

UNITED STATES DEPARTMENT OF COMMERCE National Oceanic and Atmospheric Administration NOAA Marine and Aviation Operations Marine Operations Center 439 W. York Street Norfolk. VA 23510-1114

August 15, 2017

MEMORANDUM FOR: Commander Nicholas Chrobak, NOAA Commanding Officer, NOAA Ship *Pisces* 

FROM:

Captain Scott M. Sirois, NOAA Commanding Officer, NOAA Marine Operations Center-Atlantic

SUBJECT:

Project Instruction for PC-17-04 Mid-Atlantic and Southeast Deep-Water Coral Habitats

Attached is the final Project Instruction for PC-17-04, Mid-Atlantic and Southeast Deep-Water Coral Habitats, which is scheduled aboard NOAA Ship *Pisces* during the period of August 28 – September 8, 2017. Of the 12 DAS scheduled for this project, 12 days are funded by a Line Office Allocation. The project is estimated to exhibit a Medium Operational Tempo. Acknowledge receipt of these instructions via e-mail to **OpsMgr.MOA@noaa.gov** at Marine Operations Center-Atlantic.



#### **Project Instructions**

**Date Submitted:** 

July 07, 2017

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**Platform:** 

**Project Number:** 

PC-17-04 (OMAO)

NOAA Ship Pisces

**Project Title:** 

Mid-Atlantic and Southeast Deep-Water Coral Habitats

**Project Dates:** 

August 28, 2017 to September 08, 2017

Prepared by:

Martha Nizinski **Chief Scientist** NMFS/OST/NSL

C.

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Approved by:

Dated: 8/4/17

Dated: 7/7/17

Allen Collins Director NMFS/OST/NSL

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ider Marine Operations Center - Atlantic

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Captain

Commanding

Approved by:

Dated: 8/16/17 Sirois, NOAA

#### I. Overview

- A. PC 17-04 Mid-Atlantic and Southeast Deep-Water Coral Habitats, 28 Aug 8 Sept 2017
- B. Days at Sea (DAS)

Of the \_12\_ DAS scheduled for this project, \_0\_ DAS are funded by an OMAO allocation, \_12\_ DAS are funded by a Line Office Allocation, \_0\_ DAS are Program Funded, and \_0\_DAS are Other Agency funded. This project is estimated to exhibit a Medium Operational Tempo.

C. Operating Area (include optional map/figure showing op area)

The cruise will target three canyons approximately 80 nm off the coast of North Carolina, approximately 35° 44' 1.72" N 74° 39' 40.18" W to 34° 46' 38.28" N 75° 21' 50.76" W (see Figure 1, Table 1).

D. Summary of Objectives

With the overall goal of surveying suspected deep-sea coral habitats associated with deep-water canyons off the coast of North Carolina, a team of scientists will conduct a program having the following objectives:

1. Survey canyon area and intercanyon slope habitats using the AUV *Sentry*; with concurrent sampling of environmental factors (i.e. depth, salinity, turbidity and hydrography) to characterize benthic habitats and identify areas of coral presence;

- 2. Conduct multibeam mapping in areas where data are missing or incomplete;
- 3. Assess geological features and characterize canyon morphology;
- 4. Conduct monocore and CTD sampling;

6. Assemble a database of photographs, species identification, species abundances/distributions;

7. Assemble maps of geo-referenced coral locations and associated data;

- E. Participating Institutions
  - 1. Woods Hole Oceanographic Institution
  - 2. US Geological Survey
  - 3. North Carolina Museum of Natural Sciences

