Ocean Exploration and Research

doi: 10.25923/ha05-v304

Project Instructions

Date Submitted:

Platform: NOAA Ship *Okeanos Explorer*

Project Number: EX-19-06

Project Title: Southeastern US Deep-Sea Exploration, Leg 1 (Mapping)

Project Dates: October 5 - October 26, 2019

Prepared by: Derek Sowers **Dated:** 10/01/2019

Derek C. Sowers, NOAA
Expedition Coordinator
Office of Ocean Exploration & Research

Approved by: _____ **Dated:** 10/2/2019

Craig Russell, NOAA
Program Manager
Office of Ocean Exploration & Research

Approved by: David J Zezula CAPT/NOAA ZEZULA.DAVID.J.1097241836 2019.10.03 18:34:41 -04'00' **Dated:** _____

Captain David Zezula, NOAA
Commanding Officer
Marine Operations Center - Atlantic

I. Overview

> "America's future depends on understanding the ocean. We explore the ocean because its health and resilience are vital to our economy and to our lives. We depend on the ocean to regulate weather and climate; sustain a diversity of life; for maritime shipping and national defense; and for food, energy, medicine, and other essential services to humankind."
>
> *- NOAA Office of Ocean Exploration and Research Strategic Plan*

A. Brief Summary and Project Period

This document contains project instructions for EX-19-06. This cruise will include 24 hours/day acoustic exploration mapping operations. The expedition will commence on October 5, 2019 in North Kingstown, Rhode Island (2578 Davisville Road, North Kingstown, Rhode Island 02852) and conclude on October 26, 2019 in Miami, Florida (US Coast Guard Base Miami Beach, 100 MacArthur Causeway, Miami Beach, FL 33139). Mapping operations will focus on areas generally deeper than 200 meters off the U.S. East Coast with a focus on the Blake Plateau. The first four days of the cruise will entail transiting from Rhode Island to the primary surveying area, with the rest of the cruise spent conducting systematic surveying operations on the Blake Plateau. Mapping operations will occur mainly within the U.S. Exclusive Economic Zones (EEZ), with a very small amount of mapping planned just inside the Bahamian EEZ's northern boundary if permits are approved at that time.

NOAA's Office of Ocean Exploration and Research (OER) is the only federal organization dedicated to exploring the global ocean. OER works with partners to identify priority areas for exploration; support innovations in exploration tools and capabilities; and encourage the next generation of ocean explorers, scientists, and engineers to pursue careers in ocean exploration and related fields. The data and information collected during our expeditions and the research we fund gives resource managers, the academic community, and the private sector the information they need to identify, understand, and manage ocean resources for this and future generations of Americans.

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. We explore the ocean to make valuable scientific, economic, and cultural discoveries; we explore because ocean health and resilience are vital to our economy and to our lives. Exploration supports NOAA

mission priorities and national objectives by providing high-quality scientific information about the deep ocean to anyone who needs it.

In close collaboration with government agencies, academic institutions, and other partners, OER conducts deep-ocean expeditions using advanced technologies on NOAA Ship *Okeanos Explorer*. From mapping and characterizing previously unseen seafloor to collecting and disseminating information about ocean depths, this work helps to establish a foundation of information and to fill data gaps. Data collected on the ship follow federal open-access data standards and are publicly available shortly after an expedition ends. This ensures the delivery of reliable scientific data needed to identify, understand, and manage key elements of the ocean environment.

EX-19-06 will be one of several NOAA Ship *Okeanos Explorer* expeditions from 2018 to 2021 that will contribute to NOAA's Atlantic Seafloor Partnership for Integrated Research and Exploration (ASPIRE), a major multi-year, multi-national, collaborative ocean exploration program focused on raising our collective knowledge and understanding of the North Atlantic Ocean. The North Atlantic Ocean plays a pivotal role to humankind, providing biological and geological resources, ecosystem services such as seafood production and climate regulation, and a route for trade and travel between Europe and the Americas. However, we have only begun to understand the North Atlantic Ocean's ecosystems, resources and oceanography, as much about the seabed bathymetry, geology, mineralogy, and trans-Atlantic connectivity of biological communities remains unknown. With the signing of the Galway Statement on Atlantic Ocean Cooperation by The European Union, Canada and the U.S., and the Atlantic Ocean Research Alliance's deep-sea science and exploration efforts, there is significant momentum within the international community to cooperate on integrated exploration and research of the North Atlantic Ocean.

Building on previous work in the North Atlantic, including the 2011-2014 Atlantic Canyons Undersea Mapping Expeditions (ACUMEN), NOAA's ASPIRE campaign will provide data to inform research planning and management decisions in the region, by broadening both the geographic focus to include more of the U.S. Atlantic and Canada, and the scope of partnerships to include U.S. federal agencies, such as U.S. Geological Survey (USGS) and Bureau of Ocean Energy Management (BOEM), as well as international partners from Canada and Europe.

B. Days at Sea (DAS)

Of the 22 DAS scheduled for this project, 22 DAS are funded by OAR allocation. This project is estimated to exhibit a Medium Operational Tempo due to 24-hour-per-day exploratory mapping operations.

C. Operating Area

EX-19-06 is a 24-hour a day mapping cruise that will focus operations on the U.S. Blake Plateau off the U.S. southeast region. Four high priority mapping areas are indicated in Figure 1 and are planned to be surveyed during this cruise.

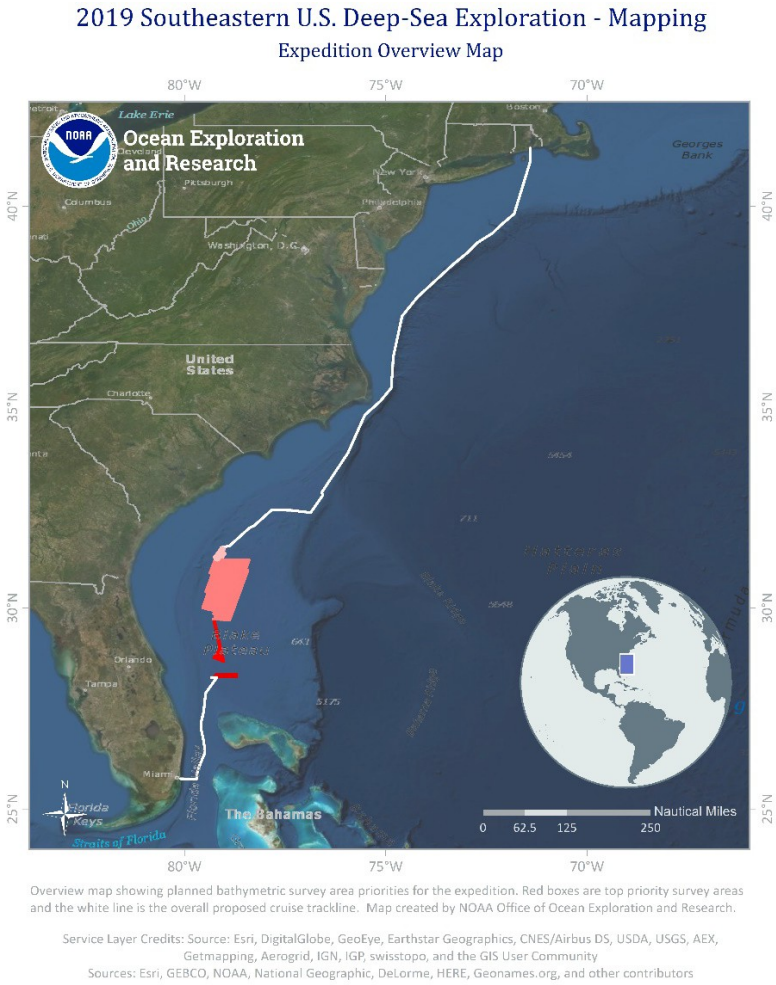

Figure 1: Map showing the general operating area for EX-19-06. The red polygons indicate priority mapping areas, and the white lines show the proposed cruise track. Note that the cruise track is subject to change based on survey results, field conditions, and the discretion of the CO.

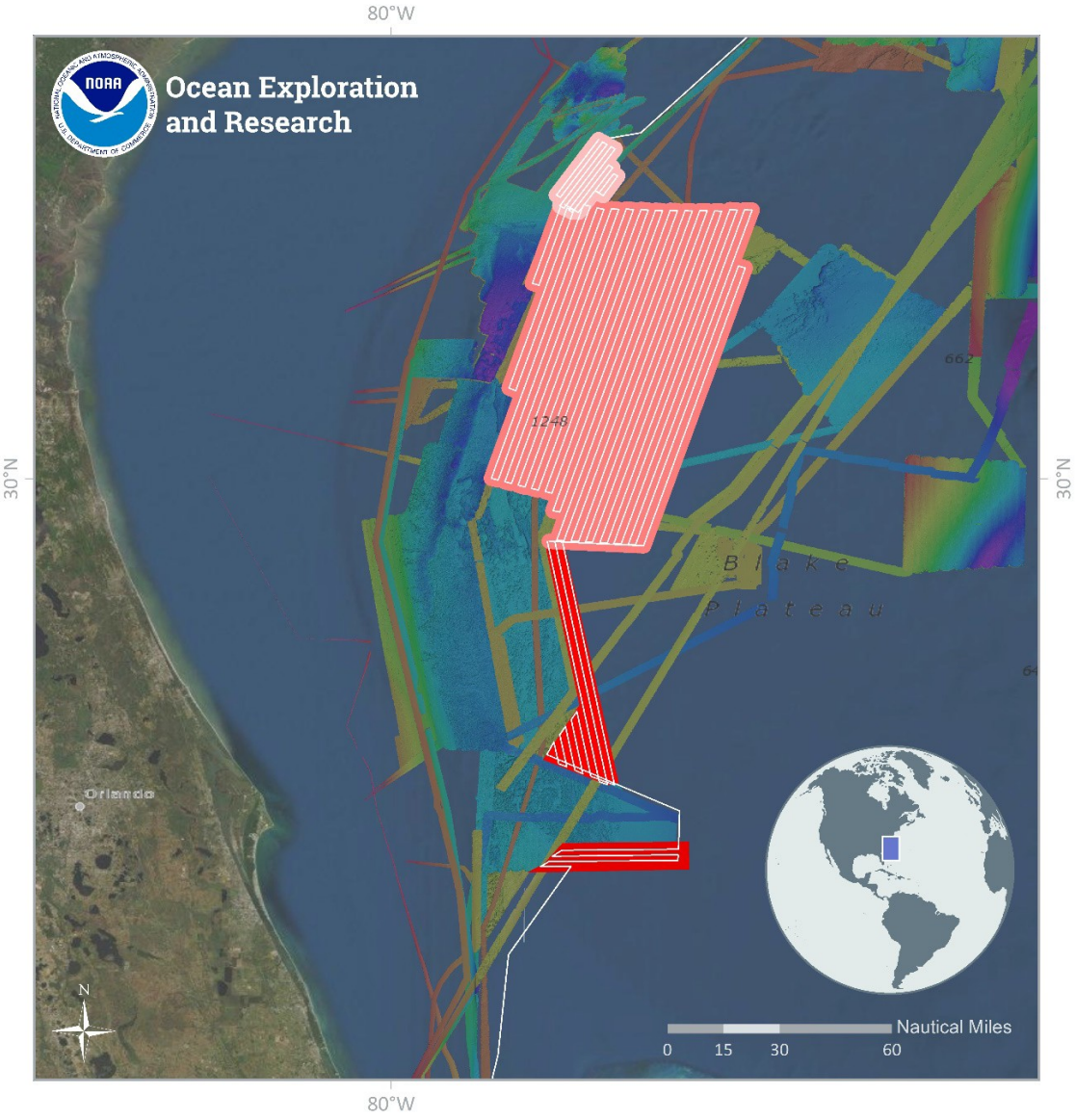

Figure 2: Map showing the priority ocean exploration mapping areas for EX-19-06. The red polygons indicate priority mapping areas, and the white lines show the proposed cruise track and surveying lines. Multibeam bathymetry data previously collected by NOAA OER shown in the background for context.

Ocean Exploration and Research

The tables below detail the bounding vertices of the priority mapping polygons. Priority areas are listed in order from north to south.

Table 1: Latitude and Longitude vertices for Priority Area 1 (Bloody Marsh Wreck Survey).

Priority Area 1 (Bloody Marsh Wreck Survey)		
ID	**Latitude**	**Longitude**
1	31 31.604 N	79 4.846 W
2	31 16.228 N	79 16.601 W
3	31 12.123 N	79 15.692 W
4	31 70.195 N	79 9.929 W
5	31 21.073 N	78 58.451 W
6	31 28.794 N	78 59.23 W

Table 2: Latitude and Longitude vertices for Priority Area 2 (Big Stetson Survey).

