.S. continental margin through telepresence-based exploration. In addition to ASPIRE, EX1907 also contributed to NOAA's ongoing collaboration with the Bureau of Ocean Energy Management (BOEM) and U.S. Geological Survey (USGS) as well as to NOAA's National Marine Fisheries Service (NMFS) Deep-sea Coral Research and Technology Program and NOAA's Southeast Deep-sea Coral Initiative.

## **2.2 Rationale for Exploration**

The deep water areas offshore Florida, Georgia, and South Carolina are some of the least explored areas along the U.S. East Coast. Though this region is home to millions of Americans, we know very little about the deepwater areas and the seafloor just off the coast. The Southeastern U.S. continental margin has some of the largest gaps in high-resolution ocean mapping data on the East Coast, and deepwater ROV-captured images in this region are limited. These data gaps include much of the Stetson-Miami Terrace Deepwater Coral Habitat Area of Particular Concern.

## **3. Objectives**

The expedition addressed scientific themes and priority areas put forward by NOAA scientists and resource managers, the South Atlantic Fishery Management Council, BOEM, USGS, and the broad ocean science community. Objectives and additional rationale for exploration can be found in the EX1907 Project Instructions which can be requested from [ncei.info@noaa.gov](mailto:ncei.info@noaa.gov). The primary purpose of the expedition was to survey deepwater areas offshore Florida, Georgia, and South Carolina to provide baseline information to support management and science needs. Specifically, this expedition sought to:

- Acquire data on deepwater habitats of the Southeastern U.S. continental margin to support priority science and management needs.
- Identify, map, and explore the diversity and distribution of benthic habitats, including fish habitats and deep-sea coral and sponge communities.
- Explore U.S. maritime heritage by identifying and investigating sonar anomalies.
- Investigate biogeographic patterns of deep-sea ecosystems and connectivity across the Southeastern U.S. continental margin for use in broader comparisons of deepwater habitats throughout the Atlantic Basin.
- Map, survey, and sample geological features of the Southeastern U.S. continental margin to better understand the geological context of the region and improve knowledge of past and potential future geohazards.
- Collect high-resolution bathymetry in areas with no or low-quality sonar data.
- Acquire a foundation of remotely operated vehicle (ROV), sonar, and oceanographic data to better understand the characteristics of the water column and the fauna that live there.
- Engage a broad spectrum of the scientific community and public in telepresence-based exploration and provide publicly accessible data and information products to spur further exploration, research, and management activities.

## 4. List of Participants

EX1907 included mission personnel who participated on board the *Okeanos Explorer* as well as shore-side science personnel who participated remotely via telepresence technology. See Tables 1 and 2 for lists of onboard and onshore personnel who supported EX1907.

**Table 1.** EX1907 onboard mission team personnel

Name	Role	Affiliation
Michael White	Expedition coordinator	Office of Ocean Exploration and Research/Cherokee Nation Strategic Programs
Stephanie Farrington	Science lead	Harbor Branch Institute at Florida Atlantic University/University Corporation for Atmospheric Research
Kimberly Galvez	Science lead	University of Miami/Rosentiel School of Marine and Atmospheric Science/University Corporation for Atmospheric Research
Shannon Hoy	Mapping lead	Office of Ocean Exploration and Research/Cherokee Nation Strategic Programs
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Mark Durbin	Engineering team	Global Foundation for Ocean Exploration

Name	Role	Affiliation
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Tara Smithee	Engineering team	Global Foundation for Ocean Exploration
Annie White	Engineering team	Global Foundation for Ocean Exploration
Art Howard	Engineering team	Global Foundation for Ocean Exploration
Caitlin Bailey	Engineering team	Global Foundation for Ocean Exploration
Marcel Peliks	Explorer-in-training/watch stander	University Corporation for Atmospheric Research

**Table 2. EX1907 shore-based science team members**

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## 5. Methodology

To accomplish its objectives, the expedition used:

- A dual-bodied ROV system (ROVs *Deep Discoverer* and *Seirios*) to conduct daytime seafloor surveys as well as to collect a limited number of samples to help further characterize the deepwater fauna and geology of the region.
- Mapping systems (Kongsberg EM 302 multibeam sonar, Knudsen 3260 sub-bottom profiler, Simrad EK60 and EK80 split-beam sonars, and Teledyne acoustic Doppler current profilers) to conduct mapping operations at night and when the ROVs were on deck.
- A high-bandwidth satellite connection for real-time, ship-to-shore communications.

### 5.1 ROV Seafloor Surveys

ROV dive operations supported the expedition objectives, including characterizing bottom fish and precious coral habitats, deep-sea coral habitats, seamounts, and fracture zones. During each dive, the ROVs descended to the seafloor and then moved from waypoint to waypoint, documenting the geology and biology of the area. Onboard and shore-based scientists identified encountered organisms to the lowest taxon possible based on data available during real-time assessment. Tools scientists used for this purpose included the online pilot version of OER's Benthic Deepwater Animal Identification Guide ([http://oceanexplorer.noaa.gov/oceanos/animal\\_guide/animal\\_guide.html](http://oceanexplorer.noaa.gov/oceanos/animal_guide/animal_guide.html)) as well as other image databases and their own expertise. Additionally, the scientists provided geological interpretations of the observed substrate throughout each ROV seafloor survey. These biological and geological observations were recorded using [Ocean Networks Canada SeaTube V2](https://data.oceannetworks.ca/SeaTubeV2): <https://data.oceannetworks.ca/SeaTubeV2>

### 5.2 Sampling Operations

A limited number of geological and biological samples were collected on the seafloor using ROV *Deep Discoverer's* manipulator arms and biological and geological collection boxes. ROV *Deep Discoverer's* five chamber suction sampler was used for both seafloor and midwater sample collections. The primary goal of sampling operations was to collect voucher samples to be made publicly available to the science community so they could be used to characterize the site.

For each collected sample, the date, time, latitude, longitude, depth, salinity, temperature, and dissolved oxygen content were recorded at the time of collection. Geological samples were acquired for age dating and geochemical composition. Biological sample collections targeted samples that represented potential new species, range extensions of animals not previously known to occur in the region, dominant species at the site, and/or rare morphotypes. Samples targeted to contribute to trans-Atlantic connectivity studies were also collected.

After vehicle recovery, samples were examined for commensal organisms, labeled, photographed, and entered into a database containing all relevant metadata. Any commensal organisms found were separated from the primary sample and processed separately as an “associate” sample.

Geological samples were air dried and placed in rock bags or small containers depending on the size of the specimen. At the conclusion of the *Okeanos Explorer* 2019 cruises, these samples were shipped to the Marine and Geology Repository at Oregon State University, where they will be photographed and entered into the university’s online database (<http://osu-mgr.org>). Thin and polished sections will be made for each hard-rock sample and included in the database.

Biological samples were subsampled for inclusion in the Smithsonian’s National Museum of Natural History Biorepository (<https://naturalhistory.si.edu/research/biorepository>) for future barcoding and DNA extraction. For this purpose, a small subsample, consisting of not more than 1 square centimeter of tissue, was removed from the original sample and placed in 95% analytical grade ethanol.

All voucher samples and subsamples from EX1907 were shipped to the Smithsonian’s National Museum of Natural History for long-term archival and public access (<https://collections.nmnh.si.edu/search/iz/>). For most collected biological samples, the remainder of the sample was preserved in 95% ethanol. For select taxa, vouchers or subsamples were preserved in 10%, 5%, or 4% buffered formalin per recommendations from taxa experts and guidance provided by the Smithsonian’s National Museum of Natural History. Full details of the preservation of each biological sample can be seen in its associated metadata record.

### **5.3 Seafloor Mapping**

Mapping operations included Kongsberg EM 302 multibeam, Simrad EK60 and EK80 split-beam, Knudsen sub-bottom profile, and acoustic Doppler current profiler (ADCP) data collection. The schedule of mapping operations included overnight transits and whenever the ROVs were on deck. Lines were planned to maximize either edge matching of existing data or data gap filling in areas where bathymetry coverage did not exist. In regions with no existing data, exploration transit lines were planned to optimize potential discoveries. Targeted mapping operations were

conducted on the Blake Plateau, including the Stetson Mesa and Million Mounds region; in the Florida Straits/Florida Gap; and south of Key West, Florida.

### **5.3.1 Multibeam Sonar (Kongsberg EM 302)**

Multibeam seafloor mapping data were collected using the Kongsberg EM 302 sonar, which operates at a frequency of 30 kilohertz (kHz). Multibeam mapping operations were conducted during all overnight transits between ROV dive sites. Whenever possible, transits were designed to maximize coverage over seafloor areas with no previous high-resolution mapping data. Overnight surveys were also completed in areas that were previously mapped with a lower-resolution multibeam sonar system. Additionally, multibeam mapping operations were conducted directly over planned ROV dive sites to collect seafloor mapping data to help refine dive plans. Multibeam mapping operations collected data on seafloor depth (i.e., bathymetry), seafloor acoustic reflectivity (i.e., seafloor backscatter), and water column reflectivity (i.e., water column backscatter).

### **5.3.2 Sub-bottom Profiler (Knudsen Chirp 3260)**

The primary purpose of the Knudsen Chirp 3260 (3.5 kHz) sonar is to image sediment layers underneath the seafloor to a maximum depth of about 80 meters (m) below the seafloor, depending on the specific sound velocity of the substrate. The sub-bottom profiler was operated simultaneously with the multibeam sonar during mapping operations to provide supplemental information about the sedimentary features underlying the seafloor.

### **5.3.3 Split-beam Sonars (Simrad EK60 and EK80)**

The *Okeanos Explorer* is equipped with five Simrad EK60 split-beam sonar transducers operated at frequencies of 18, 38, 70, 120, and 200 kHz. It is also equipped with one EK80 wide band transceiver operated at a frequency of 70 kHz. With the exception of the 38 kHz, which interferes with the multibeam during mapping operations, these sonars were used continuously throughout EX1907 during both overnight mapping operations and daytime ROV operations. No 38 kHz data were recorded at any time during EX1907. The sonars provided calibrated target strength measurements of water column features such as dense biological layers and schools of fish. These sonars can also help detect the presence of gaseous seeps emanating from the seafloor.

### **5.3.4 Acoustic Doppler Current Profiler (Teledyne Workhorse Mariner and Ocean Surveyor ADCPs)**

The *Okeanos Explorer* is equipped with two ADCPs: a Teledyne Workhorse Mariner (300 kHz) and a Teledyne Ocean Surveyor (38 kHz). The 300 kHz ADCP had a reliable range of approximately 60 m throughout EX1907 and provided information on the speed and direction of currents underneath the ship. It was used throughout ROV dives to support safe deployment and recovery of the vehicles.

## 6. Clearances and Permits

Pursuant to the National Environmental Policy Act (NEPA), OER is required to include in its planning and decision-making processes appropriate and careful consideration of the potential environmental consequences of actions it proposes to fund, authorize, and/or conduct. The companion manual for NOAA Administrative Order 216-6A describes the agency's specific procedures for NEPA compliance. An environmental review memorandum was completed for this survey in accordance with Section 4 of the manual in the form of a categorical exclusion evaluation worksheet (see Appendix C). Based on this review, a categorical exclusion was determined to be the appropriate level of NEPA analysis for EX1907 as no extraordinary circumstances existed that required the preparation of an environmental assessment or environmental impact statement.