Name (Last,	Title	Date	Date	Gende	Affiliation	Nationali
First)		Aboard	Disembar	r		ty
			K			
Nizinski, Martha	Chief Scientist	8/26/2017	9/08/2017	F	NMFS/OST/NSL	USA
Berkowitz, Zachary	Sci/Sentry	8/26/2017	9/08/2017	Μ	Woods Hole	USA
	lead				Oceanographic	
					Institute	
Fujii, Justin	Sci/Sentry	8/26/2017	9/08/2017	М	Woods Hole	USA
	team				Oceanographic	
					Institute	
Maxalan Jan	Cold Constant	0/26/2017	0/00/2017	<b>N</b> 4	Manda Unit	
vaugnn, Ian	Sci/Sentry	8/26/2017	9/08/2017	IVI	Woods Hole	USA
	team				Oceanographic	
					Institute	
Skowronski, Mike	Sci/Sentry	8/26/2017	9/08/2017	М	Woods Hole	USA
	team				Oceanographic	
					Institute	
Summan, Stefano	Sci/Sentry	8/26/2017	9/08/2017	М	Woods Hole	USA
	team				Oceanographic	
					Institute	
		0/27/2047	0/10/2017	-		
Demopoulos,	Scientist	8/2//201/	9/10/2017	F	USGS, Gainesville,	USA
Amanda					FL	
Baird, Elizabeth	Sci/Educator	8/27/2017	9/08/2017	F	North Carolina	USA
					Museum of	
					Natural Sciences	
Robert Figueroa-	Scientist	8/27/2017	9/08/2017	Μ	Univ of Texas, Rio	USA
Downing					Grande Valley	
Physical Scientist	Scientist	8/27/2017	9/08/2017	TBA	ТВА	USA
ТВА						

F. Personnel/Science Party: name, title, gender, affiliation, and nationality

- G. Administrative
  - 1. Points of Contacts:

Martha.Nizinski@noaa.gov zberkowitz@whoi.edu {Chief Scientist} {AUV Sentry lead} CO.Pisces@noaa.gov XO.Pisces@noaa.gov ops.Pisces@noaa.gov {Commanding Officer – *Pisces*} {Executive Officer – *Pisces*} {Operations Officer – *Pisces*}

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

None Required.

## II. Operations

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

#### Key Changes and Points of Emphasis:

- 1. Science watches will be on a flexible schedule to accommodate the Sentry schedule.
- 2. Mission will depart from Norfolk, VA and Return to Morehead City, NC.
- 3. Sentry will begin mobilization 26 Aug 2017.
- 4. Installation of transducers on centerboard with all associated cabling (work to begin on 18 Aug) MUST BE COMPLETED before mobilization begins.
- 5. CTD rosette must be on board, calibrated, with new bottles mounted; sensors rated to at least 2000 m.
- 6. Metal deck plate to cover trawl roller should be in place to expedite mobe. (Note: Ship states that metal deck plate is in MS and will not be available for this cruise.)
- 7. Shore-side crane is needed to load *Sentry* and additional containers. WHOI, with assistance from the ship, will make the arrangements.
- 8. Forklift needs to be on the dock and available for mobe.
- 9. Demobe will not take place until after PC-17-05.
- **10.** WHOI equipment will be placed on deck according to layout discussed during Sentry team visit to the ship.
  - A. Project Itinerary:

The cruise will target three canyons approximately 80 nm off the coast of North Carolina, approximately 35° 44' 1.72" N 74° 39' 40.18" W to 34° 46' 38.28" N 75° 21' 50.76" W (see Figure 1, Table 1).

26 Aug:	Begin mobilization of Sentry and scientific equipment.
27 Aug:	Finish <i>Sentry</i> mobe. Load additional scientific gear, embark scientific personnel.
28 Aug:	Depart Norfolk, VA. Transit to Unnamed Canyon north of Keller Canyon.
28 Aug:	Arrive at Unnamed Canyon. Begin calibration of USBL upon arrival (8-12 hrs).
29 - 30 Aug:	Conduct <i>Sentry</i> , CTD, and multibeam ops, in and around Unnamed Canyon north of Keller Canyon.
30 Aug: 31 Aug:	Finish <i>Sentry</i> operations at Unnamed Canyon; Underway to Keller Canyon; conduct <i>Sentry</i> operations upon arrival. Conduct <i>Sentry</i> , CTD, and multibeam ops at Keller Canyon; Underway to Unnamed Canyon between Keller and Hatteras canyons
1 Sept:	Conduct <i>Sentry</i> , CTD, and multibeam ops operations at Unnamed Canyon between Keller and Hatteras canyons;
2 Sept:	Finish <i>Sentry</i> operations at Unnamed Canyon between Keller and Hatteras canyons; Underway to Hatteras Canyon; conduct <i>Sentry</i> operations upon arrival.
3 Sept:	Conduct Sentry, CTD, and multibeam operations at Hatteras Canyon.
4 Sept:	Underway to Pamlico Canyon; conduct Sentry operations upon arrival.
5 Sep:	Conduct Sentry, CTD, and multibeam ops at Pamlico Canyon;
6 Sept:	Finish <i>Sentry</i> operations at Pamlico Canyon; Underway to area SW of Pamlico; conduct <i>Sentry</i> operations upon arrival.
7 Sept:	Finish <i>Sentry</i> operations at area SW of Pamlico Canyon; Underway to Morehead City, NC
8 Sept:	Arrive Morehead City, offload scientific collections and equipment; disembark scientific personnel.
9 Sept:	"Demobe Sentry" [Sentry stays on board for next cruise leaving 10 Sept]

- B. Staging and Destaging:
  - Staging will begin on 26 Aug.