Priority Area 2 (Big Stetson Survey)		
ID	**Latitude**	**Longitude**
1	31 14.173 N	79 15.326 W
2	30 51.914 N	79 24.297 W
3	30 24.317 N	79 573.347 W
4	30 21.382 N	79 27.124 W
5	29 58.726 N	79 34.968 W
6	29 54.376 N	79 16.52 W

7	29 42.821 N	79 18.904 W
8	29 41.574 N	78 51.345 W
9	31 12.153 N	78 18.583 W
10	31 13.655 N	79 12.336 W

Table 3: Latitude and Longitude vertices for Priority Area 3 (Stetson Southeast Survey).

Priority Area 3 (Stetson Southeast Survey)		
ID	**Latitude**	**Longitude**
1	28 59.468 N	79 9.796 W
2	29 43.097 N	79 19.066 W
3	29 43.626 N	79 17.35 W
4	29 42.861 N	79 13.843 W
5	28 38.603 N	78 59.271 W
6	28 37.977 N	79 2.171 W
7	28 44.814 N	79 19.467 W

Table 4: Latitude and Longitude vertices for Priority Area 4 (Boundary Survey).

Priority Area 4 (Boundary Survey)		
ID	**Latitude**	**Longitude**

1	28 22.553 N	79 14.305 W
2	28 22.95 N	78 40.554 W
3	28 15.469 N	78 40.43 W
4	28 14.643 N	79 23.816 W
5	28 16.903 N	79 19.367 W

Table 10 lists the general planned transit route for the expedition. This transit route is to provide a sense of the overall direction for the cruise and is subject to change based on guidance from the ship's Navigation Officer and CO, weather conditions, traffic conditions, optimization of mapping coverage and data quality, and other potential circumstances.

Table 5: Latitude and Longitude coordinates for the overall planned transit of the cruise between Rhode Island and Miami.

Planned Transit Waypoints (Subject to Change)		
ID	**Latitude**	**Longitude**
1	41 26.62 N	71 24.629 W
2	41 5.88 N	71 25.066 W
3	39 48.411 N	71 48.754 W
4	39 32.519 N	72 7.747 W
5	39 19.66 N	72 20.866 W
6	39 4.745 N	72 44.396 W
7	38 50.23 N	72 58.601 W

8	38 33.305 N	73 19.333 W
9	37 44.459 N	74 12.635 W
10	37 15.58 N	74 35.985 W
11	36 14.973 N	74 48.969 W
12	35 28.769 N	74 51.9 W
13	35 8.698 N	75 8.348 W
14	34 48.009 N	75 31.367 W
15	33 51.325 N	75 56.553 W
16	32 52.144 N	76 35.837 W
17	32 48.608 N	76 33.908 W
18	32 22.354 N	76 52.097 W
19	32 25.785 N	77 21.186 W
20	32 26.555 N	77 50.008 W
21	32 2.651 N	78 16.528 W
22	31 59.511 N	78 23.405 W
23	31 32.493 N	78 53.397 W
24	31 30.389 N	79 5.6 W
25	31 12.672 N	79 13.921 W

26	31 12.072 N	79 13.711 W
27	30 52.528 N	79 22.041 W
28	30 50.644 N	79 16.74 W
29	30 34.468 N	79 23.54 W
30	30 32.932 N	79 22.174 W
31	30 26.655 N	79 25.015 W
32	28 38.533 N	78 59.326 W
33	28 31.446 N	78 42.425 W
34	28 17.398 N	78 42.657 W
35	28 16.530 N	79 12.000 W
36	27 52.880 N	79 28.770 W
37	27 25.890 N	79 31.500 W
38	27 11.337 N	79 35.120 W
39	26 58.220 N	79 35.200 W
40	26 29.850 N	79 30.060 W
41	26 23.440 N	79 29.900 W
42	25 57.670 N	79 40.710 W
43	25 43.870 N	79 42.420 W

44	25 45.150 N	80 5.740 W

D. Summary of Objectives

October 5-26, 2019 (North Kingstown, RI – Miami, Florida) EX1906, Southeastern US Deep-Sea Exploration - Leg 1 (Mapping)

EX-19-06 operations will involve a transit southward followed by focused ocean mapping operations that will occur mostly in deep (>200 m) U.S. federal waters off the southeast U.S. Coast. Some limited surveying may also be completed along the US/Bahamas maritime boundary as permitted by The Bahamas. The cruise will conduct 24 hour/day exploratory mapping operations, as well as provide data for the EX-19-07 expedition's ROV dive planning.

1. Ship

a. Small boat deployment (weather permitting); Develop and maintain proficiency with small boat operations for new and long term crew;
b. Conduct CTD operations as requested and able;
c. Man overboard / ship handling training
d. Additional safety training.

2. Onboard Mapping

a. Upgrade mapping data visualization and processing software (Fledermaus and Qimera) to the latest versions and test functionality.
b. Execute mapping line plans as defined by onboard personnel, with real time adjustments made to obtain complete seabed coverage as necessary.
c. Collect high-resolution mapping data from sonars in priority areas. Focused surveys may also be completed in the contingency areas as time allows or in order to adapt to adverse weather conditions.
d. Conduct 24 hr/day mapping operations for the entirety of the cruise.
e. Create daily standard bathymetry mapping products.
f. Collect sun photometer measurements as part of Exploration Project of Opportunity (EPO).
g. Average survey speeds of 8.5-9 kts will be utilized during mapping operations.
h. Transit speeds of 10kts may occasionally be requested in certain areas and as feasible.
i. Produce daily products for backscatter data following the new draft SOP. Refine SOP as needed.

j. Ancillary mapping data processing objectives include: generate bottom backscatter mosaics; review water column data for anomalies; and produce jpg images of sub-bottom data.
k. Generate final cruise map showing seabed coverage obtained.

3. Science

a. Acquire data on deepwater habitats to support science and management needs and in support of ASPIRE.
b. Explore areas relevant to resource managers such as essential fish habitat (EFH), habitat areas of particular concern (HAPC), national marine monuments, MPAs, or other priority areas for management or conservation.
c. Identify, map, and explore the diversity and distribution of benthic habitats, including potential deep-sea coral and sponge communities, fish habitats, and chemosynthetic communities.
d. Map geologic features to better understand the geological context of the region and improve knowledge of past and potential future geohazards.
e. Acquire acoustic, and oceanographic data as a foundation to better understand the characteristics of the water column and the pelagic fauna that live there.
f. Acoustically identify potential underwater cultural heritage (UCH) sites such as shipwrecks.
g. Engage a broad spectrum of the scientific and management community, as well as the public in telepresence-based exploration.
h. Conduct operations in conjunction with shore-based exploration command centers and remote science team participants.
i. Create and provide input into standard science products to provide a foundation of publicly accessible data and information products to spur further exploration, research, and management activities.
j. Collect high-resolution bathymetry in areas with no (or low quality) sonar data.

4. Mapping Sound Velocity Profiling Objectives

a. Collect XBT casts as data quality requires but not more than 6 hours apart, during mapping operations using handheld and AOML automatic XBT launchers.
b. Maintain CTD capabilities as back up sound velocity profiling method for mapping data requirements. At least one CTD cast is planned for this cruise, with the specific location to be determined in consultation with the ship's SST, OPS, and CO. This CTD will likely be during the first week of the cruise and in a high priority mapping survey area. Two to three hours shall be dedicated to this purpose.
c. Potentially collect CTD data with the new equipment Castaway CTD, a hand held, hand deployed CTD device deployed to 100 meters depth. The device would be attached to the end of a line and manually lowered and raised over the rail on the fantail by a member of the survey department. Due to the

lightweight nature of the gear, it is possible a small weight may need to be attached to the line if current is present. Data is downloaded via BlueTooth. Demonstration videos can be found on the website https://www.sontek.com/castaway-ctd and https://www.sontek.com/video-post.php?Energize-Your-Science-Class-with-the-CastAway-CTD-Lesson-Plan-18.

5. Data Management

a. Provide a foundation of publicly accessible data and information products to spur further exploration, research, and management activities;
b. Use daily bathymetric mapping products and SCS mailers to update *Okeanos Atlas* for onshore situational awareness.
c. Verify GFOE-managed data systems perform as expected
d. Update SOPs to reflect GFOE-managed network changes
e. Clean up mapping data files and folders to reduce duplication and free up storage capacity.
f. Confirm mapping data file throughput to shoreside FTP.
    i. EM 302 .all, .wcd
    ii. EK 60/80 .raw, .idx (LIKELY will not send WBT files shoreside)
    iii. SBP .segy, .keb, .kea

6. Video Engineering

a. Provide onboard support for 24 hour mapping and telepresence mapping objectives.
b. Test terrestrial and high-speed satellite links;
c. Verify Global Foundation for Ocean Exploration (GFOE)-managed telepresence systems perform as expected

7. Outreach (see section II.C.1 for more)

a. Engage the general public in ocean exploration through live video and timely content (daily updates and mapping products) posted on the *Ocean Explorer* website.
b. One or two live interactions are planned for this cruise with the University of New Hampshire's Center for Coastal and Ocean Mapping as part of their annual outreach event "Ocean Discovery Day" on October 18th and/or 19th.

8. Training of Onboard Explorers-in-Training

a. Conduct training in the acquisition and processing of sonar data
b. Conduct detailed bathymetric data processing
c. Generate cruise map
d. Process subbottom, EK60, multibeam bottom backscatter and water column backscatter data according to SOPs
e. Plan and execute cruise mini-projects

E. Participating Institutions

- National Oceanic and Atmospheric Administration (NOAA), Office of Ocean Exploration and Research (OER)–1315 East-West Hwy, Silver Spring, MD 20910 USA
- NOAA, National Centers for Environmental Information (NCEI), Stennis Space Center MS, 39529 USA
- University Corporation for Atmospheric Research (UCAR) Cooperative Programs for the Advancement of Earth System Science (CPAESS), PO Box 3000 Boulder, CO 80307 USA
- University of New Hampshire (UNH) Center for Coastal and Ocean Mapping (CCOM) Jere A. Chase Ocean Engineering Lab, 24 Colovos Rd, Durham, NH 03824 USA
- Global Foundation for Ocean Exploration (GFOE), P.O. Box 417, Mystic, CT 06355

F. Personnel (Mission Party)

Table 6: Full list of seagoing mission party members and their affiliations (* marks those that have not yet been confirmed). Note that this list is tentative until travel is booked. Any deviations will be communicated to the OPS Officer.

#	Name (First, Last)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
1	Derek Sowers	Expedition Coordinator/ Mapping Lead	10/03	10/27	M	OER (CNSP)	USA
2	Daniel Freitas	Watch Lead	10/03	8/27	M	UCAR	USA
3	Jason Meyer	Watch Lead	10/03	10/27	M	UCAR	USA
4	Janessy Frometa	Explorer in Training	10/03	10/27	F	UCAR	USA
5	Rebecca Composto	Explorer in Training	10/03	10/27	F	UCAR	USA
6	Lynette Davis	Explorer in Training	10/03	10/27	F	UCAR	USA
7	Fernando Aragon	Data Manager	10/03	10/27	M	GFOE	USA
8	Brian Doros	Video Engineer	10/03	10/27	M	GFOE	USA
9	Chris Wright	Network System Administrator	10/03	10/27	M	GFOE	USA

G. Administrative

1. Points of Contact:

Ship Operations

Marine Operations Center, Atlantic (MOA)
439 West York Street
Norfolk, VA 23510-1145
Telephone: (757) 441-6776
Fax: (757) 441-6495

Chief, Operations Division, Atlantic (MOA)
LCDR Fionna Matheson, NOAA
Telephone: (757) 441-6842
Fax: (757) 441-6776
Email: Chiefops.MOA@noaa.gov

Mission Operations

Derek Sowers
Expedition Coordinator
NOAA Office of Ocean Exploration and Research (CNSP)
C: (714) 321-6084
Email: derek.sowers@noaa.gov

CDR Nicole Manning, NOAA
Commanding Officer
NOAA Ship *Okeanos Explorer*
Phone: (401) 439-7848
Email: CO.Explorer@noaa.gov

LT Rosemary Abbitt
Operations Officer
NOAA Ship Okeanos Explorer
Phone: 808-659-9179 x221
Email: ops.explorer@noaa.gov

Other Mission Contacts

Craig Russell
Program Manager
NOAA Ocean Exploration & Research
Phone: (206) 526-4803 / (206) 518-1068
Email: Craig.Russell@noaa.gov

Rachel Medley
Chief, Expedition & Exploration Division
NOAA Ocean Exploration & Research
Phone: (301) 789-3075
Email: Rachel.Medley@noaa.gov

Alan Leonardi, Director
NOAA Ocean Exploration & Research
Phone: 301-734-1016
Mobile: 202-631-1790
Email: alan.leonardi@noaa.gov

Vessel Shipping Address

1. Shipments

Send an email to the *Okeanos Explorer* Operations Officer at OPS.Explorer@noaa.gov indicating the size and number of items being shipped.