As required under Section 7 of the Endangered Species Act (ESA), OER conducted an informal consultation with NMFS to request their concurrence with OER's biological evaluation determining that *Okeanos Explorer* operations conducted as part of ASPIRE may affect, but are not likely to adversely affect, ESA-listed marine species. In a letter dated August 8, 2018, the chief of the ESA Interagency Cooperation Division in the NMFS Office of Protected Resources wrote that NMFS concurred with OER's determination that proposed ASPIRE expeditions are not likely to adversely affect ESA-listed marine species (See Appendix D).

In addition, OER consulted with the NMFS Habitat Conservation Division on potential impacts of ASPIRE operations to essential fish habitat (EFH). They concurred that OER operations would not adversely affect EFH provided proposed procedures and their guidance in the letter were adhered to (see Appendix E).

OER also received a letter of acknowledgement from the NMFS Southeast Regional Office for operations in Southeastern U.S. deepwater MPAs and HAPCs (see Appendix F).

## 7. EX1907 Schedule

EX1907 was planned for a total of 22 days at sea, from October 31, 2019, to November 21, 2019, departing from Miami, Florida, and returning to, Key West, Florida. Due to winter repair period requirements, and concerns with a safe passage into Key West, the ship actually arrived in Key West on November 20. See Table 3 for a day-by-day breakdown of EX1907. There were 20 scheduled dives, with 12 dives achieved (see Table 4 for details).

**Table 3. EX1907 schedule**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
10/27	10/28	10/29	10/30 Mobilization at U.S. Coast Guard Station Miami  Outreach: NOAA Atlantic Oceanographic and Meteorological Laboratory ship tours	10/31 EX Departure  Transit mapping and overnight mapping operations	11/01 Dive 01: Southern Blake Plateau  Overnight mapping operations	11/02 Dive 02: Stetson East  Overnight mapping operations
11/03 Dive 03: Stetson Mesa West  Overnight mapping operations	11/04 Dive 04: Stetson Mound Field 01  Overnight mapping operations	11/05 Dive 05: Stetson Mound Field 02  Overnight mapping operations	11/06 Dive 06: Isolated Mound, Central Blake Plateau  Overnight mapping operations	11/07 Dive 07: Habitat Response 01  Overnight mapping operations	11/08 Dive cancelled, weather  24-hour mapping operations	11/09 Dive cancelled, weather  24-hour mapping operations
11/10 Dive cancelled, surface and bottom currents  Medical emergency, ship headed to Charleston, SC  Transit mapping	11/11 Ship in port in Charleston, SC	11/12 Depart Charleston, SC  Overnight mapping operations	11/13 Dive Cancelled, Weather  Overnight mapping operations	11/14 Transit mapping south through the Florida Straits  Overnight mapping operations  Outreach: Live interactions with Harbor Branch Oceanographic Institute and former NOAA teacher-at-sea Meredith Salmon's class at Peddie School	11/15 Dive 08: Miami Terrace  Overnight mapping operations	11/16 Dive 09: Key Largo Deep  Overnight mapping operations

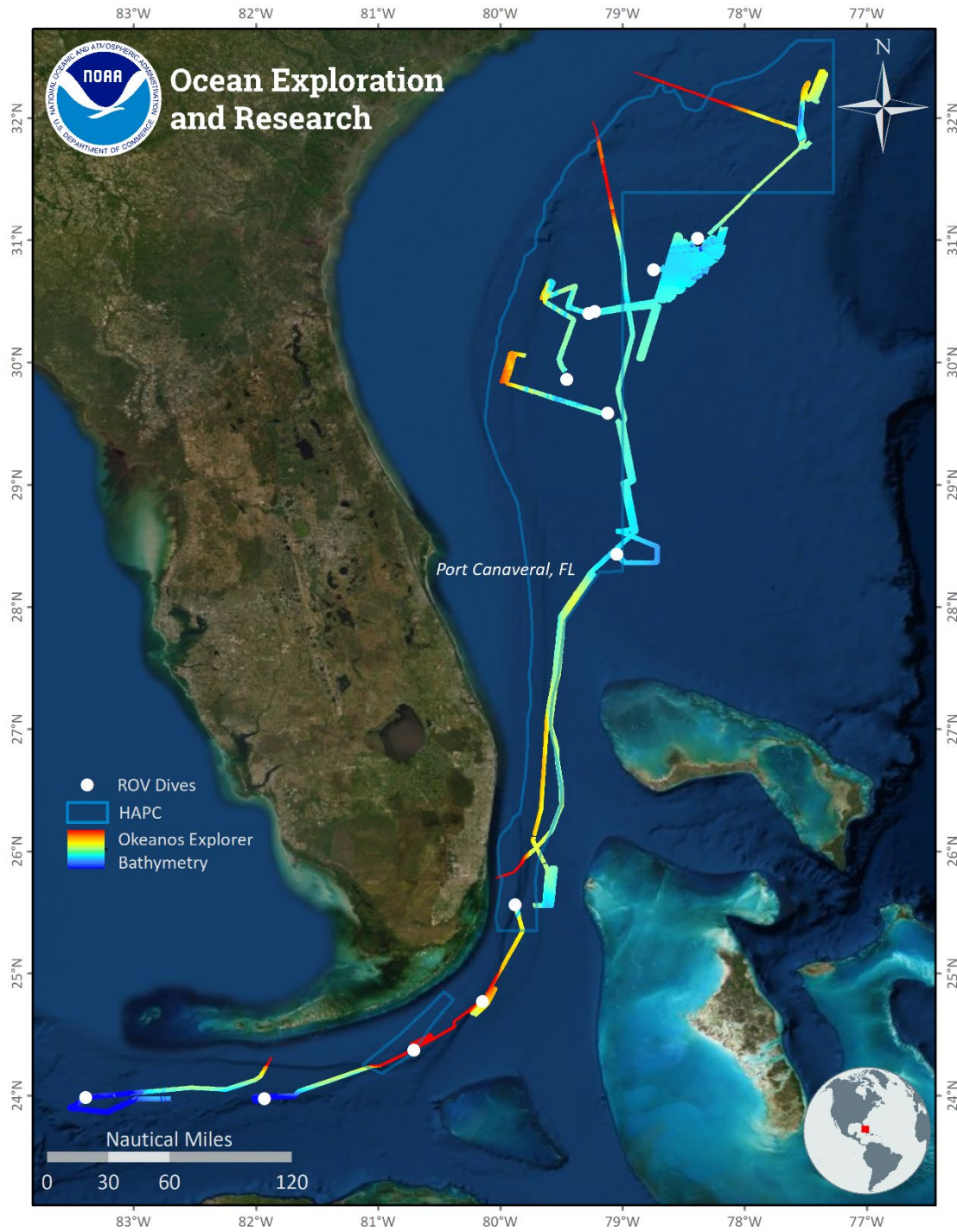


Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
11/17 Dive 10: Pourtalès Terrace  Overnight mapping operations	11/18 Dive 11: Key West Deep  Outreach: Live interactions with students at Harbor Branch Oceanographic Institute and University of Rhode Island/ Inner Space Center  Overnight mapping operations	11/19 Dive 12: “Berg Bits”  Outreach: Live interaction with Dr. Neil Jacobs at University of Rhode Island/ Inner Space Center  Overnight mapping operations	11/20 Arrival, Key West	11/21	11/22	11/23

## 8. EX1907 Map

EX1907 began on October 31, 2019, in Miami, Florida, and ended on November 20, 2019, in Key West, Florida. Operations included ROV dives (see Table 4) during the day and overnight mapping operations targeting unmapped or poorly mapped areas. When weather or seas did not permit ROV daytime operations, daytime mapping operations were conducted. Figure 1 shows the cruise map and extents of survey operations.





**Figure 1.** Map showing the 12 ROV dive sites (white dots) and bathymetry data collected during EX1907 (rainbow colored).



## 9. Results

Depths explored during ROV surveys were between 347 and 1,218 m. During the 12 dives, the ROVs spent a total of 84:33:42 hours on the bottom. Table 4 provides additional details of these dives.

**Table 4.** Summary information for the 12 ROV dives conducted during EX1907

Dive #	Date (YYYYMMDD)	Site	On Bottom Location	Off Bottom Location	Max Depth (m)	Bottom Time	Dive Duration
1	20191101	Southern Blake Plateau	28°, 25.926' N; 79°, 2.84' W	28°, 25.731' N; 79°, 2.677'	870	6:50:33	8:49:52
2	20191102	Stetson East	29°, 35.135' N ; 79°, 7.224' W	29°, 34.995' N ; 79°, 7.382' W	826	09:05:30	10:15:56
3	20191103	Stetson Mesa West	29°, 51.805' N; 79°, 27.314' W	29°, 51.59' N; 79°, 27.344' W	809	3:51:34	5:54:4
4	20191104	Stetson Mound Field 01	30°, 24.158' N; 79°, 16.558' W	30°, 23.835' N; 79°, 16.589' W	836	6:56:52	8:09:48
5	20191105	Stetson Mound Field 02	30°, 25.194' N; 79°, 13.564' W	30°, 25.048' N; 79°, 13.53'	819	7:06:58	8:02:37
6	20191106	Isolated Mound, Central Blake Plateau	30°, 45.548' N; 78°, 44.778' W	30°, 46.217' N; 78°, 44.668' W	842	8:57:21	10:16:57
7	20191107	Habitat Response 01	31°, 1.007' N; 78°, 23.203' W	31°, 1.515' N; 78°, 23.155' W	807	6:41:22	8:06:25
8	20191115	Miami Terrace	25°, 33.771' N; 79°, 52.731' W	25°, 33.884' N; 79°, 53.256' W	564	7:27:06	8:35:31
9	20191116	Key Largo Deep	24°, 46.129' N; 80°, 8.682' W	24°, 46.374' N; 80°, 8.99' W	542	6:26:59	7:43:16
10	20191117	Pourtales Terrace	24°, 22.354' N; 80°, 42.45' W	24°, 22.107' N; 80°, 42.42' W	404	8:08:48	9:55:29
11	20191118	Key West Deep	23°, 58.558' N; 81°, 55.932' W	23°, 58.76' N; 81°, 56.363' W	1,218	6:08:43	7:58:46
12	20191119	"Berg Bits"	23°, 59.049' N; 83°, 23.171' W	23°, 59.04' N; 83°, 23.557' W	973	6:51:56	8:14:33

### 9.1 Sample Collections

A total of 46 primary samples were collected during EX1907: 6 geological samples and 40 biological samples. Four geological associate samples and 29 biological associate samples were also collected.

The geological samples included nodules, likely ferromanganese encrusted, and unconsolidated sediment and coral rubble. See Table 5 for details about the geological samples.