- Any extraneous equipment (e.g., live tank, picnic table) must be removed from the main and 01 decks.
- Additional crane will be required to load *Sentry* and associated containers
- Fork lift needs to be in place and available
- Mobe Strategy (Draft):

Day 1

- Offload Vehicle Van, Server Van, and USBL Pole
- Begin USBL Pole assembly and cable run
- Place Sentry Van, Vehicle Van, USBL Pole A-Frame, Air Tugger and Sentry with associated brackets on Ship
- Power up Server Van and begin setup
- Setup up computing infrastructure in dry lab
- Run all cables to Sentry vehicle and dry lab
- Mount Antennas

#### Day 2

- Spool Spectra on to crane and Pull test to 10,000 lbs
- Setup *Sentry* Vehicle cooling system
- Setup *Sentry* Vehicle and Test
- Test USBL system
- Tie down everything prior to sailing
- Additional ship's personnel will be utilized as needed (e.g. Crane operator, ET, Engineer)
- Although 8 Sept is considered a **Destaging** day, *Sentry* will remain on board for the next cruise.
- Ship's personnel may be needed (e.g. Crane operator) to help offload scientific equipment on 8 Sept.
- C. Operations to be Conducted:

<u>Operational Plans:</u> A detailed protocol will be provided to the vessel prior to departure. This protocol will describe the operating guidelines. However, sampling schedules and locations will be assessed and adjustments made while at sea to maximize data collection from *Sentry* ops.

The following is an operational summary: The cruise will target known or suspected deep-sea coral locations in six priority canyon areas (Figure 1) for surveys. Table 1 lists latitude/longitude for these priority areas. Bottom depths in area of operation range from 500 – 2000 m. The primary sampling equipment will be the *Sentry* AUV system (Figure 2). Multibeam sonar mapping using ship ME70 will be conducted in areas where bathymetry and backscatter data are missing or incomplete (150 - 400 m). CTD rosette with monocore will be deployed at selected stations.

Precise *Sentry* deployment locations will be based on the best available multibeam sonar data. Target sites for *Sentry* will be prioritized and provided to the ship before sailing. It is requested that the vessel's

Navigation Officer plot and examine stations, and identify any stations that are problematic for the vessel in terms of depth, obstructions or other issues in advance of deployment. Specific sampling problems and requirements may necessitate the planning of additional stations during the actual operation of the cruise.

The survey approach will consist of picking "points" on the sea floor within a target site and also choosing transect lines between points or along areas of interest. We will plan two dives (i.e., two *Sentry* deployments) per canyon. The first will be multibeam reconnaissance, lasting approximately eight hours. These data will be processed and used to plan a longer (up to 40-hours) deployment of *Sentry* to maximize the number of images collected in hard-bottom areas. The remaining time will be used for recharging batteries and downloading data while conducting other operations. *Sentry*, an untethered system, will be programmed to make single or multiple passes over a target, either as a series of parallel lines spaced appropriately to cover a larger target, or using a series of lines that intersect over a central point to provide highest density of coverage over smaller areas of greatest potential interest. The number of passes will depend on the size of the target. When appropriate these transects will include other areas of interest and in some cases long transect lines will be the most appropriate way to survey a particular feature (such as a long ridge crest, or up a slope with changing reflectivity) or depth contour.

Days at sea will be divided between priority areas with approximately 1-2 days in each area. Transit between priority areas will occur when *Sentry* is on deck for battery charging and data downloads. Multiple *Sentry* deployments will be made in each priority area. Generalized launch and recovery protocols are provided in Appendix 1. Priority target sites are listed in Table 1. When *Sentry* is on deck to download data and recharge batteries, multibeam sonar operations or CTD/monocore operations will be conducted. Monocore operation protocol is provided in Appendix 2.