For shipments to arrive while in port in North Kingstown, Rhode Island at the start of the expedition, **shipments should arrive no later than October 4, 2019** and be mailed to the following address:

NOAA Ship *Okeanos Explorer*
Name or Department
2578 Davisville Road
North Kingstown, Rhode Island 02852

For shipments to arrive while in port in Miami, Florida after the expedition from October 27-30, 2019, **shipments should arrive no later than October 30, 2019** and should be mailed to the following address:

NOAA NMFS SEFSC
C/O: LT Justin Boeck
ATT: NOAA Ship Okeanos Explorer Operations Officer
75 Virginia Beach Drive
Key Biscayne, FL 33149

2. Diplomatic Clearances

The priority areas of this project lie within the EEZ of the U.S. and to a minor extent in The Bahamas. A request to conduct marine scientific research (MSR) in the waters of The Bahamas was submitted to the U.S. Department of State on July 8, 2019, and is currently pending approval for mapping operations (Appendix C).

3. Licenses and Permit

Pursuant to the National Environmental Policy Act (NEPA), NOAA 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 conduct. NOAA's Administrative Order (NAO) 216-6A Companion Manual describes the agency's specific procedures for NEPA compliance. Among these is the need to review all proposed NOAA-supported field projects for their environmental effects. An environmental review analysis has been completed for this expedition in accordance with Section 4 of the Companion Manual. Based on this review we determined that a categorical exclusion is the appropriate level of NEPA analysis for this expedition and that no extraordinary circumstances exist that would require preparation of an environmental assessment or environmental impact statement (Appendix D).

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 NOAA 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 (Appendix E).

OER has completed consultation with NOAA's Habitat Conservation Division on potential impacts of our operations to Essential Fish Habitat (EFH) in the Greater Atlantic Region, including the Caribbean Sea. They concurred that our operations would not adversely affect EFH provided adherence to our proposed procedures and their guidance stated in the letter (Appendix F).

Additionally, a request for a letter of acknowledgement (LOA) from the NOAA Greater Atlantic Regional Office (GARFO) covering all activities to be conducted as part of this expedition was submitted on April 4, 2019. A signed LOA from the GARFO Assistant Regional Administrator for Sustainable Fisheries stating that expedition activities are all in accordance with NMFS regulations was received on April 24, 2019 (Appendix G).

II. Operations

The Expedition Coordinator is responsible for ensuring the scientific staff are trained in planned operations and are knowledgeable of project objectives, priorities and environmental compliance procedures. The Commanding Officer is responsible for ensuring all operations conform to the ship's accepted practices and procedures.

A. Project Itinerary

All times and dates are subject to prevailing conditions and the discretion of the Commanding Officer. Locations are approximate.

Table 7: Cruise Itinerary. This is an approximate itinerary and is subject to change based on objective completion.

Date	Activities

10/3	Cruise mobilization day in North Kingstown, RI. Mission personnel arrive to the ship throughout the day. Pre-cruise meeting in the afternoon with EC, OPS, and CO.
10/4	Cruise mobilization day. Dockside sonar pinging may be requested. Mission team orientation meeting. Vessel familiarization meeting with OPS for any new mission team members. Mapping watch schedule posted.
10/5	First day underway - Depart North Kingstown, RI in the morning. Transit mapping along the edge of the continental shelf as the ship heads south to primary survey grounds on the Blake Plateau. Safety drills including donning of survival suits.
10/6	Transit mapping south along the edge of the continental shelf.
10/7	Transit mapping south along the edge of the continental shelf.
10/8	Transit mapping south along the edge of the continental shelf.
10/9	Arrive at Priority Area 1 (Bloody Marsh wreck search area) and complete a focused survey of the Bloody Marsh Survey area.
10/10	Begin mapping Priority Area 2 (Big Stetson Survey area). Survey lines will be oriented mostly directly against and with the Gulf Stream current (not orthogonal to it) to avoid severe crabbing angles while mapping. This survey will edge match existing multibeam data coverage in the region.
10/11-10/21	Focused surveying operations of the Big Stetson Survey area.
10/22-10/23	Focused surveying operations of Priority Area 3 (Stetson Southeast Survey).
10/24	Focused surveying operations of Priority Area 4 (Boundary Survey).
10/25	Transit day from Boundary Survey area towards port in Miami, FL. Mapping will be conducted following the US/Bahamas boundary if The Bahamas MSR permit allows mapping within Bahamian waters, while edge mapping previously collected multibeam sonar coverage as possible. Conduct post-cruise meeting and present cruise results to officers and crew.
10/26	Transit overnight to Miami, FL and arrive in port in the early morning. Last sea day of the expedition. Demobilization.
10/27	Mission personnel depart the ship.

B. Staging and Destaging

Minimal staging and de-staging are anticipated for this mapping cruise. XBT probes will need to be loaded onboard prior to departure from Rhode Island, and this work will be coordinated with the ship's Senior Survey Technician.

C. Operations to be Conducted

1. **Telepresence / Outreach Events**

a. Three live video feeds will be used throughout the cruise to provide situational awareness for onshore personnel.
b. One or two live interactions are planned for this cruise with the University of New Hampshire's Center for Coastal and Ocean Mapping as part of their annual outreach event "Ocean Discovery Day" on October 18th and/or 19th.

2. **In-Port Events**
   a. No in port public events are planned for this cruise.

D. SCUBA Dive Plan

All SCUBA dives are to be conducted in accordance with the requirements and regulations of the NOAA Diving Program and require the approval of the ship's Commanding Officer. No science dives are planned during EX-19-06, but the ship may plan training, safety drills, or maintenance dives.

E. Applicable Restrictions

Sonar Operations

EM 302, EK 60/80, ADCP, and sub-bottom profiler sonar data acquisition are planned for this cruise. All data acquisition will be conducted in accordance with established standard operating procedures under the direction of the mapping team lead. These operating procedures will include protection measures when operating in the vicinity of marine mammals, sea turtles or Endangered Species Act-listed species as described in the appendices of this document. The final decision to operate and collect 24-hour sub-bottom profiler data will be at the discretion of the Commanding Officer.

III. Equipment

A. Equipment and capabilities provided by the ship

- Kongsberg Simrad EM 302 Multibeam Echosounder (MBES)
- Kongsberg Simrad EK 60/80 Split-beam Sonars: GPTs (18, 120, 200 kHz)
- Knudsen Chirp 3260 Sub-bottom profiler
- Teledyne RDI Workhorse Mariner ADCP (300 kHz)
- Teledyne RDI Ocean Surveyor ADCP (38 kHz)
- LHM Sippican XBT Mark21 System(Deep Blue probes)
- AOML Automated XBT Launcher (Deep Blue probes)
- Sea-Bird SBE 911Plus CTD and deck box
- Sea-Bird SBE 32 Carousel and 24 2.5 L Niskin Bottles

- Light Scattering Sensor (LSS)
- Oxidation – Reduction Potential (ORP)
- Dissolved Oxygen (DO) sensor
- Altimeter Sensor and battery pack
- Scientific Computing System (SCS)
- POS/MV with serial data feeds provided for the GFOE network
- Seabird SBE-45 (Micro TSG) data feeds provided for GFOE network
- Kongsberg Dynamic Positioning-1 System
- ECDIS
- Met/Wx Sensor Package with serial data feeds provided for GFOE network
- Three VoIP telephone lines
- 1 functioning and seaworthy SOLAS approved fast rescue boat
- 1 functioning and seaworthy work boat to support operations and personnel transfers

B. Equipment and capabilities provided by the OER and partners

- NOAA OER 6000 m *Deep Discoverer* ROV and NOAA *Seirios* Camera Platform
- Microtops II Ozone Monitor Sun photometer and handheld GPS required for NASA Marine Aerosols Network supplementary project.
- Sontek Castaway CTD
- K-Sync synchronization unit
- EK 80 Wide Band Transceivers, WBTs (38 and 70 kHz)
- SIS Software and Kongsberg acquisition computer
- EK 60/80 acquisition computer
- Sub-bottom profiler acquisition computer
- CTD acquisition computer
- QPS software suite (2 licenses)
- Hypack software
- Sound Speed Manager software
- GFOE provided VSAT High-Speed link (15 Mbps ship to shore; 5 Mbps shore to ship)
- Backscatter Mosaic computer
- GFOE exploration operations networking infrastructure
- MarineStar GPS with satellite corrections serial data feeds provided for GFOE network
- Telepresence System
- NCEI Cruise Information Management System (CIMS)
- GFOE VOIP system
- GFOE provided data storage

IV. Hazardous Materials

A. Policy and Compliance

The Expedition Coordinator is responsible for complying with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it). The Expedition Coordinator and Science Team Lead will be responsible for transporting all samples and HAZMAT on and off the ship. By Federal regulations and NOAA Marine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name and quantity, MSDS, appropriate spill cleanup materials (neutralizing agents, buffers, or absorbents) in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and chemical safety and spill response procedures. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Per OMAO procedure, the scientific party will include with their project instructions and provide to the CO of the respective ship 30 days before departure:

- List of chemicals by name with anticipated quantity
- List of spill response materials, including neutralizing agents, buffers, and absorbents
- Chemical safety and spill response procedures, such as excerpts of the program's Chemical Hygiene Plan or SOPs relevant for shipboard laboratories
- For bulk quantities of chemicals in excess of 50 gallons total or in containers larger than 10 gallons each, notify ship's Operations Officer regarding quantity, packaging and chemical to verify safe stowage is available as soon as chemical quantities are known.

Upon embarkation and prior to loading hazardous materials aboard the vessel, the scientific party will provide to the CO or their designee:

- An inventory list showing actual amount of hazardous material brought aboard
- An MSDS for each material
- Confirmation that neutralizing agents and spill equipment were brought aboard sufficient to contain and cleanup all of the hazardous material brought aboard by the program
- Confirmation that chemical safety and spill response procedures were brought aboard

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory showing that all chemicals were removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

Scientific parties are expected to manage and respond to spills of scientific hazardous materials. Overboard discharge of hazardous materials is not permitted aboard NOAA ships.

B. Inventory

Table 8: Inventory of hazardous materials that will be onboard for EX-19-06

Item	Use	Approx. locations
95% Denatured Ethanol (32 gal.)	Sample preservation	Wetlab, under the chemical hood, Flame Locker
Formaldehyde (2 gal.) to be buffered into 10% Buffered Formalin	Sample preservation	Wetlab, under the chemical hood
Chaos Buffer (325 mL) (4 M guanidine thiocyanate, 0.5% N-laurosylsarcosine, 25 mMTris pH 8.0, 0.1 M beta-mercaptoethanol)	Sample preservation	Wetlab, under the chemical hood
Aqua Shield	Underwater Lubricant	ROV Workshop Fire Cabinet, Pit
Dow Corning 4	Electrical insulating compound	ROV Workshop Fire Cabinet, Pit
Fluid Film Spray	Silicone Lubricant	ROV Workshop Fire Cabinet
Isopropanol Alcohol (2 gal.)	Solvent	ROV Workshop Fire cabinet
Scotchkote	Electrical insulating compound	ROV Workshop Fire cabinet
3M Silicone Spray	Silicone Lubricant	ROV Workshop Fire cabinet
Synthetic AW Hydraulic Oil, ISO-22	Amsoil (AWG-05)	Hanger, Pit, Vehicles
Tap Magic Cutting Fluid	Cutting/Machining Lubricant	ROV Workshop Fire cabinet
Tap Magic Heavyweight Cutting Fluid	Cutting/Machining Lubricant	ROV Workshop Fire cabinet
Tuff Coat M	Marine Lubricant	Winch room
Dow Corning Molykote 111	Valve Lubricant and Sealant	ROV Workshop Fire cabinet, Pit
WD40	Lubricant	ROV Workshop Fire cabinet
Loktite	Bolt adhesive	ROV Workshop Fire cabinet
Shell Diala S2	Vitrea	Hanger, Vehicles

Por-15	Paint Kit	ROV Workshop Fire cabinet
Aeroshell 41	Hydraulic Fluid	Hanger, ROV *D2*
Ultratane	Butane fuel	ROV Workshop fire cabinet
Rust-oleum	Protective Enamel	ROV Workshop fire cabinet
Flux-Off	Soldering Flux remover	ROV Workshop fire cabinet
Propane	Torch Fuel	ROV Workshop fire cabinet
Adhesive Pliobond 25	General adhesive	Tool room
AP 120 Metal Prep	Degreaser/cleaner for metal surfaces	Pit
Butane Fuel	Torch refill	Tool Room
PVC cement	Adhesive for PFV plastic piping	Tool Room
Phosphoric Acid	Ferrous metal rust removal	Tool room
Pipetite Paste	Plumbing sealant	Tool room/pit
Spindle Oil 10, ROS PT	Lubricant/compensation oil	Tool room
DC557	Silicon grease	Tool room/pit
Tether Potting Catalyst	Two part epoxy catalyst	Pit
Tether Potting Compound	Two part epoxy ingredient	Pit
ThermaPlex Bearing Grease	Lubricant	Pit
Tritech Seaking	Compensator oil for sonar head	Pit
Bleach (1 Quart)	Sterilization and sample preservation	Cabinet under sink

C. Chemical safety and spill response procedures

All safety and spill response procedures will be handled according to OMAO guidelines and following the manufacturer's MSDS which has been provided to the ship's ECO.