**Table 5. Inventory of geological samples collected during EX1907**

Sample #	Sample ID	Site	Date (YYYYMMDD)	UTC Time (HHMMSS)	Latitude	Longitude	Depth (m)	Salinity (parts per thousand)	Temp (C)	Oxygen (milligrams per liter)
EX1907_D06_03G	Sediment	Isolated Mound, Central Blake Plateau	20191106	201050	30.76889992	-78.74590302	813	35.14	8.54	4.98
EX1907_D06_04B_A02	Sediment and coral rubble	Isolated Mound, Central Blake Plateau	20191106	203231	30.7689991	-78.74590302	805	35.15	8.58	4.97
EX1907_D07_02G	Ferromanganese nodule	Habitat Response 01	20191107	180834	31.02129936	-78.38480377	804	35.16	8.93	4.78
EX1907_D07_03G	Sediment	Habitat Response 01	20191107	180943	31.02129936	-78.38480377	804	35.16	8.93	4.79
EX1907_D07_04G	Ferromanganese nodule	Habitat Response 01	20191107	205633	31.02519989	-78.38559723	800	35.16	8.94	4.78
EX1907_D08_04G	Rock	Miami Terrace	20191115	165003	25.56340027	-79.88130188	550	34.90	7.25	4.28
EX1907_D09_01B_A01	Sediment	Key Largo Deep	20191116	161320	24.76959991	-80.14600372	627	34.88	6.28	4.78
EX1907_D10_02B_A01	Sediment	Pourtales Terrace	20191117	192942	24.3696003	-80.70819855	360	34.75	9.51	3.90
EX1907_D11_02G	Rock	Key West Deep	20191118	153518	23.97610092	-81.93289948	1,203	34.95	4.30	6.99
EX1907_D11_04B_A01	Limestone rock	Key West Deep	20191118	203652	23.97949982	-81.93990326	1,138	34.95	4.33	6.68

There were 40 primary biological samples collected as well as 29 samples that were collected as associate samples. These 69 individual samples included whole specimens and voucher samples for DNA analysis. Sixteen were collected for ASPIRE connectivity studies, 7 were characteristic of the associated ROV dive site, 50 were undescribed or potential new species (primary samples and associates), and 7 were rare fauna collected at the request of science team members. Regardless of intent in sampling, all will be publically avoidable from their respective repositories listed in section 9.1.1. See Table 6 for details about the biological samples.

**Table 6. Inventory of biological samples collected during EX1907**

Sample ID*	Field Identification	Final Preservative	Site	Date (YYYYMMDD)	UTC Time (HHMMSS)	Latitude	Longitude	Depth (m)	Salinity (parts per thousand)	Temp (C)	Oxygen (milligrams per liter)
EX1907_D01_01B	Aphrocallistes beatrix	95% ethyl alcohol	Southern Blake Plateau	20191101	175534	28.430201	-79.0439	828.99	35.064	6.576	6.470
EX1907_D01_01B_A01	n/a	95% ethyl alcohol	Southern Blake Plateau	20191101	175534	28.430201	-79.0439	828.99	35.064	6.576	6.470
EX1907_D01_01B_A02	Polychaeta	95% ethyl alcohol	Southern Blake Plateau	20191101	175534	28.430201	-79.0439	828.99	35.064	6.576	6.470
EX1907_D01_02B	Porifera	95% ethyl alcohol	Southern Blake Plateau	20191101	181407	28.43	-79.044197	831.95	35.062	6.576	6.482
EX1907_D01_02B_A01	Primnoidae	95% ethyl alcohol	Southern Blake Plateau	20191101	181407	28.43	-79.044197	831.95	35.062	6.576	6.482
EX1907_D01_02B_A02	Ophiolithrix sp.	95% ethyl alcohol	Southern Blake Plateau	20191101	181407	28.43	-79.044197	831.95	35.062	6.576	6.482
EX1907_D01_02B_A03	Nidalia sp.	95% ethyl alcohol	Southern Blake Plateau	20191101	181407	28.43	-79.044197	831.95	35.062	6.576	6.482
EX1907_D01_02B_A04	Bacterial	95% ethyl alcohol	Southern Blake Plateau	20191101	181407	28.43	-79.044197	831.95	35.062	6.576	6.482
EX1907_D01_03B	Lophelia	95% ethyl alcohol	Southern Blake Plateau	20191101	185802	28.429701	-79.044601	837.91	35.063	6.556	6.475

Sample ID*	Field Identification	Final Preservative	Site	Date (YYYYMMDD)	UTC Time (HHMMSS)	Latitude	Longitude	Depth (m)	Salinity (parts per thousand)	Temp (C)	Oxygen (milligrams per liter)
EX1907_D01_03B_A01	Hydrozoa	95% ethyl alcohol	Southern Blake Plateau	20191101	185802	28.429701	-79.044601	837.91	35.063	6.556	6.475
EX1907_D01_03B_A02	Ophiuroidea	95% ethyl alcohol	Southern Blake Plateau	20191101	185802	28.429701	-79.044601	837.91	35.063	6.556	6.475
EX1907_D01_03B_A03	Annelida	95% ethyl alcohol	Southern Blake Plateau	20191101	185802	28.429701	-79.044601	837.91	35.063	6.556	6.475
EX1907_D01_04B	Porifera	95% ethyl alcohol	Southern Blake Plateau	20191101	195352	28.429199	-79.044296	836.16	35.059	6.663	6.307
EX1907_D01_05B	Lophelia	95% ethyl alcohol	Southern Blake Plateau	20191101	195806	28.429199	-79.044296	836.10	35.059	6.701	6.277
EX1907_D01_05B_A01	Gorgonacea	95% ethyl alcohol	Southern Blake Plateau	20191101	195806	28.429199	-79.044296	836.10	35.059	6.701	6.277
EX1907_D01_05B_A02	Nidalia sp.	95% ethyl alcohol	Southern Blake Plateau	20191101	195806	28.429199	-79.044296	836.10	35.059	6.701	6.277
EX1907_D01_05B_A03	Ophiotrix sp.	95% ethyl alcohol	Southern Blake Plateau	20191101	195806	28.429199	-79.044296	836.10	35.059	6.701	6.277
EX1907_D01_05B_A04	Hexactinellida	95% ethyl alcohol	Southern Blake Plateau	20191101	195806	28.429199	-79.044296	836.10	35.059	6.701	6.277
EX1907_D02_01B	Oceanapia	95% ethyl alcohol	Stetson Mesa East	20191102	143249	29.585899	-79.121597	798.31	35.039	8.227	4.675
EX1907_D02_02B	Leiopathes	95% ethyl alcohol	Stetson Mesa East	20191102	145540	29.586	-79.121696	790.42	35.039	8.225	4.525
EX1907_D02_03B	Bathypathes alternata	95% ethyl alcohol	Stetson Mesa East	20191102	154558	29.586	-79.122299	769.72	35.039	8.223	4.660
EX1907_D02_04B	Plexauridae	95% ethyl alcohol	Stetson Mesa East	20191102	165534	29.586399	-79.122902	748.99	35.051	8.317	4.430
EX1907_D02_05B	Vazella poutalesii	95% ethyl alcohol	Stetson Mesa East	20191102	181801	29.586599	-79.122902	752.83	35.079	8.503	4.447
EX1907_D02_06B	Endoxocrinus sp.	70% ethyl alcohol	Stetson Mesa East	20191102	183730	29.5865	-79.122902	751.08	35.075	8.489	4.427
EX1907_D02_06B_A01	Hydrozoa	5% Formalin	Stetson Mesa East	20191102	183730	29.5865	-79.122902	751.08	35.075	8.489	4.427
EX1907_D02_06B_A02	Coral rubble	95% ethyl alcohol	Stetson Mesa East	20191102	183730	29.5865	-79.122902	751.08	35.075	8.489	4.427
EX1907_D02_07B	Unknown biological/geological specimen	95% ethyl alcohol	Stetson Mesa East	20191102	200740	29.584999	-79.1231	752.67	35.066	8.391	4.329
EX1907_D02_08B	Hexactinellida	95% ethyl alcohol	Stetson Mesa East	20191102	213841	29.583401	-79.1231	753.66	35.061	8.397	4.384
EX1907_D02_08B_A01	Coral rubble	95% ethyl alcohol	Stetson Mesa East	20191102	213841	29.583401	-79.1231	753.66	35.061	8.397	4.384
EX1907_D03_01B	Porifera	95% ethyl alcohol	Stetson Mesa West	20191103	184459	29.8615	-79.455101	789.79	35.123	8.580	5.011
EX1907_D03_01B_A01	Coral rubble	95% ethyl alcohol	Stetson Mesa West	20191103	184459	29.8615	-79.455101	789.79	35.123	8.580	5.011
EX1907_D04_01B	Raspelia	95% ethyl alcohol	Stetson Mesa Mound Field 01	20191104	164558	30.399799	-79.275497	821.10	35.116	8.402	4.913
EX1907_D04_01B_A01	Ophiuroidea	95% ethyl alcohol	Stetson Mesa Mound Field 01	20191104	164558	30.399799	-79.275497	821.10	35.116	8.402	4.913
EX1907_D04_02B	Echinodermata	95% ethyl alcohol	Stetson Mesa Mound Field 01	20191104	180323	30.399	-79.275703	824.85	35.126	8.371	5.222
EX1907_D04_03B	Cnidaria	80% ethyl alcohol	Stetson Mesa Mound Field 01	20191104	185207	30.3986	-79.276398	826.35	35.112	8.340	4.973
EX1907_D04_03B_A01	Ophiuroidea	95% ethyl alcohol	Stetson Mesa Mound Field 01	20191104	185207	30.3986	-79.276398	826.35	35.112	8.340	4.973
EX1907_D04_03B_A02	Nephtidae	95% ethyl alcohol	Stetson Mesa Mound Field 01	20191104	185207	30.3986	-79.276398	826.35	35.112	8.340	4.973
EX1907_D04_04B	Porifera	95% ethyl alcohol	Stetson Mesa Mound Field 01	20191104	192347	30.398399	-79.276604	824.16	35.133	8.472	4.924
EX1907_D04_05B	Octocorallia	95% ethyl alcohol	Stetson Mesa Mound Field 01	20191104	194626	30.398399	-79.277	817.82	35.137	8.546	4.887