<u>Scientific Computer System (SCS)</u>: *Pisces*' SCS system is a PC-based server, which continuously collects and distributes scientific data from various navigational, oceanographic, meteorological, and sampling sensors throughout the cruise. Date and time for data collections from computers, instrumentation, and log sheet recordings will be synchronized using the vessel's GPS master clock. The *Pisces*' Survey Tech is responsible for ensuring data collection.

The ship's Scientific Computer System (SCS) will be required for logging data on a routine basis and data requirements will be coordinated with the Commanding Officer and Electronics Technician at the beginning of the cruise. The bridge officers will be requested to execute "*Sentry* Events" using established software applications to capture SCS data streams during *Sentry* operations. Detailed information on data collection protocols will be supplied to the ship prior to sailing. Collection of ship sensor data through sampling events is a critical requirement to support this work. It is requested that the time server/time date be imbedded into the SCS files. Global Positioning System (DGPS or P-code GPS) provides data on vessel towing speed and direction to be recorded at a frequency of 0.01 Hz. A list of the requested SCS sensors is provided in Table 2. It is requested that the sensors be operational, calibrated and that logging capabilities be enabled.

<u>EK60 and ME70 Data Acquisition</u>: The Simrad EK60 echo sounder, (18-, 38-, 70-, 120-, and 200-kHz with split-beam transducers mounted on the retractable center-board) will acquire data continuously throughout the cruise. The EK60 will be interfaced to the SCS to record bottom depth and vessel log

values. The EK60 will be interfaced to the POSMV motion sensor. When operational, the EK60 will be synchronized with the Simrad ME70 multibeam (operating within the frequency band 70–120 kHz), and the ship's ADCP. The EK60 is not synchronized with the other sounders and Doppler speed log on the vessel. To minimize acoustic and electrical interference, whenever possible we request deactivating other sounders on the vessel. The survey technicians will be responsible for EK60 and ME70 data acquisition and storage.

## Additional operations:

- 1. Physical oceanographic parameters will be monitored through CTD casts, and the ship's flow-through thermosalinograph and fluorometer instruments.
- 2. Multibeam sonar mapping, using the ship's ME70 (operating within the frequency band 70–120 kHz) systems, will be conducted. Survey technicians with help from the science team will be responsible for multibeam operations. Data collected (.all files) will be saved and provided to the chief scientist. Science team will provide KBTs.
- 3. CTD casts will be conducted when *Sentry* is on deck and is non-operational. The ship will supply SBE19+ and SBE911+, ECO Chlorophyll Fluorometer and Turbidity sensor (rated to at least 2000 m), and O2 sensor (rated to at least 2000 m), and have these ready for use in support of the ship multibeam ops. CTD rosette will also be deployed when *Sentry* is on deck and is non-operational to collect water samples. The survey technician, with help from the science team, will be responsible for CTD operations.
- 4. A monocore (Figure 3) will be securely attached to the CTD rosette at selected stations to collect discrete, quantitative bottom samples. The science team, with help from the survey tech and deck crew, will be responsible for CTD/monocore operations.

## D. Dive Plan

Dives are not planned for this project.

## E. Applicable Restrictions

Bad weather conditions, high sea states, equipment failure, safety concerns, and unforeseen circumstances can preclude normal operations. The ship's officers, chief scientist, and *Sentry* engineers will assess and address any concerns or issues affecting normal operations.

## III. Equipment

A. Equipment and Capabilities provided by the ship (itemized)

ADCP Dynamic Positioning EK-60 ME-70 CTD rosette Oxygen sensor rated to at least 2000 m ECO Chlorophyll Fluorometer and Turbidity sensor rated to at least 2000 m Working winches Working cranes

B. Equipment and Capabilities provided by the scientists (itemized)

<u>1. WHOI AUV Sentry</u>: Sentry (Figure 2), (<u>http://www.whoi.edu/main/sentry</u>), operated through the WHOI-Deep Submergence Facility, is an internally recording, 6000 m rated, AUV with these basic specifications:

Depth capability	6,000 meters	
Dimensions: Length:	2.9m (9.7ft)	
Width	2.2m (7.2ft)	
Height	2m (6.5ft)	
Weight:	1,451 kg (3,200 lb) without extra science gear	
Operating range	70-100 km, (38-54 mile) depending on speed, terrain and payload	
Operating speed	0-1.2 m/s (0-2.3 knots)	
Propulsion	:4 brushless DC electric thrusters on pivoting wings	
Energy	Lithium Ion batteries; 13 kWh	
Bus power	48-52 Volts DC.	
Endurance	18-40 hours depending on mission type	
Recharge time	10 hours, 16 hour full turnaround from surface to release	
Descent/Ascent speed	40m/min for both descent and ascent, 2400m/hr.	
Navigation	tion USBL Navigation with real-time Acoustic Communications and/or Long Baseline	
_	(LBL) using acoustic transponders, Doppler Velocity Log (DVL), and Inertial	
	Navigation System (INS)	