D. Radioactive Materials

NOT APPLICABLE TO THIS CRUISE

V. Additional Projects

A. Supplementary Projects

NASA Maritime Aerosol Network

During the cruise the marine aerosol layer observations will be collected for the NASA Maritime Aerosol Network (MAN). Observations will be made by mission personnel (as time allows) with a sun photometer instrument provided by the NASA MAN program. Resulting data will be delivered to the NASA MAN primary investigator Alexander Smirnov by the expedition coordinator. All collected data will be archived and publically available at: http://aeronet.gsfc.nasa.gov/new_web/maritime_aerosol_network.html

Equipment resides on the ship and is stewarded by the Expedition Coordinators.

See Appendix H for full Survey of Opportunity Form.

B. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

VI. Disposition of Data and Reports

A. Data Responsibilities

All data acquired on *Okeanos Explorer* will be provided to the public archives without proprietary rights. All data management activities shall be executed in accordance with NAO 212-15, Management of Environmental and Geospatial Data and Information

B. Ship Responsibilities

The Commanding Officer is responsible for all data collected for missions until those data have been transferred to mission party designees. Data transfers will be documented on NOAA Form 61-29.

C. NOAA OER Responsibilities

The Expedition Coordinator will work with the *Okeanos Explorer* Operations Officer to ensure data pipeline protocols are followed for final archive of all data acquired on *Okeanos Explorer* without proprietary rights. See Appendix B for detailed data management plans.

D. Deliverables

1. At sea

a. Daily plans of the Day (POD)
b. Daily situation reports (SITREPS)
c. Summary forms for each CTD rosette cast
d. Daily summary bathymetry data files
e. Raw sonar files (EM 302, EK 60/80, Sub-bottom, ADCP)

2. Post cruise

a. Refined SOPs for all pertinent operational activities
b. Assessments of all activities

3. Science

a. Multibeam raw and processed data (see appendix B for the formal cruise data management plan)
b. XBT and CTD raw and processed data
c. EK 60 raw data
d. Knudsen 3260 sub-bottom profiler raw data
e. ADCP raw data
f. Mapping data report
g. Cruise report (for ROV cruises only)

E. Archive

OER and ship will work together with the NOAA National Centers for Environmental Information (NCEI)-based Data Management Team to ensure the documentation and stewardship of acquired datasets in accordance with NAO 212-15.

VII. Meetings, Vessel Familiarization, and Project Evaluations

A. Shipboard Meetings

A safety brief and overview of POD will occur on the Bridge each morning at 0800. Daily Operations Briefing meetings will be held at a time and location determined by Operations Officer based on watch schedule, to review the current day, and define operations, associated requirements, and staffing needs for the following day. A Plan of the Day (POD)

will be posted each evening for the next day in specified locations throughout the ship. OER Daily Situation Reports (SITREPS) will be produced by onboard Expedition Coordinator (EC). OMAO related information in SITREPS will be discussed during either safety or operations meetings. Additionally, EC and OPS will be meet as needed to discuss OMAO related information in SITREPS. The OPS Officer will be cc'd on SITREPS sent to shore to provide additional clarification as needed.

B. Pre-Project Meeting:

The Expedition Coordinator and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship's crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all concerns. This meeting shall be conducted before the beginning of the project with sufficient time to allow for preparation of the ship and project personnel. The ship's Operations Officer usually is delegated to assist the Expedition Coordinator in arranging this meeting.

C. Vessel Familiarization Meeting:

The Commanding Officer is responsible for ensuring scientific personnel are familiarized with applicable sections of the standing orders and vessel protocols, e.g., meals, watches, etiquette, drills, etc. A vessel familiarization meeting shall be conducted in the first 24 hours of the project's start and is normally presented by the ship's Operations Officer.

D. Post-Project Meeting:

The Commanding Officer is responsible for conducting a meeting no earlier than 24 hours before or seven days after the completion of a project to discuss the overall success, challenges, and shortcomings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the applicable ship's officers, applicable crew, the Expedition Coordinator, and members of the scientific party and is normally arranged by the Operations Officer and Expedition Coordinator.

E. Project Evaluation Report:

Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Expedition Coordinator. The form is available at https://docs.google.com/a/noaa.gov/forms/d/1a5hCCkgIwaSII4DmrHPudAehQ9HqhRqY3J_FXqbJp9g/viewform and provides a "Submit" button at the end of the form. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information.

Though the complete form is not shared with the ship, specific concerns and praises are followed up on while not divulging the identity of the evaluator.

VIII. Miscellaneous

A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheese, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least twenty-one days prior to the survey (e.g., Expedition Coordinator is allergic to fin fish).

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Expedition Coordinator. The Expedition Coordinator and Operations Officer will work together on a detailed berthing plan to accommodate the gender mix of the scientific party taking into consideration the current makeup of the ship's complement. The Expedition Coordinator is responsible for ensuring the scientific berthing spaces are left in the condition in which they were received; for stripping bedding and linen return; and for the return of any room keys which were issued. The Expedition Coordinator is also responsible for the cleanliness of the laboratory spaces and storage areas utilized by the scientific party, both during the cruise and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Expedition Coordinator will ensure that all non-NOAA or non-Federal scientists aboard also have proper orders. It is the responsibility of the Expedition Coordinator to ensure that the entire scientific party has a mechanism in place to provide lodging and food and to be reimbursed for these costs in the event that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 7, 1999 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Expedition Coordinator or the NOAA website http://www.corporateservices.noaa.gov/noaaforms/eforms/nf57-10-01.pdf.

NHSQs must be submitted every 2 years for individuals under the age of 50 and every 1 year for ages 50 and above. NHSQs must be accompanied by NOAA Form (NF) 57-10-02 - Tuberculosis Screening Document in compliance with OMAO Policy 1008 (Tuberculosis Protection Program, which requires a yearly PPD or TB exam).

The completed forms should be sent to Marine Health Services at the applicable Marine Operations Center. The NHSQ and Tuberculosis Screening Document should reach the Health Services Office no later than 4 weeks prior to the start of the project to allow time for the participant to obtain and submit additional information should health services require it, before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of either form. Ensure to fully complete each form and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

The participant can mail, fax, or email the forms to the contact information below. Participants should take precautions to protect their Personally Identifiable Information (PII) and medical information and ensure all correspondence adheres to DOC guidance (http://ocio.os.doc.gov/ITPolicyandPrograms/IT_Privacy/PROD01_008240).

The only secure submission process approved by NOAA is kiteworks by Accellion Secure File Transfer, which requires the sender to set up an account using a valid NOAA email address and password. User accounts may expire after 30 days of inactivity. Simply re-register to send and receive files.

Persons without a NOAA email account must fax or mail their forms.

Contact information:

Marine Health Services
Marine Operations Center – Atlantic
439 W. York Street
Norfolk, VA 23510
Telephone 757-441-6320
Fax 757-441-3760
Email MOA.Health.Services@noaa.gov

Prior to departure, the Chief Scientist must provide an electronic listing of emergency contacts to the Executive Officer for all members of the scientific party, with the following information: contact name, address, relationship to member, and telephone number.

C. Shipboard Safety

Hard hats are required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. Steel-toed shoes are required to participate in any work dealing with suspended loads, including CTD deployments and recovery. The ship does not provide steel-toed boots. Hard hats are also required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

Operational Risk Management: For every operation to be conducted aboard the ship (NOAA-wide initiative), risk management procedures will be followed. For each operation, risks will be identified and assessed for probability and severity. Risk mitigation strategies/measures will be investigated and implemented where possible. After mitigation, the residual risk will have to be assessed to make Go-No Go decisions for the operations. Particularly with new operations, risk assessment will be ongoing and updated as necessary. This does not only apply to over-the-side operations, but to everyday tasks aboard the vessel that pose risk to personnel and property.

- CTD, ROV (and other pertinent) ORM documents will be followed by all personnel working onboard *Okeanos Explorer*.
- All personnel onboard are in the position of calling a halt to operations/activities in the event of a safety concern.

D. Communications

An OER daily OER situation report (SITREP) on operations prepared by the Expedition Coordinator will be relayed to the program office. Sometimes it is necessary for the Expedition Coordinator to communicate with another vessel, aircraft, or shore facility. Through various modes of communication, the ship is able to maintain contact with the Marine Operations Center on an as needed basis. These methods will be made available to the Expedition Coordinator upon request, in order to conduct official business. The ship's primary means of communication with the Marine Operations Center is via email and the Very Small Aperture Terminal (VSAT) link.

Specific information on how to contact NOAA Ship *Okeanos Explorer* and all other fleet vessels can be found at https://www.omao.noaa.gov/learn/marine-operations/ships/okeanos-explorer/contact

Important Telephone and Facsimile Numbers and E-mail Addresses

Ocean Exploration and Research (OER):

OER Program Administration
Phone: (301) 734-1010
Fax: (301) 713-4252
Email: Firstname.Lastname@noaa.gov

University of New Hampshire, Center for Coastal and Ocean Mapping

Phone: (603) 862-3438
Fax: (603) 862-0839

NOAA Ship *Okeanos Explorer* - Telephone methods listed in order of increasing expense:

Okeanos Explorer Cellular: (401) 713-4114
Okeanos Explorer Iridium:(808) 659-9179
OER Mission Iridium (dry lab): (808) 851-3827

EX INMARSAT B
Line 1: 011-870-764-852-328
Line 2:011-870-764-852-329

Voice Over IP (VoIP) Phone:
(541) 867-8932
(541) 867-8933
(541) 867-8934

Email: Ops.Explorer@noaa.gov- (mention the person's name in SUBJECT field)

Email: expeditioncoordinator.explorer@noaa.gov for dissemination of all hands emails by Expedition Coordinator while onboard. See ET for password.

E. IT Security

Data related to the mission will be accessible to mission personnel via the GFOE network, which will be accessible via wifi connection. In the event that mission personnel require access to the ship's network in addition to the GFOE network, computers must comply with all OMAO IT policies:

1. Any computer that will be hooked into the ship's network must comply with the OMAO Fleet IT Security Policy 1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Requirements include, but are not limited to: Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.
2. Installation of the latest critical operating system security patches.
3. No external public Internet Service Provider (ISP) connections.

Completion of these requirements prior to boarding the ship is required.
Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within three days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

No foreign national guests are on the mission personnel team for this expedition.

Appendix A: Emergency Contact

EMERGENCY CONTACT DATA SHEET–NOAA SHIP *OKEANOS EXPLORER*
Scientists sailing aboard *Okeanos Explorer* shall fill out the form found at the following link with their emergency contact information:
https://docs.google.com/a/noaa.gov/forms/d/17WwNYHySRhmhDY4-EZnm8y7uKnLWfXuIOSI-Hka1JBM/edit?usp=drive_open

Appendix B: Data Management Plan

OER Data Management Objectives

To ensure the thorough documentation and preservation of the data from EX1906 within a 90 day window.

1. General Description of Data to be Managed

Name and Purpose of the Data Collection Project

- Okeanos Explorer (EX1906): Southeast US and Bahamas, Leg 1 (Mapping)

Summary description of the data to be collected.

- The cruise will conduct 24 hour/day mapping operations to provide data for EX1907 ROV dive planning.

Keywords or phrases that could be used to enable users to find 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, oceans, ASPIRE

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

- Okeanos Mapping Cruises

Planned or actual temporal coverage of the data.

- Dates: 10/5/2019 to 10/26/2019

Planned or actual geographic coverage of the data.