Sample ID*	Field Identification	Final Preservative	Site	Date (YYYYMMDD)	UTC Time (HHMMSS)	Latitude	Longitude	Depth (m)	Salinity (parts per thousand)	Temp (C)	Oxygen (milligrams per liter)
EX1907_D04_06B	Enallopsammia profunda	95% ethyl alcohol	Stetson Mesa Mound Field 01	20191104	200831	30.398399	-79.277199	817.17	35.123	8.483	5.105
EX1907_D04_06B_A01	Coral rubble	None	Stetson Mesa Mound Field 01	20191104	200831	30.398399	-79.277199	817.17	35.123	8.483	5.105
EX1907_D05_01B	Hexactinellida	80% ethyl alcohol	Stetson Mesa Mound Field 02	20191105	202055	30.4179	-79.225601	813.92	35.096	8.569	4.520
EX1907_D06_01B	Aphrocallistes beatrix	80% ethyl alcohol	Isolated Mound, Central Blake Plateau	20191106	193126	30.7687	-78.746002	819.10	35.145	8.534	4.986
EX1907_D06_02B	Bryozoa	80% analytical ethyl alcohol	Isolated Mound, Central Blake Plateau	20191106	200901	30.7689	-78.745903	813.27	35.145	8.534	4.984
EX1907_D06_04B	Lophelia	80% analytical ethyl alcohol	Isolated Mound, Central Blake Plateau	20191106	203231	30.768999	-78.745903	805.41	35.148	8.580	4.968
EX1907_D06_04B_A01	Barnacle	80% analytical ethyl alcohol	Isolated Mound, Central Blake Plateau	20191106	203231	30.768999	-78.745903	805.41	35.148	8.580	4.968
EX1907_D07_01B	Haplosclerida	80% analytical ethyl alcohol	Habitat Response 01	20191107	155144	31.0186	-78.385902	805.23	35.160	8.921	4.801
EX1907_D07_02G_A01	Cup coral	95% ethyl alcohol	Habitat Response 01	20191107	180834	31.021299	-78.384804	804.92	35.162	8.927	4.785
EX1907_D07_02G_A02	Stylasteridae	95% ethyl alcohol	Habitat Response 01	20191107	180834	31.021299	-78.384804	804.92	35.162	8.927	4.785
EX1907_D08_01B	Euplectella	80% analytical ethyl alcohol	Miami Terrace	20191115	143228	25.563	-79.879303	563.16	34.891	6.942	4.430
EX1907_D08_01B_A01	Farrea sp.	80% analytical ethyl alcohol	Miami Terrace	20191115	143228	25.563	-79.879303	563.16	34.891	6.942	4.430
EX1907_D08_02B	Stylocordylidae	80% analytical ethyl alcohol	Miami Terrace	20191115	155914	25.563299	-79.8806	554.95	34.899	7.136	4.318
EX1907_D08_03B	Cladorhizidae	80% analytical ethyl alcohol	Miami Terrace	20191115	163102	25.5634	-79.880898	553.67	34.907	7.255	4.285
EX1907_D08_03B_A01	Bryozoa	80% analytical ethyl alcohol	Miami Terrace	20191115	163102	25.5634	-79.880898	553.67	34.907	7.255	4.285
EX1907_D08_05B	Cladorhizidae	80% analytical ethyl alcohol	Miami Terrace	20191115	183927	25.5637	-79.8834	535.02	34.908	7.257	4.280
EX1907_D09_01B	Chondrocladia	80% analytical ethyl alcohol	Key Largo Deep	20191116	161320	24.7696	-80.146004	627.19	34.878	6.275	4.785
EX1907_D09_01B_A02	Ophiuroidea	80% analytical ethyl alcohol	Key Largo Deep	20191116	161320	24.7696	-80.146004	627.19	34.878	6.275	4.785
EX1907_D09_02B	Chondrocladia	80% analytical ethyl alcohol	Key Largo Deep	20191116	181203	24.7708	-80.147598	607.78	34.812	6.486	4.664
EX1907_D09_03B	Henricia	95% ethyl alcohol	Key Largo Deep	20191116	192014	24.771799	-80.148399	601.34	34.888	6.488	4.596
EX1907_D09_03B_A01	Chondrocladia	80% analytical ethyl alcohol	Key Largo Deep	20191116	192014	24.771799	-80.148399	601.34	34.888	6.488	4.596
EX1907_D09_03B_A02	Polychaeta	4% Formalin	Key Largo Deep	20191116	192014	24.771799	-80.148399	601.34	34.888	6.488	4.596
EX1907_D10_01B	Hexactinellida	80% analytical ethyl alcohol	Portalès Terrace	20191117	160426	24.3717	-80.708	383.44	35.165	9.871	3.884



Sample ID*	Field Identification	Final Preservative	Site	Date (YYYYMMDD)	UTC Time (HHMMSS)	Latitude	Longitude	Depth (m)	Salinity (parts per thousand)	Temp (C)	Oxygen (milligrams per liter)
EX1907_D10_02B	Hexactinellida	80% analytical ethyl alcohol	Pourtales Terrace	20191117	192942	24.3696	-80.708199	360.39	34.753	9.512	3.902
EX1907_D10_03B	Aphrocallistes beatrix	80% analytical ethyl alcohol	Pourtales Terrace	20191117	221000	24.3682	-80.707497	349.15	34.567	9.239	3.899
EX1907_D11_01B	Chondrocladia	80% analytical ethyl alcohol	Key West Deep	20191118	145945	23.976101	-81.932503	1217.56	34.950	4.303	7.013
EX1907_D11_03B	Chondrocladia	80% analytical ethyl alcohol	Key West Deep	20191118	200936	23.979099	-81.939598	1168.46	34.950	4.316	6.920
EX1907_D11_04B	Geodia	80% analytical ethyl alcohol	Key West Deep	20191118	203652	23.9795	-81.939903	1138.63	34.947	4.333	6.682
EX1907_D12_01B	Lepidisis	80% analytical ethyl alcohol	"Berg Bits"	20191119	161407	23.9839	-83.387497	929.75	34.927	4.785	6.176
EX1907_D12_02B	Floiaster maya	95% ethyl alcohol	"Berg Bits"	20191119	185718	23.9832	-83.3927	932.62	34.928	4.767	6.139

\*Sample IDs with "\_A##" indicate associate samples.

### 9.1.1 Sample Repositories

The following repositories will archive samples from EX1907:

- Invertebrate Zoology Collections, National Museum of Natural History, Smithsonian Institution, Museum Support Center, MRC 534, 4210 Silver Hill Road, Suitland, MD 20746  
Contact: Abigail Reft, [ReftAJ@si.edu](mailto:ReftAJ@si.edu)  
Website: <https://invertebrates.si.edu/LoanPolicy.html>
- Biorepository, National Museum of Natural History, Smithsonian Institution, Museum Support Center, 4210 Silver Hill Road, Suitland, MD 20746  
Contact: Chris Huddleston, [huddlestonc@si.edu](mailto:huddlestonc@si.edu)  
Website: <https://naturalhistory.si.edu/research/biorepository>
- Ocean Genome Legacy Center, Northeastern University, 430 Nahant Road, Nahant, MA 01908  
Contact: Hannah Appiah-Madson, [h.appiah-madson@northeastern.edu](mailto:h.appiah-madson@northeastern.edu)  
Website: <https://www.northeastern.edu/ogl/>
- Marine and Geology Repository, Oregon State University, Burt 346, Corvallis, OR 97331-5503  
Contact: Kevin Konrad, [Konradke@geo.oregonstate.edu](mailto:Konradke@geo.oregonstate.edu)  
Website: <http://osu-mgr.org/noaa-ex/>

### 9.2 Accessing ROV Data

ROV data and dive summaries from EX1907 will be available through OER's Digital Atlas (<https://www.ncei.noaa.gov/maps/oer-digital-atlas/mapsOE.htm>). To access this data, click on the Search tab, enter "EX1907" in the Enter Search Text field, and click Search. Appendix A details additional instructions for access. The data management plan is outlined in Appendix B

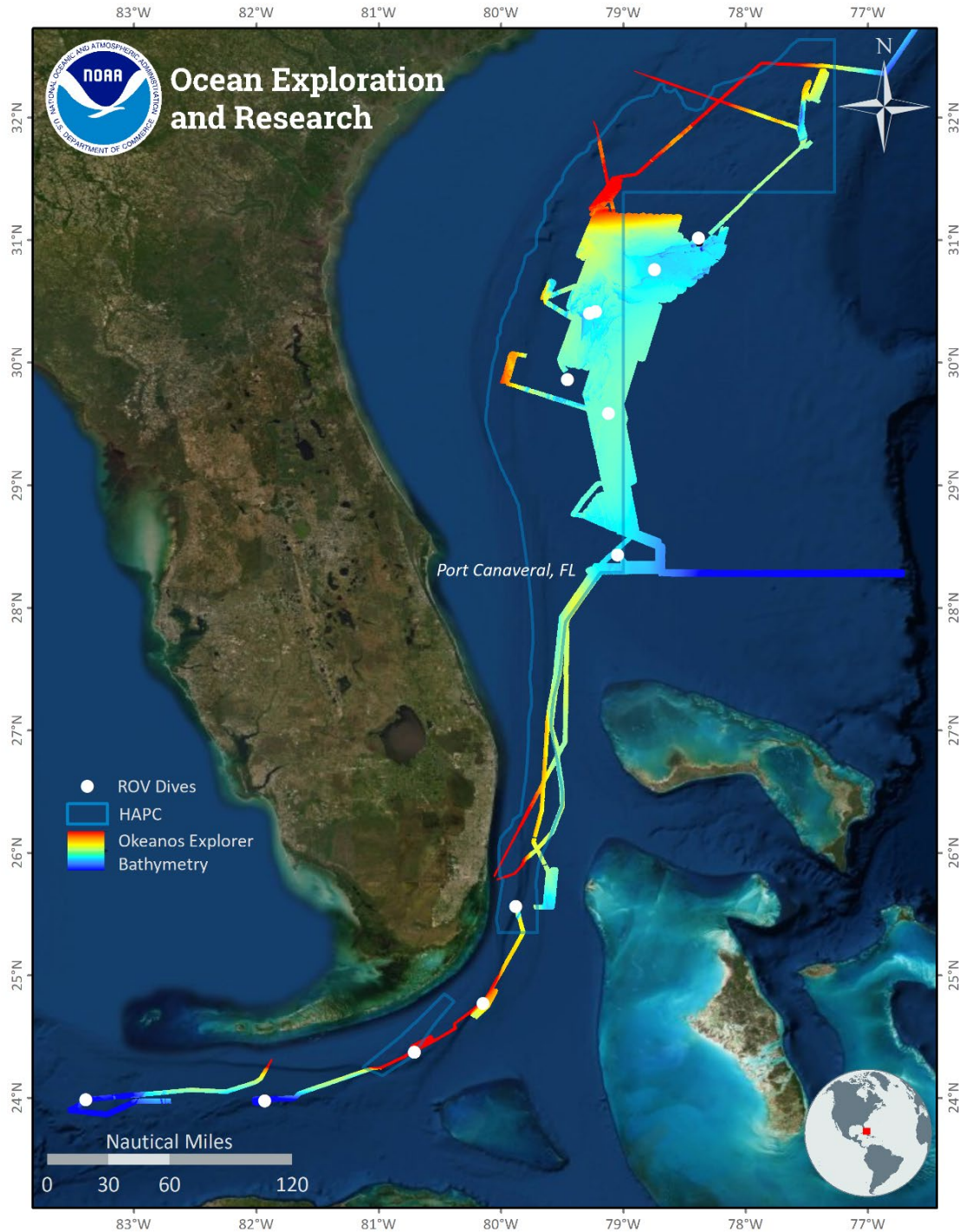


### 9.3 Seafloor Mapping

Background data used to guide exploratory and systematic mapping operations for this cruise included mapping data collected during other *Okeanos Explorer* cruises as well as via other platforms: EX1903L1, EX1903L2, EX1806, EX1805, EX1106, EX1202L1, EX1203, EX1402L1, EX1403, EX1812, H11071, and AT41. Figure 2 shows the combined bathymetry from both cruises of the 2019 Southeastern U.S. Deep-sea Exploration (EX1906 and EX1907). Some dive planning and mapping operations were conducted using bathymetric grids created using all available bathymetry archived at NCEI and NCEI's AutoGrid tool. Sandwell and Smith satellite altimetry data were also used to plan operations.