These sensors are standard to Sentry's configuration:

Sensor	Model
Sonardyne Ranger 2 w/ Avtrack2	Ranger 2
WHOI LBL	Custom
INS	IXSEA PHINS 1 INS
DVL	RDI 300kHz
Pressure Depth Sensor	Paroscientific 8B7000
CTD	SBE FastCAT 49
Dissolved Oxygen	Aanderaa Optode w/ fast foil
Turbidity	Seapoint Optical Back Scatter (OBS)
Side Scan Sonar	Edgetech 2200-M 120/410kHz
Sub Bottom Profiler	Edgetech 2200-M 4-24kHz
Magnetometers	3x APS1520 3 axis
Camera	Prosilic a GC-1380C Digital Still Camera
Multibeam	Reson 7125 MBES 400kHz with 7216 receiver

<u>Sentry operations requirements</u>: Protocols for *Sentry* operations will be discussed during a meeting of WHOI *Sentry* team lead Z. Berkowitz, Chief Scientist M. Nizinski and *Pisces* crew during a pre-cruise meeting. Launch and recovery protocols are provided in Appendix 1.

2. Monocore (Figure 3). The monocore will be suspended under the CTD rosette by a 10 m line. The monocore weighs about 33 lbs. The CTD will be lowered to as near bottom as possible. The monocore will collect a sample of the bottom sediments. Refer to Appendix 2 for sampling protocol.

## IV. Hazardous Materials

## A. Policy and Compliance

The Chief Scientist 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). 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.

2				
Common Name of Material	Qty	Notes	Trained Individual	Spill control
Formalin	4 liters	Stored in ship chem. locker	A. Demopolous	F
95% Ethyl Alcohol (ethanol)	1 liter	Alkalinity, stored in ship chem. locker	A. Demopolous	E

B. Inventory

#### C. Chemical safety and spill response procedures

#### F: Formalin/Formaldehyde

- Ventilate area of leak or spill. Remove all sources of ignition.
- Wear appropriate personal protective equipment.
- Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible.
- Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container.
- Do not use combustible materials, such as saw dust.

#### E: Ethanol

• Ventilate area of leak or spill. Remove all sources of ignition.

- Wear appropriate personal protective equipment.
- Stop the flow of material. Dike the spilled material.
- Carefully cover the area with spill absorbent material.
- Sweep up the residue using spark-proof tools and place the residue into a labeled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). Store for disposal as hazardous waste.
- Mop the affected area using detergent and water.
- D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

## V. Additional Projects

A. Supplementary ("Piggyback") Projects

No Supplementary Projects are planned.

B. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

## VI. Disposition of Data and Reports

Disposition of data gathered aboard NOAA ships will conform to NAO 216-101 *Ocean Data Acquisitions* and NAO 212-15 *Management of Environmental Data and Information*. To guide the implementation of these NAOs, NOAA's Environmental Data Management Committee (EDMC) provides the *NOAA Data Documentation Procedural Directive* (data documentation) and *NOAA Data Management Planning Procedural Directive* (preparation of Data Management Plans). OMAO is developing procedures and allocating resources to manage OMAO data and Programs are encouraged to do the same for their Project data.

- A. Data Classifications: Under Development
  - a. OMAO Data
  - b. Program Data
- B. Responsibilities: Under Development

## VII. Meetings, Vessel Familiarization, and Project Evaluations

A. <u>Pre-Project Meeting</u>: The Chief Scientist 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 Chief Scientist in arranging this meeting.

- B. <u>Vessel Familiarization Meeting</u>: 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.
- C. <u>Post-Project Meeting</u>: The Commanding Officer is responsible for conducted a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success 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 ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.