- Latitude Boundaries: 25.1 to 41.45
- Longitude Boundaries: -79.58 to -71.4

What data types will you be creating or capturing and submitting for archive?

- Cruise Plan, Cruise Summary, Data Management Plan, Highlight Images, Quick Look Report, CTD (processed), CTD (product), CTD (raw), EK60 Split Beam Data, Mapping Summary, Multibeam (image), Multibeam (processed), Multibeam (product), Multibeam (raw), SCS Output (compressed), SCS Output (native), Sub-Bottom Profile data, Water Column Backscatter, XBT (raw)

What platforms will be employed during this mission?

- NOAA Ship Okeanos Explorer

2. Point of Contact for this Data Producing Project

Overall POC: Derek Sowers
Title: Expedition Coordinator
Affiliation/Dept: NOAA Office of Ocean Exploration and Research E-Mail: derek.sowers@noaa.gov
Phone: 603-862-0369

3. Point of Contact for Managing the Data

Data POC Name: Megan Cromwell, Fernando Aragon
Title: Stewardship Data Management, Onboard and shoreside data management
E-Mail: megan.cromwell@noaa.gov, fernando.aragon@tgfoe.org

4. Resources

Have resources for management of these data been identified?

- Yes

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

- unknown

5. Data Lineage and Quality

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; multibeam data and metadata will be compressed and delivered in a bagit format to NCEI-CO

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

Does the metadata comply with the Data Documentation Directive?

- Yes

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

- not applicable

Where will the metadata be hosted?

- ISO 19115-2 Geographic Information with Extensions for Imagery and Gridded Data will be the metadata standard employed. Metadata will be generated via xml editors or metadata generation tools. 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.
- (data.noaa.gov/waf/NOAA/NESDIS/ncei/oer/iso)

7. Data Access

Do the data comply with the Data Access Directive?

- Yes

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

- Not Applicable

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.

Name and URL of organization or facility providing data access.

- NOAA National Centers for Environmental Information (NCEI) data.noaa.gov/

Approximate delay between data collection and dissemination.

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

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

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.

If no archive planned, why?

- not applicable

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

- 60-90 days

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.

Prepare a Data Use Statement

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

Appendix C: Marine scientific research (MSR) permit for expedition activities in waters of The Bahamas

An MSR application was submitted on 7/12/19 to The Bahamas. Formal clearance is pending. OER has been told verbally that mapping work will be approved.

Ocean Exploration and Research

Appendix D: National Environmental Policy Act Categorical Exclusion

OAR staff may use this template to prepare a draft CE determination for internal review and review by the OAR NEPA Coordinator. Final responses should be entered into the OAR CE Evaluation Worksheet Google form in order to receive the pdf document for Decision Maker signature.

Section 1

Short Project Identifier: EX-19-06

Date Review Completed: 8/26/2019

Completed by (name and title): Caitlin Adams, Project Coordinator

OAR Functional Area: OER

Worksheet File Name: 2019-08-OER-G3-EX-19-06

Section 2. Sea Grant

When applicable, refer to Sea Grant Program Office instructions.

Section 3. CE applicability

1. Is OAR providing 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?

☒Yes

☐No

2. Describe the proposed federal action.

The proposed action is 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). The expedition will conduct operations in unexplored deep water (>200 m) areas of the Atlantic Continental Margin in the exclusive economic zones (EEZ) of the United States and The Bahamas. The expedition is currently scheduled to start in North Kingstown, Rhode Island on October 5, 2019, and end in Miami, Florida on October 26, 2019. This action demonstrates independent utility and is not a connected action.

3. a. Provide the Number and Definition of the CE in Appendix E of the NAO 216-6A Companion Manual that is applicable to this action.

G3: Topographic, bathymetric, land use and land cover, geological, hydrologic mapping, charting, and surveying services that do not involve major surface or subsurface land disturbance and involve no permanent physical, chemical, or biological change to the environment.

b. Explain why/how your action fits this CE class.

The main cruise objectives are to collect seafloor and water column sonar data, the acquisition of which cause no permanent physical, chemical, or biological change to the environment.

Section 4. Extraordinary Circumstances Consideration

4. Explain whether the action would 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 that are not neglible. NOAA Ship Okeanos Explorer will be operating in offshore, deep-sea (>200 m) areas during EX-19-06, an expedition which seeks to address research and management priorities of U.S. management agencies, as well as those of the broader scientific community. This action does not involve any procedures or outcomes known to result in impacts on human health and safety more than would be negligible.

5. Explain whether 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 deep water (greater than 250 meters). The effects will be negligible, as acoustic mapping 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. Explain whether the action would 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-19-06 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-19-05 Leg 2 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-19-06project instructions.

7. Explain whether the action would 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. Explain whether the action would 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 conduct some mapping operations in areas believed to contain shipwrecks or other underwater cultural heritage (UCH) sites. Should any potential UCH targets be discovered during mapping operations, an ROV dive may be conducted on subsequent expeditions in the area to determine whether this is indeed an UCH. If any such areas are confirmed to be shipwrecks, they can potentially be eligible for listing on the National Register of Historic Places. OER conducts non-invasive surveys on archaeology targets and has specific

protocols for protecting sensitive location information of such UCH sites. These protocols and procedures are outlined in detail in the appendices of the EX-19-06 project instructions.

9. Explain whether the action would 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 North Atlantic and Caribbean 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. Explain whether the action would 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-19-06, 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, 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. Explain whether the action would 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 obtained authorizations for this expedition via several consultations on ESA Section-7 and EFH outlined in questions 4-6 above.

12. Explain whether the action would 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. Explain whether the action would 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. Explain whether the action would result in environmental effects that are uncertain, unique, or unknown.

The techniques and equipment used are standard for this type of field study.

15. Explain whether the action would 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.

Section 5. CE Determination

To be completed after submitting the Google form and upon receipt of pdf document for Decision Maker signature.

CE Determination

01 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 enviromnental assessment or environmental impact statement.

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

Signature: CANTELA S.FRAN Digita lly sign ed by K.J.136 5855087 CANTELAS.FRANKJ.1365855087 Date 2019.09.10 0,7 28'31 -04'00'

Signed by: Frank Cantelas, OER Acting Deputy Director

Date Signed: September 10, 2019

Appendix E: ESA Section 7 Concurrence Letter

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

AUG 0 8 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.

Ocean Exploration and Research

Ocean Exploration
and Research

Appendix F: EFH Concurrence Letter

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

Ocean Exploration and Research

Appendix G: GARFO Letter of Acknowledgement (LOA)

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

SCIENTIFIC RESEARCH LETTER OF ACKNOWLEDGMENT

Principal Investigators: Daniel Wagner, Ph.D.
NOAA Office of Ocean Exploration and Research
331 Fort Johnson Road, Bldg. HML
Charleston, SC 29412
(808) 256-5014
Daniel.Wagner@noaa.gov

Shannon Hoy
NOAA Office of Ocean Exploration and Research
331 Fort Johnson Road, Bldg. HML
Charleston, SC 29412
(469) 265-2908
Hoy.Shannon@gmail.com

Issuance Date: April 22, 2019

Acknowledged Study Period: August 6, 2019, through September 15, 2019

Vessel Owner or Operator	Vessel Name	Hull ID	Federal Permit Number
NOAA	R/V *Okeanos Explorer*	R337	N/A

This letter acknowledges that the above vessel is acting as a scientific research vessel, and is not subject to the Atlantic Coastal Fisheries Cooperative Management Act, the Magnuson-Stevens Fishery Conservation and Management Act, and fishery regulations published in 50 CFR parts 648 and 697. This acknowledgement applies only while the vessel is participating in research activities described in the Scientific Research Plan, within the specified study period, and while under the control of NOAA's Office of Ocean Exploration and Research (OER).

Project Description

The R/V *Okeanos Explorer* will be conducting mapping and survey operations covering waters of Canada, the U.S. Mid-Atlantic and Northeast Regions. Research will consist of multibeam and sonar mapping, CTD (conductivity, temperature, and depth) casts, and remotely operated vehicle (ROV) operations at selected sites throughout the study area, in water depths ranging from 250 m to approximately 5,000 m. Target sites will include seamounts, undersea canyon and slope areas, deep-sea coral and sponge habitats, chemosynthetic communities, and unmapped or poorly mapped areas.

Cruise operations will take place 24 hours a day, with daytime ROV dives and overnight mapping. The CTD casts will record the chemical and physical properties of the water column at sample sites, and the ROV dives will include high-resolution visual surveys of seafloor and water-column habitats , as well as sampling of rocks and biological specimens. The OER will direct all research operations. No fishing gear will be deployed during research cruises .

Requirements

Please carry copies of the Scientific Research Plan and this Letter of Acknowledgment (LOA) on board the vessel(s) while conducting this research. In additi on, we recommend that a copy of this LOA be kept with any fish or fish parts retained for research on and off of the vessel.

Any participating vessel subject to vessel monitoring system reporting requirements must declare out of fishery (DOF-SCI) while operating under this LOA.

Research personnel and project participants should take steps to minimize the mortality of all fish caught during this research project. Catch that is not necessary for research activities should be avoided when possible, and returned to the sea as quickly as practicable. Research landings will be monitored. This letter does not acknowledge any activities, including the landing of fish, conducted outside the scope of the Scientific Research Plan; including those which may not be considered scientific research activities and require a separate pennit. This letter is not intended to inhibit or prevent any scientific research activity conducted by the research vessel(s). In addition, state requirements apply to the above vessel(s).

This letter is separate and distinct from any permit or consultation required under the Marine Mammal Protection Act, the Endangered Species Act, or any other applicable law. If research will occur within NOAA ' s Stellwagen Bank National Marine Sanctuary, additional permits may be required. All necessary permits should be obtained prior to embarking on any research activity.

Acknowledged by:

Sarah Heil

Sarah Heil
Assistant Regional Administrator
for Sustainable Fisheries

Appendix H: NASA Maritime Aerosols Network Survey of Opportunity

Survey or Project Name

Maritime Aerosol Network

Lead POC or Principle Investigator (PI & Affiliation)

Dr. Alexander Smirnov

Activities Description(s)(Include goals, objectives and tasks)

The Maritime Aerosol Network (MAN) component of AERONET provides ship-borne aerosol optical depth measurements from the Microtops II sun photometers. These data provide an alternative to observations from islands as well as establish validation points for satellite and aerosol transport models. Since 2004, these instruments have been deployed periodically on ships of opportunity and research vessels to monitor aerosol properties over the World Oceans.

Appendix I: Operational policies and procedures for explorations of underwater cultural heritage (UCH) sites

I. Purpose

The purpose of this document is to provide guidance for OER mission activities conducted aboard the NOAA Ship *Okeanos Explorer*, when such mission activities involve either unexpected discovery or targeted exploration of potential underwater cultural heritage (UCH) sites.

II. Background

Since the inception of NOAA's ocean exploration program in 2000, OER data management practices have been guided by the 2000 President's Panel Report recommendations, which prioritized rapid and unrestricted data sharing as one of five critical exploration program components. More recently Public law 111-11 [Section XII Subtitle A Part 1 Exploration] reinforced and expanded OER data management objectives, continuing to stress the importance of sharing unique exploration data and information to improve public understanding of the oceans, and for research and management purposes.

OER missions conducted aboard the NOAA Ship *Okeanos Explorer* offer a best-case scenario for meeting program mission objectives related to data sharing:

- Dedicated shipboard and shore-side teams work in tandem to ensure near-real time data product generation from shipboard and ROV sensors;
- Telepresence is used to share data products and information in real-time with shore-side participants and the public;
- Mission information is publicly communicated in real time via Internet access to streamed video and related resources; and
- Data are managed throughout the lifecycle in accordance with all applicable policy directives and community best practices.

The nature of exploration defines the possibility of discovery, including unexpectedly exposing the location of underwater cultural resources; on some occasions, exploration targets are specifically focused on the exploration of suspected UCH sites. The need to protect the location of suspected UCH sites until they are fully understood, whether purposefully explored or fortuitously discovered, is an important statutory responsibility. In the case of OER expeditions aboard the *Okeanos Explorer*, a range of operational procedures must be modified to ensure this

protection occurs to the fullest extent possible. The following sections of this document define the methods for ensuring protection of these sensitive data throughout the data lifecycle.