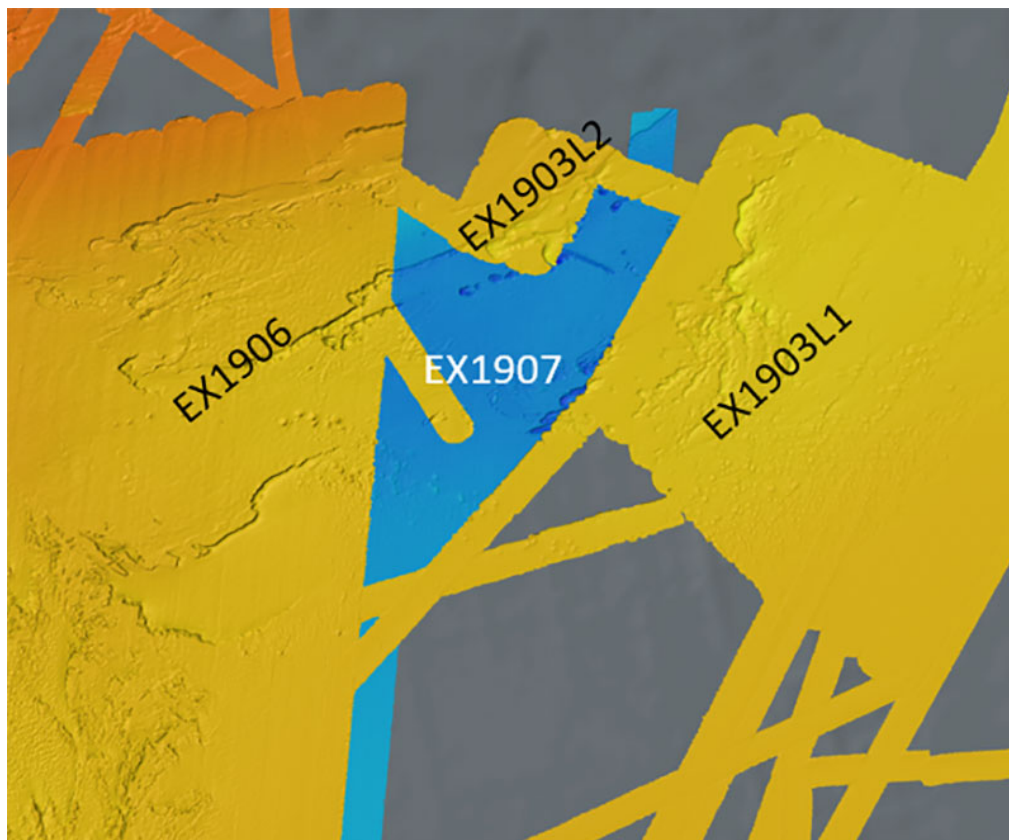




**Figure 2.** Combined multibeam bathymetry from EX1906 and EX1907 (rainbow colored). The ROV dive sites from EX1907 are shown in white.

The schedule of operations included overnight transit mapping and mapping operations whenever the ROVs were on deck (see Table 3). Survey lines were planned to maximize either edge matching of existing data or filling in gaps between areas where modern bathymetric

coverage existed. In regions with no existing data, exploratory transit or focused survey lines targeted areas to optimize potential discoveries. In areas with existing data, focused mapping operations edge matched existing data and targeted potential seafloor features within the satellite bathymetry. Figure 3 shows an example of focused mapping completed during weather days on EX1907 that filled in an unmapped area and merged three existing OER/*Okeanos Explorer* surveys together creating a single unified bathymetric surface over the entire area.



**Figure 3.** Example of mapping optimization during overnight operations and weather days. Mapping operations were able to fill in an unmapped area and merge it with mapping data from three previous *Okeanos Explorer* cruises in the region: EX1903L1, EX1903L2, and EX1906.

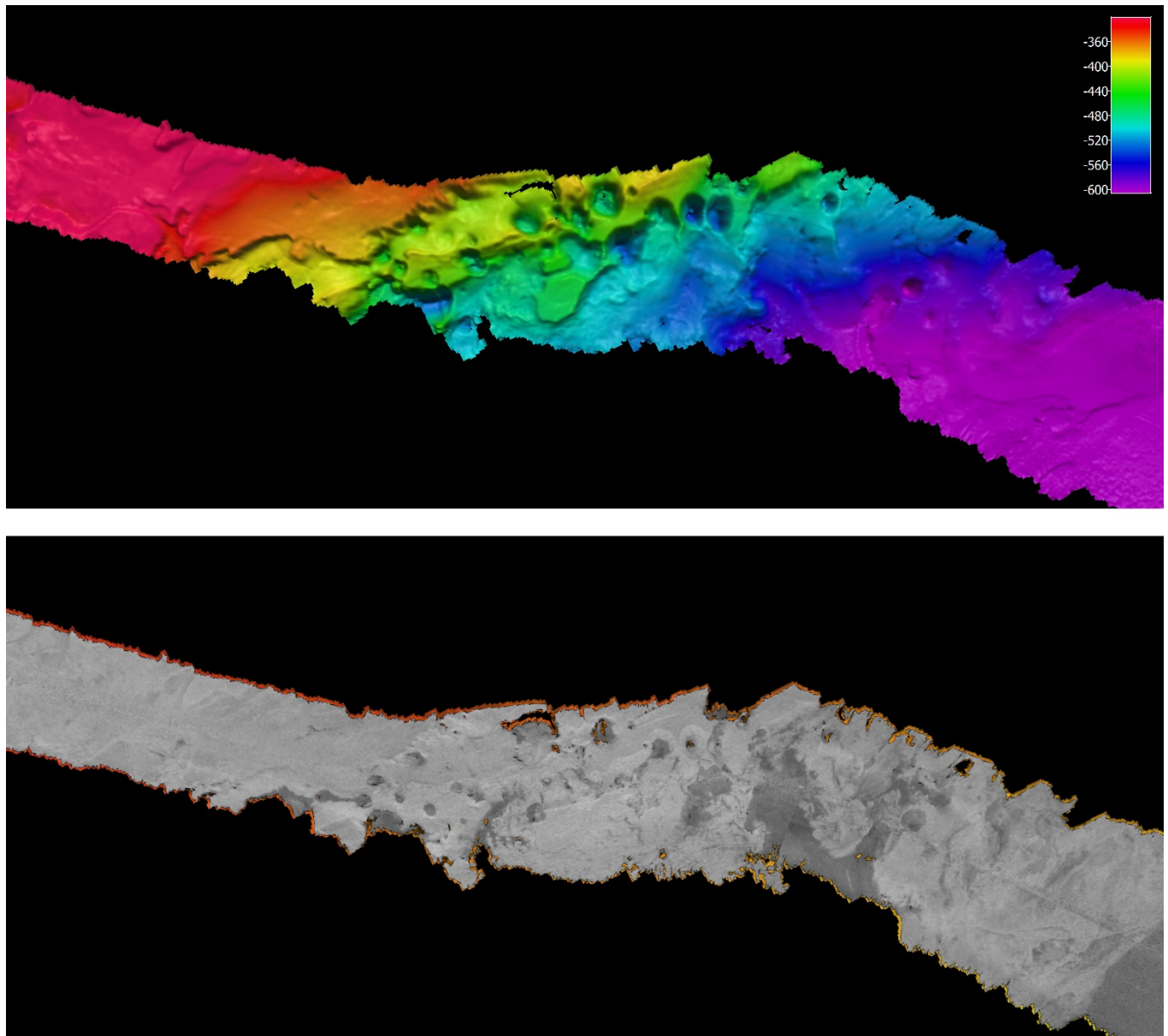
Mapping operations included EM 302 multibeam, EK60 and EK80 split-beam, Knudsen sub-bottom profile, and ADCP data collection. Expendable bathythermographs (XBTs) were collected every six hours or as needed and applied in real time using Seafloor Information System (SIS) software. Sound speed at the sonar head was determined using sound speed from a flow through thermosalinograph (TSG). See Table 7 for a summary of EX1907 mapping statistics.



**Table 7. Mapping statistics for EX1907**

<b>Dates:</b>	October 31–November 20, 2019
<b>Departure Port:</b>	Miami, Florida
<b>Arrival Port:</b>	Key West, Florida
<b>Days at Sea:</b>	21
<b>EM 302 Linear Kilometers Mapped:</b>	3,972
<b>EM 302 Square Kilometers Mapped:</b>	12,758
<b>EM 302 Number/Data Volume of Raw (.all) Bathymetric and Bottom Backscatter Files:</b>	412/35.4 gigabytes
<b>EM 302 Number/Data Volume of Raw (.wcd) Water Column Files:</b>	412/62.3 gigabytes
<b>EK60 and EK80 Number/Data Volume Split-beam Files:</b>	510/40.1 gigabytes
<b>Knudsen Sub-bottom Number/Data Volume Files:</b>	515/2.7 gigabytes
<b>Number of XBT (expendable bathythermograph) Casts:</b>	105
<b>Number of CTD (conductivity, temperature, and depth) Casts:</b>	0

Throughout EX1907, multibeam data quality was monitored in real time by acquisition watchstanders. Ship speed was adjusted to maintain data quality as necessary. Much of the mapping was conducted along transit lines to ROV dive sites, an example of which can be found in Figure 4. In places where time allowed, focused surveying was completed over areas lacking multibeam data. In these focus areas, line spacing was generally planned to ensure 20-30% overlap between lines at all times. Cutoff angles in SIS were generally adjusted on both the port and starboard sides to ensure the best balance between data quality and coverage.



**Figure 4.** Strategic transit mapping of an area containing interesting seafloor features, likely karst topography. Top image is rainbow-colored bathymetry. Bottom image is grayscale backscatter. Image generated in QPS Fledermaus, depth shown in meters, 3x vertical exaggeration, 25x25 meter cell size.

The ADCPs were always turned off for general mapping operations due to noticeable interference between the Ocean Surveyor 38 kHz ADCP, the Workhorse 300 kHz ADCP, and the EM 302 multibeam. This interference has been documented during previous cruises.

During normal mapping operations, data were collected with the EM 302, EK60s, EK80, and sub-bottom profiler. During ROV operations, both ADCPs were turned on to provide

information on currents in the vicinity of each dive site, and the EK60s and EK80 were turned on to better understand the interaction between the ROVs and biology in the water column.

### 9.3.1 Mapping Data Access

All data collected on EX1907 are managed as outlined in the EX1907 Data Management Plan which can be found in Appendix B.

#### **Multibeam Sonar (Kongsberg EM 302)**

The multibeam dataset for the EX1907 will be archived at NCEI and accessible through their Bathymetric Data Viewer (<https://maps.ngdc.noaa.gov/viewers/bathymetry/>). To access this data, click on the Search Bathymetric Surveys button, select “NOAA Ship Okeanos Explorer” from the Platform Name dropdown menu, “NOAA Office of Ocean Exploration and Research” from the Source Institution dropdown menu, and “EX1907” from the Survey ID dropdown menu. Click OK, and the ship track for the cruise will appear on the map. Click on the ship track for options to download data.

#### **Sub-bottom Profiler (Knudsen Chirp 3260)**

The sub-bottom profiler was not run during any of EX1907’s ROV dive operations, but generally was operated during multibeam mapping operations. For sub-bottom data access, send an inquiry to [ncei.info@noaa.gov](mailto:ncei.info@noaa.gov) requesting access to EX1907 Knudsen 3260 sub-bottom raw and processed data.

#### **Split-beam Sonars (Simrad EK60/EK80)**

These sonars were used continuously throughout the cruise during both overnight mapping operations and daytime ROV operations. EK60 and EK80 water column data for EX1907 will be available through NCEI’s Water Column Sonar Data Viewer ([https://www.ngdc.noaa.gov/maps/water\\_column\\_sonar/index.html](https://www.ngdc.noaa.gov/maps/water_column_sonar/index.html)). To access this data, click on the Additional Filters button, deselect “All” next to Survey ID and select “EX1907” from the Survey ID list. Click OK, and the ship track for the cruise will appear on the map. Click on the ship track for options to download data.

#### **Acoustic Doppler Current Profilers (Teledyne Marine Workhorse Mariner/ Teledyne Ocean Surveyor)**

ADCP data for EX1907 were collected at each ROV dive location, and will be available through NCEI’s Global Ocean Currents Database ([https://www.nodc.noaa.gov/gocd/sadcp\\_oer\\_inv.html](https://www.nodc.noaa.gov/gocd/sadcp_oer_inv.html)). Data can be found by searching the table for the cruise identification number, “EX1907.”