# D. Project Evaluation Report

Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist. The form is available at <u>https://sites.google.com/a/noaa.gov/omao-intranet-dev/operations/marine/customer-satisfaction-survey</u> and provides a "Submit" button at the end of the form. It is also located at

https://docs.google.com/a/noaa.gov/forms/d/1a5hCCkgIwaSII4DmrHPudAehQ9HqhRqY3J\_FXqbJp9g/v iewform. 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 ships, 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, cheeses, 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 seven days prior to the project.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Chief Scientist. The Chief Scientist and Commanding 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 Chief Scientist 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 Chief Scientist is also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the project and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Chief Scientist will ensure that all non-NOAA or non-Federal scientists aboard also have proper orders. It is the responsibility of the Chief Scientist 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 17, 2000 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 Chief Scientist or the NOAA website <u>http://www.corporateservices.noaa.gov/noaaforms/eforms/nf57-10-01.pdf</u>.

All NHSQs submitted after March 1, 2014 must be accompanied by <u>NOAA Form (NF) 57-10-02</u> - Tuberculosis Screening Document in compliance with <u>OMAO Policy 1008</u> (Tuberculosis Protection Program).

The completed forms should be sent to the Regional Director of 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 email process approved by NOAA is <u>Accellion Secure File Transfer</u> which requires the sender to setup an account. <u>Accellion's Web Users Guide</u> is a valuable aid in using this service, however to reduce cost the DOC contract doesn't provide for automatically issuing

full functioning accounts. To receive access to a "Send Tab", after your Accellion account has been established send an email from the associated email account to accellionAlerts@doc.gov requesting access to the "Send Tab" function. They will notify you via email usually within 1 business day of your approval. The 'Send Tab" function will be accessible for 30 days.

Contact information:

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

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. At the discretion of the ship CO, safety shoes (i.e. steel or composite toe protection) may be required to participate in any work dealing with suspended loads, including CTD deployment and recovery. The ship does not provide safety-toed shoes/boots. The ship's Operations Officer should be consulted by the Chief Scientist to ensure members of the scientific party report aboard with the proper attire.

#### D. Communications

A progress report on operations prepared by the Chief Scientist may be relayed to the program office. Sometimes it is necessary for the Chief Scientist to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the Chief Scientist. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via email and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth at 128kbs is shared by all vessels staff and the science team at no charge. Increased bandwidth in 30 day increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required and it must be arranged through the ship's Commanding Officer at least 30 days in advance.

E. IT Security

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:

(1) 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 the above 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 3 days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

Foreign National access to the NOAA ship or Federal Facilities is not required for this project.

# VIII. Appendices

Figure 1. Map of target areas to be surveyed during PC-17-04 Mid-Atlantic and Southeast Deep-Water Coral Habitats, 28 Aug – 8 Sept 2017.



# Figure 2. AUV Sentry



Figure 3. NIOZ monocore will be suspended under the CTD rosette by a 10 m line. The monocore weighs about 33 lbs.



Table 1. Station locations (Priority Areas) within the Area of Operations.

Location	Latitude	Longitude	Depth (m)
Unnamed Canyon north of Keller Canyon	35.73381	-74.66116	1790
Keller Canyon	35.54458	-74.78238	1160
Unnamed canyon between Keller and Hatteras Target 1	35.3663	-74.8373	1425
Unnamed canyon between Keller and Hatteras Target 2	35.3906	-74.868	565
Hatteras Canyon	35.2692	-74.8827	1870
Pamlico Canyon 1	34.9382	-75.1688	1400
Pamlico Canyon 2	34.9505	-75.2013	960
Pamlico Canyon 3	34.9285	-75.1458	1730
SW of Pamlico Canyon	34.7773	-75.3641	1600

Table 2. Scientific Computer Sensors, and logging rates of those sensors, required during NOAA ship *Pisces* PC-17-04, Mid-Atlantic and Southeast Deep-Water Coral Habitats, 28 Aug - 8 Sept 2017.

		Log Rate
Sensor Name	Units	(secs)
ADCP-Depth	(Meters)	1
ADCP-F/A-GroundSpeed	(Knots)	1
ADCP-F/A-WaterSpeed	(Knots)	1
ADCP-P/S-GroundSpeed	(Knots)	1
ADCP-P/S-WaterSpeed	(Knots)	1
Air-Temp	(Degrees C)	1
Baro-Press	(Millibars)	1
CenterBoardPos-Value	(Position)	1
Date	(Date)	1
Doppler-Depth	(Meters)	1
Doppler-KeelOffset	(Meters)	1
Doppler-P/S-BottomSpeed	(Knots)	1
Doppler-P/S-WaterSpeed	(Knots)	1
EK60-18kHz-Depth	(Meters)	1
EK60-38kHz-Depth	(Meters)	1
ES60-200hz-Depth	(Meters)	1
ES60-50hz-Depth	(Meters)	1
GYRO	(Degrees)	1
ME70-Depth	(Meters)	1
Mid-SeaTemp-C	(Degrees C)	1
MX420-COG	(Degrees)	1
MX420-Lat	(DEGMIN)	1
MX420-Lon	(DEGMIN)	1
MX420-SOG	(Knots)	1
MX420-Time	(Time)	1