III. Authority

a) Marine Archaeology: This document is informed by: the Federal Archaeology Program; U.S. legislation on the treatment of cultural remains; and the UNESCO Convention for the Protection of the Underwater Cultural Heritage. The NOAA Office of Ocean Exploration and Research (OER) supports the standards for conducting marine archaeological activities enumerated in the Annex Rules of the UNESCO Convention on the Protection of the Underwater Cultural Heritage. Preservation and protection of prehistoric and historic cultural resources is the policy of the Federal Government and OER has a responsibility to consider the effects of its activities on these resources. If data is found to be sensitive because it reveals the location of a historically significant cultural resource, Section 304 of the National Historic Preservation Act provides that the head of a Federal agency or other public official shall withhold from public disclosure information about the location, character, or ownership of a historic property when disclosure may: cause a significant invasion of privacy; risk harm to the historic property; or impede the use of a traditional religious site by practitioners. This document will use the term underwater cultural heritage, or UCH, to refer to historic and prehistoric traces of human existence that are totally or partially underwater.

b) Data Management: Geospatial data are considered a national capital asset. National policy and international standards guide data management best practices to ensure timely and broad public accessibility to these data. Within NOAA, data management practices are informed by NOAA Administrative Order (NAO) 212-15 Management of Environmental Data and Information, which states in part:

Environmental data will be visible, accessible and independently understandable to users, except where limited by law, regulation, policy (such as those applicable to personally identifiable information or protected critical infrastructure information or proprietary trade information) or by security requirements.

Sensitive UCH data collections require special handling while determinations are made as to whether each location will be nominated and will qualify for protection under the NHPA Section 304. OER considers these data to fall within the scope of the NAO 212-15 exceptions during this period.

IV. Roles and responsibilities

Particular to the NOAA Ship *Okeanos Explorer*, there are many methods employed to ensure rapid and broad data access. When the goal is to restrict access to precise positional information, several operational scenarios must be considered. Alternate operating procedures are then developed for:

- Real time operations:
    - Routine data transmissions and events that broadcast the ship position
    - Seafloor mapping operations and data production
    - Telepresence-enabled ROV operations
    - Video annotations and production
    - Public broadcast operations via website and maps
- Post-cruise data management

The table below summarizes the roles and responsibilities of each Team Lead in implementing the policy through the management approaches described herein and the SOPs as defined in the Appendices.

Mission Personnel (Coordinated by: Expedition Coordinator)	
Responsible Team	**Accountable for these (primary) actions**
Expedition Coordinator	Notification of NDA to mission personnel;ID, communicate and enforce UCH buffer zone;coordinate with team leads and key personnel; ensure SOP compliance.
Mapping Team	Segregate raw and processed data into marked files so that restricted data are held separately and are clearly marked.
Telepresence Team	Ensure broadcast data is free of any positional information.
Video Team	Ensure UCH dives and dive products are annotated as such; ensure all raw data and products are not geo-referenced.
Data Management Team	Ensure all UCH data are appropriately segregated and documented. Follow post cruise and archive procedures as specified.
Communications Team	Ensure all communications are controlled through one primary POC; ensure communications are not geo-referenced.
Okeanos Explorer **Crew (Coordinated by CO or Designee)**	
OMAO Operations	Notification to crew of NDA responsibilities; stop SCS events (email notifications) upon entering buffer zone; start SCS events (email notifications) upon exiting buffer zone.

V. Standard Operating Procedures for UCH: Appendices

A) MAPPING OPERATIONS

The following outlines the process for pre-cruise planning, mapping field operations, post-cruise follow up, and data archival procedures for the following scenarios:

- When UCH is unexpectedly discovered on a standard, non-UCH targeted mapping cruise.
- When a cruise is specifically targeted at UCH.
- When an Isolated UCH survey is conducted as part of a broader cruise
- Large survey over UCH area with potential to contain multiple instances of UCH

Pre-Cruise Planning

1. *Standard Mapping Pre-Cruise Planning*
   a. This section does not affect normal pre-cruise or data management processes for standard mapping cruises that are not conducting targeted UCH mapping. During pre-cruise planning the expedition coordinator is advised to consult with the OER Marine Archaeologist to discuss possible UCH targets in the mission area. The mapping team may be requested to optimize line planning as necessary to detect UCH and to process data, when possible, to a smaller non-standard grid size to create higher resolution mapping products to provide better images of potential UCH. If so, follow guidance in the UCH Mapping Pre-Cruise Planning section below.

2. *UCH Mapping Pre-Cruise Planning*
   a. Background information - The EX mapping team should be supplied with information about targets in the survey area that will help in their detection and identification. This information will be supplied by OER's marine archaeologist and collaborating archaeologists.
   b. Data processing and data products - Archaeologists involved with the survey will consult with the mapping team to discuss data processing and data products that will increase the potential to discover UCH. The cruise coordinator and mapping team lead will work with OER's marine archaeologist to coordinate this activity.
   c. Consultation and data sensitivities - Cruise planning must also include a discussion on data sensitivity and data management/archiving. It is the appropriate time to collaborate with other Federal and state agencies that may have a legal or management interest in potential UCH in the survey area. The risks to the resources should be weighed to inform a post-cruise decision on whether or not UCH with potential historical or cultural significance should have information about their location restricted from public release. This should be a collaborative

discussion that includes OER's marine archaeologist, cruise coordinator and cruise data manager along with cultural resource managers and archaeologists from other agencies with an interest in the UCH. Agencies that may have an interest include the Office of National Marine Sanctuaries (ONMS) Maritime Heritage Program, Bureau of Ocean Energy Management, Bureau of Safety and Environmental Enforcement, U.S. Navy History and Heritage Command, National Park Service, State Historic Preservation Officers, and others. While planning expeditions in any foreign country the host government should be made aware of the potential to discover UCH.

d. In survey areas where an agency has responsibility for UCH, the data management team should carry out a consultation process with the agency to identify any special protocols that should be put in place to conform with the policies of the agency and these should be incorporated into the data management plan. The expedition coordinator is responsible for the overall execution of the data management plan.

e. On mapping missions within the National Marine Sanctuary System, pre-cruise discussions between the EX Cruise Coordinator and ONMS should include the ONMS Director of the Maritime Heritage Program (MHP) and the maritime heritage coordinator at the sanctuary site. They will help determine the sensitivity of data and data products.

Mapping Field Operations

1. *Standard Mapping Field Operations*

a. While standard mapping field operations are not affected by the marine archaeology SOP, any features which appear to be of cultural or historical significance, and appear anthropogenic in origin, do require special consideration. Cultural features include wrecks of ships or aircraft, the recognizable debris from wrecks, evidence of previous human settlements, or other items which may appear anthropogenic in origin and have some associated cultural or historical significance.

b. The expedition coordinator will consult with OER's marine archaeologist immediately on the discovery of UCH in the field. The expedition coordinator should provide an image and location information by email. The OER marine archaeologist may request special data products that have higher resolutions than standard data products to aid in characterizing UCH.

c. If UCH is determined not to be historically or culturally significant or it is determined that no harm will result by disclosing position information, no change to standard mapping field procedures is required.

d. If UCH is historically significant or potential to be historically

significant, data and data products should be held from public release until reviewed for sensitivity as applicable under the National Historic Preservation Act and other pertinent legislation and regulations, prior to releasing data to a public archive.

e. The expedition coordinator is responsible for the overall execution of the data management plan.

f. When appropriate, OER's marine archaeologist will contact relevant entities to notify them of the discovery and consult with them regarding the significance of the UCH.

2. *UCH Targeted Mapping Field Operations*

a. No informal information about UCH should be released to the general public by the ship or personnel. This includes posting information and images on social networking sites like Facebook, Twitter or personal blogs. Mapping data will be released to the public following the normal process and announcement of discoveries will be made through the appropriate offices and public affairs officials.

b. A five-mile buffer zone shall be created around the UCH isolated survey box. The following steps will be taken just prior to entering the buffer zone in order to stop broadcasting the ship's location while the survey is conducted:

i. NOAA Shiptracker: Disable the SCS feed from the ship going to Shiptracker

ii. Automated Information System (AIS): NOAA requires that the AIS feed which broadcasts information about the ship, including position, course and speed, must remain on at all times for collision avoidance and other safety reasons. Although the International Maritime Organization's (IMO) Maritime Safety Committee condemns the Internet publication of AIS data, it is easily available for viewing. During the cruise planning phase the Expedition Coordinator will provide the AIS broadcast range on the EX to the chief scientist and science team. The Chief scientist, the science team, or other parties involved in a UCH mapping cruise should be made aware of this and decide whether the value of the operation merits acceptance of the potential issues/outcomes imposed.

iii. Telepresence Video Feeds: Do not stream any feeds that include a visible ship location, for example the multi-beam acquisition screen does not high enough resolution over the video feed to see ship position. Streams include but not limited to the SCS data screen, or any active mapping data acquisition screens, or video feeds. It is acceptable to stream video feeds that do not include the ship's location.

iv. The expedition coordinator will ensure the survey department

takes steps to distinguish and separate UCH mapping data from non-UCH mapping data as appropriate.

v. Raw Multibeam Data Acquisition: Raw data will be logged in the standard folder structure on the multibeam acquisition computer. Raw data will be copied into a "Restricted" folder in the RAW data network folder structure. Data acquisition and processing logs will clearly state which files are restricted.

vi. Multibeam Data Field Processing: Restricted files will be processed and gridded separately from other non-restricted data and will be clearly labeled as such in projects and filenames. The products will be created according to normal field quality-control procedures, but will not be sent to shore with the daily products, in order to not become publicly available via normal channels (e.g. FTP site, OER Digital Atlas).

vii. Raw EK 60/80 and Subbottom Data Acquisition: Raw data will be logged in the standard folder structure on the acquisition computers. Raw data will be copied into a 'Restricted' folder on the RAW and CRUISE DATA data network folder structure. Data acquisition and processing logs will clearly state which files are restricted.

viii. Cruise Data Transfer (EX to UNH) Package: In the Cruise Data Package carried from the ship by the Mapping Team Lead, a "Restricted" top- level directory will be added in the cruise data folder. Within the "Restricted" folder the same directory structure as the unrestricted folder will be repeated (i.e. SCS, CTD, Multibeam, Imagery, etc).

ix. CTD and XBT operations conducted within the buffer zone do not need to be isolated from non-UCH data, or repressed from the *Okeanos* Atlas. CTD and XBT files should follow the normal unrestricted processing procedures and archiving.

x. Daily updates are normally linked to the location of the ship at the time the update is posted. If daily updates are made during UCH surveys, no position shall be provided. If a position is required, the position should be posted as it makes sense, 5 miles outside of the extent of the survey area.

a. Normal transmissions from the ship shall resume after the EX finishes UCH survey operations and exits the 5-mile buffer zone. Exiting the buffer zone should occur at approximately the same location as entry to prevent obvious data location gaps pointing to UCH location.

Post-Cruise Follow Up

1. *Information Release*

a. No informal information about UCH should be released to the general

public by the ship or personnel. This includes posting information and images on social networking sites like Facebook or personal blogs. Mapping data will be released to the public following the normal process and announcement of discoveries will be made through the appropriate offices and public affairs officials.

2. *Standard Mapping Cruise follow-up where UCH is discovered*
   - *a.* The mapping team will provide a brief summary of the survey and target that includes a description of the survey, water depth, site location, site dimensions, bottom type, and images of the target at the best available resolution.
   - *b.* The expedition coordinator and the OER Marine Archaeologist have an initial consultation to discuss the nature of the UCH and its potential significance. This consultation may include other agencies or entities.
   - *c.* If UCH is determined not to be historically significant no change to standard data management procedures is required.
   - *d.* If UCH has the potential for historical significance but it is determined that no harm will result by disclosing position information, such as UCH in deep water, no change to standard data management procedures is required.
   - *e.* If UCH has potential historically significance and disclosing information about the site poses a threat, further discussions will be held on how to minimize potential harmful impacts, including data management decisions outlined in Data Archiving section of this document. The expedition coordinator, a representative from the data management team, OER's marine archaeologist, a representative from the ONMS Maritime Heritage Program, and any parties with jurisdiction, management or other legal ties to the resource shall meet to determine what measures are needed to protect the UCH while minimizing impacts on the distribution of data and data products.

3. *UCH Targeted Mapping Cruise Follow-Up*
   - *a.* The mapping team will create a survey report that provides technical details on the survey, data processing and data products. It should contain a list of targets that includes site location, water depth, site dimensions, bottom type/topography, and images of the target at the best available resolution. Other helpful products include SD and kmz files.