## 9.4 Education and Outreach Activities

During the cruise, the mission team conducted six outreach activities to extend their reach beyond the core scientific participants. See Table 8 for details about these events. The team

also answered questions from social media during the ROV dives. Web content garnered over 18,000 views, and there were over 207,000 views of live video and more than 80 national and local media/web stories.

**Table 8. Summary of education and outreach activities**

Date	Type	Group/Individual	Short Description	Number of Participants
October 30, 2019	Ship tours	NOAA Atlantic Oceanographic and Meteorological Laboratory	Highlighted community exploration and potential for future cooperative projects	8
November 14, 2019	Live interaction	Harbor Branch Oceanographic Institute/James Masterson	Science leads took questions from students, members of the public, and staff	13
November 14, 2019	Live interaction	Peddie School, New Jersey/NOAA Teacher at Sea Meredith Salmon (EX1807)	Science leads and expedition coordinator took questions from a high school marine science class	15
November 18, 2019	Live question and answer session	Harbor Branch Oceanographic Institute/James Masterson	Science leads, expedition coordinator, and ROV pilots answered questions from students	20
November 18, 2019	Live interaction	University of Rhode Island/Inner Space Center, college marine biology class	Mapping and science leads provided background on the expedition and answered questions from students	7
November 19, 2019	Live interaction	University of Rhode Island/Inner Space Center	Short conversation with Dr. Neil Jacobs who was visiting	7

## 10. Expedition Summary and Highlights

EX1907 was supported by a core science team of more than 50 scientists from around the world. On every dive, there was live participation from the Harbor Branch Oceanographic Institute Exploration Command Center. Live interactions reached 70 onshore participants, including college and grade-school students, educators, and members of the general public. Web content garnered over 18,000 views, and there were over 207,000 views of live video.

Twelve ROV dives were completed on EX1907 in support of ocean exploration, regional priorities, and community objectives. Many of these dives were completed in areas of high surface and water column currents. On all 12 ROV dives, deepwater coral and sponges were observed. High biodiversity communities were observed on 3 dives (Dives 02, 06, and 10). Note that these high biodiversity communities were each composed of different constituents. Large coral mounds of living stony coral, *Lophelia*, were found on one dive, and areas with an

abundance of soft gorgonian corals settled on relic coral skeletons and carbonate crusts were seen on others. On Dive 06, two previously unknown cold-water coral mounds were discovered. These mounds were first mapped on EX1906 (the first cruise of the expedition). Mapping data from EX1906 suggest that other cold-water coral mounds may be present in the region.

Dives 11 and 12, south and southwest of Key West, focused on features that were thought to be potential cold-water coral mounds based on mapping data. They were actually large boulders that appeared to have calved like ice from an iceberg from the adjacent escarpments. These looked to be composed of soft facies composed of mud-size carbonate grains that were not phosphate or ferromanganese encrusted.

Dive 07 targeted an area that was a priority for BOEM and USGS as it had been historically associated with experimental deep-sea mining technology. Throughout the dive, the team observed nodules, likely ferromanganese encrusted, and they collected samples. The team also observed a cement block (number 85) that had been placed decades ago to understand colonization and settling rates of benthic organisms.

Over 12,700 square kilometers (km<sup>2</sup>) were mapped on EX1907. When combined with EX1906, over 33,000 km<sup>2</sup> of unmapped or poorly mapped seafloor were mapped. During EX1907 11,829 square kilometers were mapped in the U.S. EEZ deeply than 200 meters. Mapping operations identified what seems to be the eastern edge of the Million Mounds' region, merged three existing OER/*Okeanos Explorer* surveys together, mapped an area straddling the Pourtales Terrace HAPC, and mapped areas along the U.S. and Bahamas boundary.

Imagery and video highlights from EX1907 included:

- A pycnogonid (sea spider) with young around its body that were being released into the environment.
- A *Mola mola* (sunfish).
- Squid migration.
- A *Bathynomus giganteus* (giant isopod) eating.
- A possible new morphotype of *Zenometra columnaris* (this crinoid is usually purple; these were more tan/cream).
- Derelict fishing gear.
- *Ornithoteuthis antillarum* (Bird squid).
- *Acanthacaris caeca* (blind lobsters) out of their burrows; one was actively fishing for prey by waving a small piece of organic tissue with its second chelate leg.
- A *Goniaster* sea star eating a coral.
- Potentially new species of sea stars and gastropods.
- A *Crossota millsea* (jellyfish) feeding in the water column.

Highlights from sampling operations included a large (> 20 centimeters) egg-shaped sponge (sample EX1907\_D02\_08B) that was penetrated with very fine spicules throughout. Cris Diaz (Harbor Branch Oceanographic Institute) suggested it may be *Anoxycalyx (Scolymastra) joubini*, which has only been found in the Antarctic. Several carnivorous sponges were also sampled on Dives 08, 09, and 11 that may be new species. Sixteen ASPIRE connectivity samples were collected (i.e., *Lophelia*, *Vazella*, *Leiopathes*) and will provide information about species found in other areas of the Atlantic Ocean Basin.

The team also continued to train and engage the next generation of explorers. Several new ROV navigators were trained, and an explorer-in-training was hosted on this ROV/mapping cruise.

Data from EX1907 will help improve our understanding of the deep-ocean habitats of the Southeastern U.S. continental margin and the connections between communities throughout the Atlantic Basin. Data and information from EX1907 provide critical knowledge for the development of deep-sea management plans for habitat areas of particular concern (HAPCs), marine protected areas (MPAs), and national marine sanctuaries; support local scientists and managers seeking to understand and manage deep-sea fisheries resources; and supply a foundation of information to stimulate subsequent exploration, research, and management activities.

## 11. References

Sandwell, D.T. and Smith, W.H.F. (2009). Global marine gravity from retracked Geosat and ERS-1 altimetry: Ridge Segmentation versus spreading rate, *J. Geophys. Res.*, 114, B01411, doi:10.1029/2008JB006008.

## 12. Appendices

### 12.1 Appendix A: Dive Summaries

Dive summaries and associated data will be made publicly available on OER's Digital Atlas (<https://www.ncei.noaa.gov/maps/oer-digital-atlas/mapsOE.htm>) approximately 90 days after the conclusion of a cruise. To access data for EX1907, click on the Search tab, enter "EX1907" in the Enter Search Text field, and click Search. Click on the dot on the map representing the cruise. In the pop-up, click on the ROV Data Access tab and then select "ROV Data Access by Dive" under ROV Summary Products. Please contact [ex.expeditioncoordinator@noaa.gov](mailto:ex.expeditioncoordinator@noaa.gov) for data access issues.



## **12.2 Appendix B: Okeanos Explorer EX1907 Data Management Plan**

Report Date: 2019-09-24

### **1. General Description of Data to be Managed**

#### **1.1 Name and Purpose of the Data Collection Project:**

Okeanos Explorer (EX1907): Mid and Southeast US (ROV & Mapping)

This expedition will contribute to NOAA's Atlantic Seafloor Partnership for Integrated Research and Exploration (ASPIRE), a major multi-year, multi-national collaborative field program focused on raising collective knowledge and understanding of the North Atlantic. This campaign provides timely, actionable information to support decision making based on reliable and authoritative science. It also serves as an opportunity for the nation to highlight the uniqueness and importance of these deepwater environments. ASPIRE builds on the momentum of past U.S. campaigns and international initiatives to support ecosystem-based management of marine resources.

#### **1.2 Summary Description of the data to be collected:**

Operations will include the use of the ship's deepwater mapping systems (Kongsberg EM302 multibeam sonar, EK 60/80 split-beam fisheries sonars, Knudsen 3260 chirp sub-bottom profiler sonar, and Teledyne Acoustic Doppler Current Profilers), XBTs in support of multibeam sonar mapping operations, CTD casts, the two-body ROV Deep Discoverer and Seirios, and the ship's high-bandwidth satellite connection for continuous real-time ship-to-shore communications.

#### **1.3 Keywords or phrases that could be used to discover the data:**

expedition, exploration, explorer, marine education, noaa, ocean, ocean discovery, ocean education, ocean exploration, ocean exploration and research, ocean literacy, ocean research, OER, science, scientific mission, scientific research, sea, stewardship, systematic exploration, technology, transformational research, undersea, underwater, Davisville, mapping survey, multibeam, multibeam backscatter, multibeam sonar, multi-beam sonar, noaa fleet, okeanos, okeanos explorer, R337, Rhode Island, scientific computing system, SCS, single beam sonar, singlebeam sonar, single-beam sonar, sub-bottom profile, water column backscatter, Seabed 2030, SEDCI, SECART, sonar anomalies, South Atlantic Bight, oceans, biogeographic patterns, deep-sea ecosystems, habitat characterization, dominant community members, potential new species, site characterization, Essential Fish Habitats, Habitat Areas of Particular Concern, National Marine Sanctuaries, Southeast Deep-sea Coral Initiative, Southeastern US Continental Margin, ASPIRE

#### **1.4 If this mission is part of a series of missions, what is the series name?**

Okeanos ROV Cruises



### **1.5 Planned or Actual Temporal Coverage of the data:**

Start Date: 10/31/2019 and End Date: 11/21/2019

### **1.6 Actual or Planned Geographic Coverage of the data:**

Northernmost Boundary: 34.85 and Southernmost Boundary: 23.96

Westernmost Boundary: -83.47 and Easternmost Boundary: -71.98

### **1.7 What data types will be created or captured and submitted for archive?**

Bottom Backscatter, Cruise Plan, Cruise Summary, CTD (processed), CTD (product), CTD (raw), Data Management Plan, Dive Summaries, EK60 Split Beam Data, Highlight Images, Multibeam (image), Multibeam (processed), Multibeam (product), Multibeam (raw), Quick Look Report, Raw Video (digital), Sample Analysis Reports, SCS Output (compressed), SCS Output (native), Sound Velocity Profile, Sub-Bottom Profile data, Temperature data, Water Column Backscatter, XBT (raw)

### **1.8 What platforms will be employed?**

NOAA Ship Okeanos Explorer, Deep Discoverer ROV, SEIRIOS Camera Sled

## **2 Points of Contact for this Data Producing Project**

Overall POC: Michael White

Title: Expedition Coordinator

Affiliation: NOAA Office of Ocean Exploration and Research

Phone: 301-938-8460

## **3 Points of Contact for Managing the Data**

Data POC: Fernando Aragon, Megan Cromwell

Data POC Title: Shoreside/Onboard Data Manager, Sample Data Manager and Stewardship Data Manager

Data POC Email: [fernando.aragon@tgfoe.org](mailto:fernando.aragon@tgfoe.org), [megan.cromwell@noaa.gov](mailto:megan.cromwell@noaa.gov)

## **4 Resources**

### **4.1 Have resources for management of these data been identified?**

Yes

### **4.2 Approximate percentage of the budget devoted to data management. (specify % or unknown)**

Unknown

## **5 Data Lineage and Quality**



### **5.1 What is the processing workflow from collection to public release?**

SCS data shall be delivered in its native format as well as an archive-ready, documented, and compressed NetCDF3 format to NCEI-MD; Acoustic data and metadata will be compressed and delivered in a bagit format to NCEI-CO; Video data shall be delivered via hard-drive to NCEI-MD, where they will be post-processed, documented, and archived then made discoverable and accessible through the OER Video Portal.