PASHR-Hdg-Qual	(Value)	1
PASHR-Hdg-True	(Degrees)	1
PASHR-Heave	(Centimeters)	1
PASHR-Pitch	(Degrees)	1
PASHR-Pitch-Qual	(Value)	1
PASHR-Roll	(Degrees)	1
PASHR-Roll-Qual	(Value)	1
PASHR-Time	(Time)	1
PI32-DEPTH300-VAL	(Meters)	1
PI32-DS-VAL	(Meters)	1
PI32-HR-VAL	(Meters)	1
PI32-WS-VAL	(Meters)	1
PORTTrawlWinchLineOut	(Meters)	1
PORTTrawlWinchLinespeed	(Meters/sec)	1
PORTTrawlWinchTension	(Kilos)	1
POSMV-COG	(Degrees)	1
POSMV-Elevation	(Value)	1
POSMV-hdops	(Value)	1
POSMV-Heading	(Degrees)	1
POSMV-Lat	(DEGMIN)	1
POSMV-Lon	(DEGMIN)	1
POSMV-Quality	(Value)	1
POSMV-Sats	(Value)	1
POSMV-SOG	(Knots)	1
POSMV-Time	(Time)	1
SAMOS-AirTemp-Value	(Degrees C)	1
SAMOS-TRUE-WIND-DIR-Value	(Degrees)	1
SAMOS-TRUE-WIND-Spd-Value	(Knots)	1
Shaft-RPM-Value	(Value)	1
STBDTrawlWinchLineOut	(Meters)	1
STBDTrawlWinchLinespeed	(Meters/sec)	1
STBDTrawlWinchTension	(Kilos)	1
YOUNG-TWIND-Direction	(Degrees)	1
YOUNG-TWIND-Speed	(Knots)	1

Appendix 1. Launch and Recovery Procedures for AUV *Sentry*. (Excerpt from WHOI document "A Scientists Guide to *Sentry* Cruise Planning and Proposal)

Launch and recovery of *Sentry* is similar to launch and recovery of many forms of science gear free of the ship that are launched and recovered by research vessels around the world. *Sentry* sets itself apart from a lot of deployed science gear by the various sensors, sonars, and tracking equipment that are on the outside of the vehicle. This equipment is exposed and vulnerable on launches and recoveries and particular attention should be paid to avoid damaging this equipment. *Sentry* also has a unique capability that allows an operator to drive *Sentry* to the ship. This allows the Vessel to comfortably hold the ship on station while the vehicle drives to the recovery location.

Figure 1 is a picture of *Sentry* on the deck of R/V *Knorr*. This picture has the *Sentry* umbilical and charge cables attached as well as the cooling lines.



Figure 38

# 4.1 LAUNCH AND RECOVERY PREPARATION

# 4.1.1 General Safety Awareness

Personnel safety is the number one concern for *Sentry* Operations. *Sentry* Operations combines the Vessels Safety Guidelines, WHOI's Safety Guidelines as well as UNOLS RVOC Safety Guidelines to provide safest operations environment possible.

# 4.1.2 <u>On Deck Personnel</u>

Sentry Launches and Recoveries require the following deck support

- Deck Boss/Launch Coordinator (typically BOS'N or *Sentry* crew)
- Crane Operator (Ship Personnel)
- Line Handlers Minimum 3 Persons (Filled by Deck Crew/Sentry Crew)
- Pull Pin Handler (Sentry crew, only required for Launch)

# 4.1.3 <u>Personal Protective Equipment</u>

*Sentry* Operations requires at a minimum the following PPE (Personal Protective Equipment) during Launch and Recovery Operations.

- Hard Hat
- Coast Guard Approved Work Vest
- Closed toed shoes (preferably steel toes)
- Gloves (Optional)
- Safety Glasses (Optional)

# 4.2 NORMAL OPERATING CONDITIONS

# 4.2.1 Vessel Setup

Vessel setup is a key component to *Sentry* launch and recovery operations.