   - *b.* The expedition coordinator, OER's marine archaeologist, a representative from the ONMS Maritime Heritage Program, archaeologists involved in the survey, and any parties with jurisdiction, management or other legal ties to the resource shall meet to discuss the potential historical significance of the UCH and the sensitivities of releasing data to the public that can be protected under Section 304 of the National Historic Preservation Act.

c. The outcome of this meeting will determine if it is necessary to protect site location information from public release.

d. When data can be released:

i. If the findings determine that releasing information and data o UCH is not a threat, development of products and data management should follow the guidelines for a standard mapping cruise.

e. When data should be protected:

i. If it is determined that a site is or has potential to be historically significant and eligible for nomination to the National Register of Historic Places, the location and data containing the location should not be released to the public.

ii. Data products that contain position information will be forwarded to the EX data management team where data and products will be stored in an archive with restricted access.

iii. Cruise plans, cruise reports, situation reports, mapping summary reports and other documents that are publically available outside NOAA or freely accessible within NOAA shall not provide location information for UCH or survey areas. In certain circumstances the lead archaeologist for the cruise may request that certain UCH sites are not mentioned in the public reports.

4. UCH mapping follow-up for National Marine Sanctuaries

a. When the EX conducts UCH work inside a National Marine Sanctuary the expedition coordinator shall inform the OER Marine Archaeologist, ONMS Maritime Heritage Program Director, Sanctuary Superintendent and Sanctuary Maritime Heritage Coordinator on the availability of data products and initial results of the survey. ONMS shall determine the sensitivity of the data and whether or not it can be disclosed to the public. Published metadata shall indicate the point of contact to access UCH data within the NMS system is the Director of the Office of National Marine Sanctuaries.

B) TELEPRESENCE-ENABLED ROV OPERATIONS

The following outlines the process for pre-cruise planning, field operations, post-cruise follow up, and data archival procedures for the following scenarios:

- When a cruise conducts ROV operations specifically targeted at UCH.
- When UCH is unexpectedly discovered on non-archaeological operation

Unexpected UCH Discovery

- During the Cruise: If UCH is unexpectedly discovered during an ROV dive, the onboard Expedition Coordinator should immediately contact OER's Lead Maritime Archaeologist, and the Archaeology Doctors-on-Call identified for that expedition. Those archaeologists should be engaged in the site investigation as soon as possible to provide information to help assess the site discovered. No changes to the data, video or onboard data acquisition processes should be made. A post-dive and post-cruise discussion will be held with the OER archaeologist to determine whether any datasets should be withheld from archive. (Section 2.D.II).
- Follow-up when UCH is unexpectedly discovered
    - The EX Cruise Coordinator and the OER Marine Archaeologist will have an initial consultation to discuss the nature of the UCH and its potential significance. This consultation may include other agencies or entities.
    - If UCH is determined not to be historically significant no change to standard data management procedures is required.
    - If UCH has the potential for historical significance but it is determined that no harm will result by disclosing position information, such as UCH in deep water, no change to standard data management procedures is required.
    - If UCH is or has potential historical significance and disclosing location information about the site poses a threat, further discussions will be held on how to minimize potential harmful impacts, including data management decisions outlined in the Data Archiving section of this document. The expedition coordinator, a representative from the data management team, OER's marine archaeologist, a representative from the ONMS Maritime Heritage Program, and any parties with jurisdiction, management or other legal ties to the resource shall meet to determine what measures are needed to protect the UCH while minimizing impacts on the distribution of data and data products.

Cruises conducted with ROV operations specifically targeted at UCH

1. Pre-Cruise Planning: ROV Exploration
   a. Notifying the Team of their Responsibility to Protect Sensitive UCH Resources Expedition members and OER personnel to have a legal responsibility to protect sensitive archaeological information (primarily location information) from untimely release. For a planned UCH cruise, the EC shall notify the CO and each shall have responsibility for ensuring personnel are aware of this responsibility. The EC shall provide an archaeology background document to familiarize personnel with the particular mission and requirements. Appendix D details the range of existing accountability mechanisms already in place.

2. Pre-dive planning
   a. Archaeologists will develop a dive plan based on the best available knowledge of the site that will maximize data recovery and minimize any potential impact to the site. The archaeology team will work closely with the cruise coordinator and deep submergence vehicle manager to develop and implement the plan. The plan should include:
      - Objectives (cultural/interdisciplinary science)
      - The types of sensors needed and data to be generated

   b. ROV dives will not disturb or touch a shipwreck or other cultural features. Exceptions to this rule require the necessary permits, approvals and notifications based on the location of the dive. No shipwrecks or cultural features will be touched in Canadian waters.
   c. Prior to the cruise any permitting requirements should be identified and if required, permits must be procured.
   d. Automated Information System (AIS): NOAA requires that the AIS feed which broadcasts information about the ship, including position, course and speed, must remain on at all times for collision avoidance and other safety reasons. Although the International Maritime Organization's (IMO) Maritime Safety Committee condemns the Internet publication of AIS data, it is easily available for viewing. During the cruise planning phase the Expedition Coordinator will provide the AIS broadcast range on the EX to the chief scientist and science team. The science team, chief scientist, or other parties involved in a UCH mapping cruise should be made aware of this and decide whether the value of the operation merits acceptance of the potential issues/outcomes imposed. A Go/No-Go decision will be made based on this information.

Field operations

Exploration dives by ROV should be planned to collect optical and acoustic images without causing physical disturbance to the UCH. Representatives and leads from operational groups including the ROV, data/video, and telepresence teams, and ship operations should meet to discuss ROV operations and data collection. The guidelines for mapping operations should be followed to ensure site locations are not disclosed during field operations. SOPs with full operational details are available on the ship. A three-mile buffer zone shall be created around the UCH target or isolateD survey box. The time at which the ship enters, and departs the three-mile buffer zone needs to be recorded and provided to the Data Team Lead for data post-processing. Following work at the site, the ship will return to the site where it first entered the three-mile buffer zone to continue operations.

The following steps will be taken just prior to entering the five-mile buffer zone in order to stop broadcasting the ship's location while the survey is conducted:

- NOAA email events will be stopped (OMAO/ET)
- NOAA Shiptracker: Disable/stop the e-mail updates from the ship going to OMAO / Shiptracker
- *Okeanos* Atlas: Disable/stop the e-mail updates to NCDDC
- SAMOS: Disable/stop the e-mail update to FSU containing METOC and flow-through data, etc.
- Telepresence Video Feeds (OER Telepresence team lead): Do not stream any feeds that include the ship's location, including but not limited to the SCS data screen, or any active mapping data acquisition screens, or video feeds. It is acceptable to stream video feeds that do not include the ship's location.
- Redirect Live Feed as needed (OER EC or CO): If highly sensitive features (human remains, evidence of human remain such as shoes or other accoutrements, highly valuable items, etc.) are going to be investigated or are unexpectedly encountered during the course of our seafloor investigation, the lead archaeologist, ROV Team Leader, Expedition Coordinator or Commanding Officer has authority to immediately switch the live feed from the ROV and Seirios camera sled to another camera on the ship.

Daily updates on the *Okeanos* Atlas are normally linked to the location of the ship at the time the update is posted. If daily updates are made during UCH surveys, no position shall be provided. If a position is required, the position should be posted as it makes sense, 3 miles outside of the extent of the site or survey area. Normal transmissions from the ship shall resume after the EX finishes UCH survey operations and exits the 3-mile buffer zone. The point of exit should be as near to the point of entry as is feasible to minimize location data gaps pointing to the location of the UCH. No informal information about UCH should be released to the general public by the ship or personnel. This includes posting information and images on social networking sites like Facebook, Twitter or personal blogs. Images, video and information on UCH will be released to the public following the normal process and announcement of discoveries will be made through the appropriate offices and public affairs officials.

In addition to the items listed, the ship sends out automated weather (autoIMET) observations every hour and manual weather observations every 6 hours with positions as

a voluntary ship observer. These observations are pulled onto public sites by several different websites and Google Map apps. One example is sailwx.info. This is only accurate to the nearest decimal degree (6 nm). This level of accuracy is not of concern.

Post-cruise data management

Following completion of the expedition, the Expedition COordinator should have a follow-up call with the Data Management Team & OER lead archaeologist to review the datasets collected, confirm those that need to be withheld from public archive, and provide information to the data management team for associated metadata records.

Post-cruise follow-up

1. Information Release

a. No informal information about UCH should be released to the general public by the ship or personnel. This includes posting information and images on social networking sites like Facebook or personal blogs. Images, video, and mapping data will be released to the public following the normal process and announcement of discoveries will be made through the appropriate offices and public affairs officials.

b. Determination of whether UCH is potentially eligible for nomination to the National Register of Historic Places, or eligible for protection under other legislation such as the Sunken Military Craft Act or National Marine Sanctuary Act, will take some time following completion of the cruise. Sensitive or potentially sensitive information about the UCH is to remain restricted until determination is complete. Following completion of the cruise, the lead Archaeologist will work with others to analyze the UCH data and conduct historical research to determine whether the UCH is eligible for nomination to the National Register of Historic Places.

I. If the UCH is determined to be eligible, the lead Archaeologist will prepare the nomination for the NRHP process.

II. If the UCH is determined to NOT be eligible, and protection of the site does not fall under other legislation, the Lead archaeologist will notify the data management team that site information can be made publicly available.

2. UCH Targeted Cruise Follow-Up

a. The EX cruise coordinator, OER's marine archaeologist, a representative from the ONMS Maritime Heritage Program, archaeologists involved in the survey, and any parties with jurisdiction, management or other legal ties to the resource shall meet to discuss the potential historical significance of the UCH and the sensitivities of releasing data to the public that can be protected under Section 304 of the National Historic Preservation Act. The outcome of this meeting will determine if it is necessary to protect site location information from public release.

I. When location data can be released: If the findings determine that releasing information and data on UCH is not a threat, development of products and data management should follow the guidelines for a standard ROV cruise.

II. When location data should be protected: If it is determined that a site is or has potential to be historically significant and eligible for nomination to the National Register of Historic Places, the location and data containing the location should not be released to the public.

III. Data products that contain position information will be forwarded to the EX data management team where data and products will be stored in an archive with restricted access.

IV. Cruise plans, cruise reports, situation reports, mapping summary reports and other documents that are publically available outside NOAA or freely accessible within NOAA shall not provide location information for UCH or survey areas. In certain circumstances the lead archaeologist for the cruise may request that certain UCH sites are not mentioned in the public reports.

C) POST-CRUISE DATA MANAGEMENT

Data collected by OER that is considered sensitive will be protected from direct public release until such time as a final determination can be made as to permanent protection. Data in this state will be:

- Fully documented, so as to be independently understandable to users;
- Visible through publication of metadata records by OER;
- Accessible upon request to OER (controlled access by permission);
- Preserved in NOAA archives as 'restricted' (not available for direct public access).

These data will not be available for direct public access unless and until they are eliminated from consideration for nomination to the National Register of Historic Places (NHPA Section 304), or for protection under other legislation such as the Sunken Military Craft Act or National Marine Sanctuary Act. If data are nominated and accepted for any official protection, then the exceptional status will be made permanent, and all documentation updated and finalized as such.

Data generated by the *Okeanos Explorer* is archived under a data management agreement with NCEI. Only data that has potential to reveal the nature and location of UCH shall be restricted from public access. In accordance with the data management agreement, sensitive data from the EX will have restricted access at NCEI. To assist researchers in discovering sensitive data NGDC will publish a metadata record (but not the data) that identifies a point of contact for access. Requests to access the data will be made to the Director of OER who may delegate to the OER marine archaeologist. In lieu of the OER marine archaeologist, the OER Director may delegate to the Director of the ONMS Maritime Heritage Program.

If data is found to be sensitive because it reveals the location of a historically significant cultural resource, Section 304 of the National Historic Preservation Act provides that the head of a Federal agency or other public official shall withhold from public disclosure information about the location, character, or ownership of a historic property when disclosure may cause a significant invasion of privacy; risk harm to the historic property; or impede the use of a traditional religious site by practitioners. Data collected by the EX that is considered sensitive will be archived in a location where it can be withheld from public disclosure.

Data sets and associated products are housed in the appropriate NOAA archive; National Oceanographic Data Center, National Geophysical Data Center, National Coastal Data Development Center, National Climate Data Center, and the NOAA Central Library.

- OER Digital Atlas: NCEI will develop appropriate metadata records to post on the digital atlas.
- CTD and XBT data collected during mapping operations conducted within the buffer zone will not be repressed from the *Okeanos Atlas* and will be held in a public archive.
- Cruise reports, cruise plans, mapping summary reports and other documents that are publicly available outside NOAA or freely accessible within NOAA should not provide location information for UCH or survey areas.