### **5.2 What quality control procedures will be employed?**

Quality control procedures for the data from the Kongsberg EM302 is handled at UNH CCOM/JHC. Raw (level-0) bathymetry files are cleaned/edited into new data files (level-1) and converted to a variety of products (level-2). Data from sensors monitored through the SCS are archived in their native format and are not quality controlled. Data from CTD casts and XBT firings are archived in their native format. CTDs are post-processed by the data management team as a quality control measure and customized CTD profiles are generated for display on the Okeanos Atlas.

## **6 Data Documentation**

### **6.1 Does the metadata comply with the Data Documentation Directive?**

Yes

#### **6.1.1 If metadata are non-existent or non-compliant, please explain:**

Not Applicable

### **6.2 Where will the metadata be hosted?**

Organization: An ISO format collection-level metadata record will be generated during pre-cruise planning and published in the NOAA OneStop catalog and an OER Web Accessible Folder (WAF) hosted at NCEI-MS for public discovery and access.

URL: [https://data.noaa.gov/waf/NOAA/NESDIS/ncei/oer/iso\\_u/xml/](https://data.noaa.gov/waf/NOAA/NESDIS/ncei/oer/iso_u/xml/)

Metadata Standard: ISO 19115-2 Geographic Information with Extensions for Imagery and Gridded Data will be the metadata standard employed.

### **6.3 Process for producing and maintaining metadata:**

Metadata will be generated via xml editors or metadata generation tools.

## **7 Data Access**

### **7.1 Do the data comply with the Data Access Directive?**

Yes

#### **7.1.1 If the data will not be available to the public, or with limitations, provide a valid reason.**

Not Applicable

**7.1.2 If there are limitations, describe how data are protected from unauthorized access.**

Account access to mission systems are maintained and controlled by the Program. Data access prior to public accessibility is documented through the use of Data Request forms and standard operating procedures.

**7.2 Name and URL of organization or facility providing data access.**

Organization: NOAA National Centers for Environmental Information (NCEI)

URL: <https://www.ncei.noaa.gov>

**7.3 Approximate delay between data collection and dissemination. By what authority?**

Hold time: Data are considered immediately publicly accessible as soon as possible after the mission, unless there are documented restrictions.

Hold authority: not applicable

**7.4 Prepare a Data Access Statement**

No data access constraints, unless data are protected under the National Historic Preservation Act of 1966.

**8 Data Preservation and Protection**

**8.1 Actual or planned long-term data archive location:**

Data from this mission will be preserved and stewarded through the NOAA National Centers for Environmental Information. Refer to the Okeanos Explorer Data Management Plan at NOAA's EDMC DMP Repository for detailed descriptions of the processes, procedures, and partners involved in this collaborative effort.

**8.2 If no archive planned, why?**

Not Applicable

**8.3 If any delay between data collection and submission to an archive facility, please explain.**

60-90 days

**8.4 How will data be protected from accidental or malicious modification or deletion?**

Data management standard operating procedures minimizing accidental or malicious modification or deletion are in place aboard the Okeanos Explorer and will be enforced.

**8.5 Prepare a Data Use Statement**

Data use shall be credited to NOAA Office of Ocean Exploration and Research.

## 12.3 Appendix C: EX1907 National Environmental Policy Act Categorical Exclusion

Categorical Exclusion (CE) Evaluation Worksheet

Project Identifier : EX-19-07

Date Review Completed: 10/11/2019

Completed by : Caitlin Adams, OER Project Coordinator

OAR Functional Area : OER

Worksheet File Name : 2019-10-OER-E3-EX-19-07

### Step 1. CE applicability

**1. Is this federal financial assistance, including via grants, cooperative agreements, loans, loan guarantees, interest subsidies, insurance, food commodities, direct appropriations, and transfers of property in place of money?**

NO

### 2. What is the proposed federal action?

The proposed action is for OER to collect baseline mapping data using NOAA Ship Okeanos Explorer's scientific sonar systems (Kongsberg EM302 multibeam, Simrad EK60 and EK80 split-beam, Knudsen 3260 chirp sub-bottom profiler, and Teledyne Acoustic Doppler Current Profiler), and to conduct baseline characterization of unexplored areas using NOAA's two-body remotely operated vehicle (ROV), XBT, CTD rosette system and telepresence. ROV operations will include collection of detailed high resolution imagery, limited biological and geological specimens, and digital environmental sensor data. The expedition will conduct operations in unexplored deepwater (>200 m) throughout the Southeast U.S. Continental Margin offshore of Florida, Georgia, South Carolina, North Carolina, and Virginia. The expedition is currently scheduled to start in Miami, FL on October 31, 2019, and end in Key West, FL on November 21, 2019. All mission personnel are either on contract to OER or are funded through an OER grant. This action demonstrates independent utility and is not a connected action.

### 3. Which class of CE in Appendix E of the NAO 216-6A Companion Manual is applicable to this action and why?

- a. E3: Activities to collect aquatic, terrestrial, and atmospheric data in a non-destructive manner.
- b. The topical scope of this action is consistent with CE number E3 in Appendix E of the Companion Manual to NOAA Administrative Order (NAO) 216-6A: activities to collect aquatic,

terrestrial, and atmospheric data in a non-destructive manner. The expedition will use remote sensing, video, imagery, and a limited number of physical samples to collect baseline information on unexplored deepwater (>200 m) areas throughout the Southeast U.S. Continental Margin offshore of Florida, Georgia, South Carolina, and North Carolina.

## **Step 2. Extraordinary Circumstances Consideration**

### **4. Would the action result in adverse effects on human health or safety that are not negligible?**

This action will not result in adverse effects on human health or safety. NOAA Ship Okeanos Explorer will be operating in offshore, deep-sea (>200 m) areas of the Southeast U.S. Continental Margin during EX-19-07. All operation areas are underwater and therefore have no human presence. This action does not involve any procedures or outcomes known to result in impacts on human health and safety.

### **5. Would the action result in adverse effects on an area with unique environmental characteristics that are not negligible?**

Data collection will primarily occur offshore and in deepwater (greater than 200 meters), including the Stetson-Miami Terrace Deepwater Coral Habitat Area of Particular Concern. The effects will be negligible, as acoustic mapping and ROV operations are transient and will not cause any permanent impact on the seabed or water column. The expedition is being planned and conducted in partnership with NOAA National Marine Fisheries Service (NMFS), NOAA Deep Sea Coral Research and Technology Program (DSCRTP), NOAA National Centers for Coastal Ocean Science (NCCOS), U.S. Geological Survey, U.S. Fish and Wildlife Service, and other Management agencies of the region. OER will use input from these management authorities that are familiar with these areas in order to ensure no more than negligible effects on any areas with potentially unique environmental characteristics.

### **6. Would the action result in adverse effects on species or habitats protected by the ESA, MMPA, MSA, NMSA, or MBTA that are not negligible?**

OER has taken measures to ensure that any effects on species or habitats protected by the ESA, MMPA, MSA or NMSA meet the definition of negligible. In 2018, an informal consultation was initiated under Section 7 of the Endangered Species Act (ESA), requesting NOAA Fisheries' Protected Resources Division concurrence with our Biological Evaluation determining that NOAA Ship Okeanos Explorer operations conducted during the 2018-2019 field seasons are not likely to adversely affect ESA-listed marine species. The informal consultation was completed on August 8, 2018 when OER received a signed letter from the Chief ESA Interagency Cooperation Division in the NOAA Office of Protected Species, stating that NMFS concurs with OER's determination that operations conducted during NOAA Ship Okeanos Explorer 2018-2019 field seasons are not likely to adversely affect ESA-listed marine species. The ESA Section 7

Letter of Concurrence is provided as an appendix in the EX-19-07 project instructions. OER is currently in the process of requesting a re-initiation request to cover the 2020 field season, which will be operating in the same areas as were approved for 2018-2019 field seasons.

OER has taken measures to ensure that any effects on species or habitats protected by the ESA, MMPA, MSA or NMSA meet the definition of negligible. In 2018, an informal consultation was initiated under Section 7 of the Endangered Species Act (ESA), requesting NOAA Fisheries' Protected Resources Division concurrence with our Biological Evaluation determining that NOAA Ship Okeanos Explorer operations conducted during the 2018-2019 field seasons are not likely to adversely affect ESA-listed marine species. The informal consultation was completed on August 8, 2018 when OER received a signed letter from the Chief ESA Interagency Cooperation Division in the NOAA Office of Protected Species, stating that NMFS concurs with OER's determination that operations conducted during NOAA Ship Okeanos Explorer 2018-2019 field seasons are not likely to adversely affect ESA-listed marine species. The ESA Section 7 Letter of Concurrence is provided as an appendix in the EX-19-07 project instructions.

OER is currently in the process of requesting a re-initiation request to cover the 2020 field season, which will be operating in the same areas as were approved for 2018-2019 field seasons. Given the offshore focus of most of our proposed work, it is improbable that we will encounter marine mammals protected under the MMPA, or sea birds protected under the MBTA. If we did encounter any such protected animals, our impacts would be negligible because of the best management practices to which we adhere to avoid or minimize environmental impacts. These best management practices are all outlined in the appendices of the in the EX-19-07 project instructions.

OER also initiated a request for an abbreviated Essential Fish Habitat (EFH) consultation for expeditions by NOAA Ship Okeanos Explorer in 2018-2020 to the Greater Atlantic Region, including EX1906. On July 19, 2018, OER received a letter from the Assistant Regional Administrator for the NOAA Office of Habitat Conservation stating that these expeditions will not adversely impact EFH. This letter is provided in appendices of the EX-19-07 project instructions.

Additionally, OER received a Letter of Acknowledgement (LOA) from NMFS for operations in the Southeast Deepwater MPAs and areas deemed as a Habitat Areas of Particular Concern (HAPCs). The LOA is also included in the project instructions.

**7. Would the action result in the potential to generate, use, store, transport, or dispose of hazardous or toxic substances, in a manner that may have a significant effect on the environment?**

The operations of the expedition will be in compliance with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it) to ensure generation, use, storage, transport, and disposal of such substances will not result in significant impacts.

**8. Would the action result in adverse effects on properties listed or eligible for listing on the National Register of Historic Places authorized by the National Historic Preservation Act of 1966, National Historic Landmarks designated by the Secretary of the Interior, or National Monuments designated through the Antiquities Act of 1906; Federally recognized Tribal and Native Alaskan lands, cultural or natural resources, or religious or cultural sites that cannot be resolved through applicable regulatory processes?**

During the expedition, we will be conducting ROV dives on sonar anomaly targets believed to be shipwrecks. If these anomalies are confirmed to be significant shipwrecks, they can potentially be eligible for listing on the National Register of Historic Places. OER conducts non-invasive surveys of archaeology targets and protects the location of sensitive cultural heritage sites (UCH). OER's standard operating procedures for UCH sites can be found in Appendix H of the project instructions. This expedition is being planned in conjunction with the NOAA Office of National Marine Sanctuaries' Maritime Heritage Program and the Bureau of Ocean Energy Management (BOEM). Staff from the Maritime Heritage Program and BOEM will participate in UCH operations to ensure that operations are non-invasive and compliant to all applicable regulations.

**9. Would the action result in a disproportionately high and adverse effect on the health or the environment of minority or low-income communities, compared to the impacts on other communities (EO 12898)?**

NOAA Ship Okeanos Explorer will be operating in remote and offshore areas of the Southeast US Continental Margin during the expedition. There are no communities within or near the geographic scope of the expedition, and the mission does not involve actions known or likely to result in adverse impacts on human health.