Start and end times for the 3-mile buffer zone surrounding a UCH site need to be provided to the data management team. Datasets containing sensitive location information will be restricted in their entirety, unless other parsing arrangements have been made. The following datasets may contain sensitive UCH location information and need to be reviewed, post-processed as appropriate, made restricted and pertinent metadata records created and made available:

- Multibeam, sub-bottom and single beam sonar data
- SCS Data Logs are to be restricted
- All ROV dive products (including associated sensor data) need to be restricted
- CTD rosette and *in situ* sensor datasets collected in relation to the UCH, and within the 3 nm buffer zone, need to be restricted.
- All imagery needs to be reviewed and geospatial imagery removed before being made public. Imagery with geospatial information should be restricted.
- Ship track and other datasets within the buffer zone

D) NON-DISCLOSURE AGREEMENT (NDA) REFERENCES

Expedition members and OER personnel to have a legal responsibility to protect sensitive archaeological information (primarily location information) from untimely release. The following summarizes the types of personnel who might be engaged in an *Okeanos Explorer* Expedition, where their responsibility to protect sensitive location information about UCH lies, and whether this responsibility has already been addressed or signature of a Non-

Disclosure Agreement (NDA) is required to allow their participation in an expedition with planned UCH operations.

- If they are federally-employed scientists, they agreed not to disclose sensitive information and to adhere to federal laws as part of the terms of their employment with the federal government.
- The crew onboard the ship are under the CO's purview. On *Okeanos Explorer*, all crew are federal employees, and thus agreed not to disclose sensitive information and to adhere to federal laws as part of the terms of their employment with the federal government.
- All other members of the Mission team who are not federal employees and are engaged at-sea or ashore (including technicians, vehicle operators, students, etc.) are required to sign a non-disclosure agreement to protect sensitive cultural heritage information as part of their contract agreement.
- Other OER personnel who have access to data and information on the FTP site are either federal employees or contractors and need to be similarly reminded of their responsibilities. OER contractors signed an NDA as condition of employment with the federal government (this should be confirmed annually).

At the beginning of the expedition, all personnel need to be notified of their responsibilities:

Employee type	**Accountability mechanism for with-holding sensitive data**	**Action**
Mission Personnel (Notified by Expedition Coordinator)		
NOAA Federal Employees	NOAA and Federal Contract	Reminder of contract, and provide archaeology background document
Mission Contractors (UCAR, ERT Inc., 2020 Company LLC)	Non-Disclosure Agreement	Confirm all contractors signed NDA; send reminder of contract and provide archaeology background document
NOAA/Federal Scientists	NOAA and Federal Contract	Reminder of contract, and provide archaeology background document
Other Federal Scientists (BOEM, Navy, NPS, etc.)	Federal Contract	Reminder of contract, and provide archaeology background document
Other Mission Personnel and Scientists	Non-Disclosure Agreement	Get NDA signed

Employee type	Accountability mechanism for with-holding sensitive data	Action
***Okeanos Explorer* Crew (Notified by CO or Designee)**		
NOAA Federal Employees	Subject to NOAA and the ship's communications plans and protocols for sensitive data	CO sends out reminder of contract to ship via All Hands, and provides archaeology background document
Other Federal Employees (e.g. Public Health Service)	Subject to NOAA and the ship's communications plans and protocols for sensitive data	CO sends out reminder of contract to ship via All Hands, and provides archaeology background document
Wage Mariners	Subject to NOAA and the ship's communications plans and protocols for sensitive data	CO sends out reminder of contract to ship via all hands, and provides archaeology background document

Appendix J: Summary of Mitigation Measures and Best Management Practices

Protective Measures and Best Management Practices (BMPs) Incorporated into the Action. BMPs are required to be incorporated within project instructions, cruise plans and NEPA documentation including financial assistance awards and environmental review memoranda. All applicable BMPs must be communicated to the science leads, boat operators and field staff, and as necessary between ship's crew (Commanding Officer/Master or designee(s), as appropriate) and scientific party in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

Bridge Watchstanders on the *Okeanos Explorer's* bridge will carefully monitor for the presence of marine protected species, and permitted personnel would follow established best management practices (BMPs) to minimize disturbance.

1. Minimize Exposure to Elevated Noise Levels

a. Maintain watch for the presence of marine protected species. Immediately notify the survey department of the proximity of cetaceans and sea turtles.When marine mammals are able to be identified by Bridge Officers or Watch Standers, these observations are noted in the NOAA fleet marine mammal observation log as part of standard practice.

i. If a sea turtle is present within 400 m of the ship, the survey department will respond by stopping the pinging of the subbottom sonar. The subbottom shall remain off until the sea turtle has departed the 400 m safety zone.

ii. If cetaceans are present within 400 m of the ship (460 m/500 yards for North Atlantic Right Whales), the vessel would stop if the animal is in danger of colliding with the ship but the mapping sonars would continue transmitting to avoid startle responses. If an observed animal is unable or unwilling to depart the immediate area, sonars will be secured and the ship will slowly move away from the area if feasible.

iii. If the cetacean is within 400 m (460 m/500 yards for North Atlantic Right Whales) and is not in danger of collision, reduce speed and seek to avoid the animal as much as possible.

iv. The Survey Department will respond by stopping the pinging of the sub-bottom sonar and switching the multibeam sonar into "mammal protection" mode (keeps it pinging but at a source level reduced by 20 decibels). No change will occur to the EK 60/80s. Note: the ADCPs are

never run simultaneously with the multibeam and sub-bottom, so they would already be off. The ADCPs are mostly run when the ship is stationary at a dive site and risk to marine mammals is minimal.

b. Minimize turning all sonar sound sources on and off as a precautionary measure to avoid possible startling of animals.
c. When the systems have been shut down for any reason, the multibeam mammal protection mode would be used to turn the multibeam back on first. Only after the multibeam has been brought from mammal protection mode to full power would the sub-bottom profiler and EK 60/80 sonars then be turned back on.
d. If the multibeam sonar is not being used, but other sonar systems are being turned on, they will be started in lower power settings and will gradually (over a 15 minute time period) be adjusted to higher power settings as appropriate for the water depths to essentially mimic the approach of the "mammal protection" mode of the multibeam.

2. Minimize Temporary Disturbance from Human Activity

a. All in-water work will be postponed when whales are within 100 yards, or other protected species are within 50 yards;
    i. This includes posposting start-up of the USBL in preparation for an ROV dive.
b. Should a marine protected species enter the area while in-water work is already in progress, the activity may continue only when that activity has no reasonable expectation to adversely affect the animal(s); and
c. No attempts will be made to feed, touch, ride, or otherwise intentionally interact with any marine protected species.

3. Minimize Entanglement

a. Maintain watch for and avoid the presence of marine protected species. Notify the department heads of the proximity of animals;
b. All in-water work will be postponed when whales are within 100 yards, or other protected species are within 50 yards of the vessel;
c. Should a marine protected species enter the area while in-water work is already in progress, the activity may continue only when that activity has no reasonable expectation to adversely affect the animal(s); and
d. Individuals participating in the activity will closely monitor the instrument cables at all times while they are deployed.

4. Minimize Collisions with Vessels

The following guidelines for vessel operation in the presence of marine protected species and other marine wildlife are provided by the Bureau of Ocean Energy Management in a Notice to Lessees and Operators, and NOAA Fisheries as part of a Biological Opinion:

a. *Vessel Strike Avoidance*

Vessel operator and crew must maintain a vigilant watch for all marine mammals and sea turtles and slow down or stop the vessel or alter course, as appropriate, to avoid striking any marine mammal. These requirements apply when the vessel is in transit and do not apply in any case where compliance will create an imminent and serious threat to a person or vessel or to the extent that a vessel is restricted in its ability to maneuver and, because of the restriction, cannot comply. A visual observer aboard the vessel must monitor a vessel strike avoidance zone around the vessel according to the parameters stated below. Visual observers monitoring the vessel strike avoidance zone can be either third-party visual protected species observers or crew members, but crew members responsible for these duties must be provided sufficient training to distinguish marine mammals from other phenomena. Vessel strike avoidance measures shall be followed during sonar surveys and while in transit.

Vessel personnel should do the following in order to avoid causing injury or death to marine mammals and sea turtles:

i. Maintain a vigilant watch for marine mammals and sea turtles and slow down or stop their vessel to avoid striking protected species.

ii. When whales are sighted, maintain a distance of 100 yards (91 meters) or greater from the whale. If the whale is believed to be a North Atlantic right whale, vessel personnel should maintain a minimum distance of 500 yards (460 meters) from the animal (50 CFR 224.103).

iii. When sea turtles or small cetaceans are sighted, attempt to maintain a distance of 50 yards (45 meters) or greater whenever possible.

iv. When cetaceans are sighted while a vessel is underway, attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area.

v. Reduce vessel speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of cetaceans are observed near an underway vessel when safety permits. A single cetacean at the surface may indicate the presence of submerged animals in the vicinity of the vessel; therefore, precautionary measures should always be exercised.

vi. Whales may surface in unpredictable locations or approach slowly moving vessels. When vessel personnel sight animals in the vessel's path or in close proximity to a moving vessel, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.

The vessel must maintain a minimum separation distance of 100 m (328.1 ft) from large whales (i.e. sperm and baleen whales). The following avoidance measures must be taken if a large whale is within 100 m (328.1 ft) of the vessel.

- The vessel must reduce speed and shift the engine to neutral, and must not engage the engines until the whale has moved outside of the vessel's path and the minimum separation distance has been established.
- If the vessel is stationary, the vessel must not engage engines until the whale(s) has moved out of the vessel's path and beyond 100 m (328.1 ft).

b. *Additional Requirements for the North Atlantic Right Whale*
   i. If a sighted whale is believed to be a North Atlantic right whale, federal regulation requires a minimum distance of 500 yards be maintained from the animal (50 CFR 224.103 ©).
   ii. Vessels entering North Atlantic right whale critical habitat are required to report into the Mandatory Ship Reporting System.
   iii. Mariners shall check with various communication media for general information regarding avoiding ship strikes and specific information regarding North Atlantic right whale sighting locations. These include NOAA weather radio, U.S. Coast Guard NAVTEX broadcasts, and Notices to Mariners. Commercial mariners calling on United States ports should view the most recent version of the NOAA/USCG produced training CD entitled "A Prudent Mariner's Guide to Right Whale Protection" (contact the NMFS Southeast Region, Protected Resources Division for more information regarding the CD).
   iv. Injured, dead, or entangled right whales should be immediately reported to the U.S. Coast Guard via VHF Channel 16.
   v. Adherence to seasonal vessel speed restrictions of 10 knots or less as designated locations along the U.S. east coast.
   vi. Adherence to NOAA Compliance Guide for Right Whale Ship Strike Reduction Rule.

5. Minimize Vessel Waste and Discharge & Prevent Invasive Species

a. All vessels operating in areas where ESA-listed species are present will continue to follow MARPOL discharge protocols, but will postpone any authorized discharge if any protected species are within 100 yards of the vessel.
b. Meet all EPA Vessel General Permits and Coast Guard requirements.
c. Avoid discharge of ballast water in designated critical habitat.
d. Use anti-fouling coatings.
e. Clean hull regularly to remove aquatic nuisance species.
f. Avoid cleaning of hull in critical habitat.
g. Avoid cleaners with nonylphenols.

6. Avoid or Minimize Impacts to Essential Fish Habitat

a. The vessel would employ the use of dynamic positioning during ROV dives (no anchoring);
b. ROVs would be operated in a manner to avoid seafloor disturbance, and setting the ROV on the seafloor will be held to a minimum. For those situations when the ROV does make contact with the seafloor, visual observations will be made to confirm that the area the ROV is set down on does not include corals or other fragile animals that can reasonably be avoided;
c. Sample collections would be limited (typically 4 - 6 total rocks and primary biological specimens per dive) that represent new species, new records, the dominant morphotype animal in a community, or species to support connectivity studies. These specimens would be collected using the ROV's manipulator arms or scoop. Whenever possible, sample collections will be made using the cutting implementation tool on the ROV, and only portions of organisms (<50 cm) will be collected to avoid mortality. Clonal biological specimens (corals, sponges) would be subsampled;
d. When possible, rock samples will be selected in a way to minimize disturbance to the surrounding environment and to minimize the take of attached organisms.;
e. After each ROV dive, the vehicles are brought back onboard and thoroughly sprayed with freshwater and allowed to air dry before the next dive. Though marine organisms should not survive this process, the ROV is thoroughly inspected prior to every dive and checked for the presence of biological organisms to prevent the spread of invasive or non-endemic species from one location to another;
f. Instruments deployed to collect water samples and current data (except for expendable instruments) would not be allowed to contact the seafloor;
g. The use of detergents and other pollutants which may be washed into the marine environment will be avoided or held to a minimum;
h. The vessel will adhere to MARPOL discharge regulations at all times during the proposed cruises;
i. Except in an emergency, the vessel will not anchor while at sea.