**10. Would the action contribute to the introduction, continued existence, or spread of noxious weeds or nonnative invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of the species?**

During EX-19-07, NOAA Ship Okeanos Explorer will not make landfall in areas other than commercial ports. The ship and OER mission team will comply with all applicable local and federal regulations regarding the preventing or spread of invasive species. At the completion of every CTD cast and ROV dive, the equipment will be thoroughly rinsed with freshwater and completely dried to prevent spreading organisms from one site to another. Also, the Engineering Department aboard the NOAA Ship Okeanos Explorer attends yearly Ballast Management Training in accordance with NOAA Form 57-07-13 NPDES VGP Annual Inspection and Report to prevent the introduction of invasive species.

**11. Would the action result in a potential violation of Federal, State, or local law or requirements imposed for protection of the environment?**

The proposed action will not result in any violations of Federal, State, or local law or requirements imposed for protection of the environment. OER engaged in the requisite Consultations on ESA Section-7 and EFH for this expedition as outlined in questions 4-6 above.

**12. Would the action result in highly controversial environmental effects?**

The exploration activities will be localized and of short duration in any particular area at any given time. Given the project's scope and breath, no notable or lasting changes or highly controversial effects to the environment will result.

**13. Does the action have the potential to establish a precedent for future action or an action that represents a decision in principle about future actions with potentially significant environmental effects?**

While each cruise contributes to the overarching goal of exploring, mapping, and sampling the ocean, every cruise is independently useful and not connected to subsequent cruises.

**14. Would the action result in environmental effects that are uncertain, unique, or unknown?**

The techniques and equipment used are standard for this type of field study, and the effects are well known.

**15. Does the action have the potential for significant cumulative impacts when the proposed action is combined with other past, present and reasonably foreseeable future actions, even though the impacts of the proposed action may not be significant by themselves?**

By definition, actions that a federal agency classifies as a categorical exclusion have no potential, individually or cumulatively, to significantly affect the environment. This cruise is consistent with a class of CE established by NOAA and there are no extraordinary circumstances for this action that may otherwise result in potentially significant impacts.

CE Determination

I have determined that a Categorical Exclusion is the appropriate level of NEPA analysis for this action and that no extraordinary circumstances exist that would require preparation of an environmental assessment or environmental impact statement.

I have determined that an environmental assessment or environmental impact statement is required for this action.

Signature : Frank Cantelas

Signed by : Frank Cantelas

Date Signed: 10/11/2019



## 12.4 Appendix D: National Marine Fisheries Service Endangered Species Act Letter of Concurrence



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE  
Silver Spring, MD 20910

AUG 08 2018

Refer to NMFS No: FPR-2018-9276

Commander William Mowitt  
Deputy Director  
Office of Ocean Exploration and Research  
1315 East West Highway  
Silver Spring, Maryland 20910

RE: Concurrence Letter for the National Oceanic and Atmospheric Administration's Office of Ocean Exploration and Research's Marine Operation Activities on the National Oceanic and Atmospheric Administration Ship *Okeanos Explorer* for the 2018 through 2019 Field Seasons

Dear Mr. Mowitt:

On July 6, 2018, the National Marine Fisheries Service (NMFS) received your request for a written concurrence that the National Oceanic and Atmospheric Administration (NOAA) Office of Ocean Exploration and Research's marine operations activities on the NOAA Ship *Okeanos Explorer* for the 2018 through 2019 field seasons under the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 et seq.) is not likely to adversely affect species listed as threatened or endangered or critical habitats designated under the ESA. This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA, implementing regulations at (50 C.F.R. §402), and agency guidance for preparation of letters of concurrence.

We reviewed the consultation request document and related materials submitted by your office. We requested that your office update the acoustic thresholds submitted in the biological evaluation to match NMFS's 2018 acoustic technical guidance (NMFS 2018a). This assisted NMFS's ESA Interagency Cooperation Division to determine the total amount of disturbance from acoustic sources during the 2018 through 2019 field season on the NOAA Ship *Okeanos Explorer* is not likely to adversely affect ESA listed species within the action area. In addition, our assessment considered prior analyses and determinations on recent ESA informal consultations which had the same activities in similar geographic locations and the implementation of all mitigation measures included in your biological evaluation (NMFS 2017; 2018b). Based on our knowledge, expertise, and the materials submitted in your request for informal consultation, we concur with the Office of Ocean Exploration and Research's conclusions that the proposed action is not likely to adversely affect ESA-listed species and/or designated critical habitat.

This concludes consultation under the ESA for species and/or designated critical habitat under NMFS's purview on the NOAA Office of Ocean Exploration and Research's marine operation activities on the NOAA Ship *Okeanos Explorer* for the 2018 through 2019 field seasons.

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Ocean Exploration  
and Research

Reinitiation of consultation is required and shall be requested by the NOAA Office of Ocean Exploration and Research or by NMFS where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) take occurs; (b) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in this consultation; (c) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not previously considered in this consultation; or (d) if a new species is listed or critical habitat designated that may be affected by the action (50 C.F.R. §402.16).

We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat. If you have any questions on this consultation, please contact me at (301) 427-8495 or by email at [cathy.totorici@noaa.gov](mailto:cathy.totorici@noaa.gov) or Jonathan Molineaux at (301) 427-8440 or by email at [jonathan.molineaux@noaa.gov](mailto:jonathan.molineaux@noaa.gov).

Sincerely,



Cathryn E. Totorici  
Chief, ESA Interagency Cooperation Division  
Office of Protected Resources



### Literature Cited

- NMFS. (2017). *Concurrence letter for activities to be conducted for National Centers for Coastal Ocean Science-led activities as part of the Southeast Deep Coral Initiative in 2017 through 2019*. Silver Spring, Maryland: National Marine Fisheries Service, Office of Protected Resources.
- NMFS. (2018a). *2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0)*. NOAA Technical Memorandum. U.S. Department of Commerce.
- NMFS. (2018b). *ESA Section 7 Consultation regarding to the proposed issuance of an Incidental Harassment Authorization to Garden State Offshore Energy for upcoming surveys*. Gloucester, Massachusetts: National Marine Fisheries Service, Greater Atlantic Regional Fisheries Office.




## 12.5 Appendix E: National Marine Fisheries Service Essential Fish Habitat Consultation Memorandum



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE  
GREATER ATLANTIC REGIONAL FISHERIES OFFICE  
55 Great Republic Drive  
Gloucester, MA 01930-2276

JUL 19 2018

MEMORANDUM FOR: Daniel Wagner, Ph.D.  
Expedition Coordinator, Cherokee Nation Strategic Programs  
NOAA Office for Ocean Exploration and Research

FROM: Louis A. Chiarella   
Assistant Regional Administrator, Habitat Conservation Division

SUBJECT: Essential Fish Habitat (EFH) Consultation for Deep-Sea  
Exploration Activities occurring within the Greater Atlantic  
Region aboard NOAA Ship *Okeanos Explorer* in 2018-2020

This responds to your request for an abbreviated EFH consultation for the field activities to be conducted aboard the NOAA Ship *Okeanos Explorer* in the Greater Atlantic Region between July 2018 and December 2020. During this time, up to 33 different research expeditions will be undertaken to collect critical baseline information in unknown or poorly known areas of the region at depths of 250 m or deeper through telepresence-based exploration. Specific activities to be undertaken include the use of deep-water mapping systems such as multi-beam, single beam, sub-bottom profiler and acoustic Doppler current profiler (ACDP) sonar systems, and the use of remotely operated vehicles (ROV), the ship's conductivity-temperature-depth (CTD) rosette, underway CDT, and high-bandwidth satellite connection for real-time ship to shore communications. New technologies and novel applications may be tested during the research expeditions. These technology demonstration projects are still under development at this time and will be evaluated individually for environmental impact. Your consultation request supplements a previously completed EFH consultation between NOAA's National Centers of Coastal Ocean Science (NCCOS) and NOAA Fisheries Southeast Regional Office (SERO) for research activities to be conducted in U.S. federal waters of the Gulf of Mexico, South Atlantic Bight and Caribbean in 2017-2019 using NOAA ships *Okeanos Explorer* and *Nancy Foster*.

As specified in the Magnuson Stevens Fishery Conservation and Management Act (MSA), EFH consultation is required for federal actions that may adversely affect EFH. We have reviewed information provided on the proposed activities as well as the protective measures and best management practices incorporated into the action and have determined that adverse impacts have been minimized to the extent practicable. As such, we have no EFH conservation recommendations to provide pursuant to Section 305(b)(2) of the MSA. Further EFH consultation on this action is not necessary unless future modifications are proposed that would change the basis of our determination.

cc: GAR/HCD- K. Greene  
SERO/HCD-V. Fay, D. Dale



## 12.6 Appendix F: National Marine Fisheries Service Southeast Regional Office Letter of Acknowledgement



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
**NATIONAL MARINE FISHERIES SERVICE**  
Southeast Regional Office  
263 13<sup>th</sup> Avenue South  
St. Petersburg, Florida 33701-5505  
<https://www.fisheries.noaa.gov/region/southeast>

06/06/2019

F/SER25:FH

Mr. Craig Russell  
NOAA Office of Ocean Exploration and Research (OER)  
7600 Sand Point Way, NE  
Seattle, WA 98115

Dear Mr. Russell:

This letter of acknowledgement (LOA) recognizes the activities outlined in your May 30, 2019, request as scientific research in accordance with the definitions and guidance at 50 CFR 600.10 and 600.745(a). As such, the proposed activities are not subject to fishing regulations at 50 CFR 622 developed in accordance with the Magnuson-Stevens Fishery Conservation and Management Act. This LOA is effective from date of issuance through December 31, 2019.

NOAA Fisheries understands primary operations aboard the NOAA Ship *Okeanos Explorer* will take place throughout federal waters of the South Atlantic and U.S. Caribbean in areas deeper than 250 m. OER anticipates supporting cruises that will be some combination of mapping and remote operating vehicle (ROV) operations. Specifically, these efforts will (1) survey deep-sea coral ecosystems using ROV, including using a suction sampler to take 4-6 biological samples per ROV dive, (2) map deep-water habitats using multi-beam echosounders, and (3) sample the physical and chemical properties of the water column. From June 20 through July 12, 2019, NOAA OER will conduct a seafloor and water column mapping cruise (EX-19-03-L2) to collect data to help improve fundamental understanding in this region. Operations will consist of daytime ROV dives and overnight mapping operations. ROV dive sites are expected to include deep-sea coral and sponge habitats, submarine canyons, potential methane seeps, maritime heritage sites and midwater exploration. Another cruise (EX-19-07) will be conducted from November 1-23, 2019, with similar ROV and mapping operations. The combined dives will enable scientists and managers to have a better understanding of the diversity and distribution of deep-water habitats in this region, and enable informed resource management decisions.

Project participants covered under this LOA include: Kasey Cantwell, Eric Johnson, Elizabeth Lobecker, Rosemary Abbitt, Craig Russell, and Alan Leonardi. Copies of this LOA and the scientific research plan for the project should be onboard the vessel during all sampling activities. This LOA is separate and distinct from any permit or consultation required by the Marine Mammal Protection Act, Endangered Species Act, or any other applicable law.



Please send a copy of any cruise report or other publications resulting from the scientific research activity to me and to the Director, Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, Florida 33149-1003.

Sincerely,

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REW.J.1365863152 Date: 2019.06.06 08:29:40 -0400

for Roy E. Crabtree, Ph.D.  
Regional Administrator

Enclosure

cc: F/SEFSC, F/EN3