- During launch the critical consideration is that the vehicle not pass under the ship. To this end, the ship will need to set up into the seas to minimize roll, but with the side of the ship where launch will occur as down current as possible.
- During Recovery, the key issue is not to impact the vehicle. Since *Sentry* can drive towards the vessel, it is better to set the vessel up downwind of *Sentry* so that it is

blown away from *Sentry*. It may be necessary to move the ship's bow a little after the lift line is hooked up and before the crane lifts *Sentry* from the water as the prime consideration then becomes minimizing roll.

# 4.2.2 <u>Sentry Launch</u>

*Sentry* is ready to be launched after the *Sentry* crew conducts a successful deck test of the vehicle. The *Sentry* launch coordinator crew will coordinate launch time and position with the necessary Vessel crew. The following is the general flow of launch operations for *Sentry*. Some of these actions will happen simultaneously.

- Notify Deck personnel of Launch time and ensure all necessary jobs are filled.
- Secure tag lines to *Sentry* fore and aft
- Rig air tugger line to crane hook
- Rig lifting sling with pull pin and crane hook
- Radio Beacon on and tested, Strobe on and Tested
- Charge and umbilical cable are removed from *Sentry*
- Secure all panels on *Sentry*
- Cooling lines are removed

NOTE: On launch Tag Line handlers shall pay particular attention to entanglement of the lines, particularly when slipping the lines. The unique design of *Sentry* creates various hazards for tag lines to get caught and create damage to the vehicle. Tag lines need to stay clear of the Vehicle fins, thrusters, and sensors on the top of the vehicle. In particular, tag lines must be slipped gently and not allowed to swing freely. The recommended procedure is to slack the line and slip it until the free end is in one hand. This can then be dropped into the water to arrest line swing and gently pulled hand over hand by the other end.

Sentry Launch will commence with lifting the vehicle several inches

- The poles used to hold *Sentry* up will be removed
- The fore and aft catches will be removed
- *Sentry* shall then be lifted out of the cradle up to a height that will allow *Sentry* to clear the Vessels railing
- *Sentry* should then be moved outboard to position it above the water and a safe distance from the ship.
- Slip the bow tag line as the vehicle goes over the rail. Recover as much of stern tag line as possible in preparation for slipping it.
- Orient the vehicle pointed away from the ship (*Sentry* may glide forward as it descends).
- Start lowering the vehicle into the water AND slip the stern line. Ideally, the stern tag line is free of *Sentry* when it just touches the water but err on the side of clearing the tag line.

- Pull the release (as soon as weight is off lift sling) and lift crane hook up and away.
- If necessary slide ship away from vehicle as it descends clear of the ship. Then slowly move ship clear of *Sentry* by several hundred meters in case it should surface prematurely. Typically, the *Sentry* launch coordinator will provide direction over the radio.
- Secure crane and all launch equipment.
- Have ship remain within tracking distance until *Sentry* is following mission profile adequately

# 4.2.3 <u>Sentry Recovery</u>

Provide bridge with expected time and location for Sentry to be on the surface. Ship should typically be positioned about 400 meters down-wind of *Sentry* as it approaches the surface. It is critical to be tracking *Sentry* as it leaves the bottom since tracking is poor as it gets near the surface and hard to pinpoint its location.

There are two recovery scenarios: Sentry is able to be driven on the surface towards the ship using radio control. Sentry is "dead boat" and the ship must maneuver along-side of Sentry

- Ensure all required personnel are present and notify bridge that the deck personnel are ready for recovery of the vehicle.
- Ship should approach *Sentry* to within 50 100m meters off the rail of the ship near the recovery location. *Sentry* personnel will attempt radio control with remote control box. If radio control is obtained, ship should come to a stop and hold position and heading that they feel is best. When bridge has ship in position and is ready they should notify the deck to have *Sentry* driven to the ship.

If *Sentry* is NOT radio controlled then the ship should carefully approach *Sentry* trying to keep it off about 10-15 ft until alongside and within pole reach.

• When *Sentry* is alongside the ship in the area for recovery, a long pole attaches the lift line loop to the lift hook on *Sentry*. The lift line is pulled free of the pole and the loop at the other end is QUICKLY attached to the crane. Under some circumstances the lift line may already be attached to the crane. A tagline running directly inboard to an air tugger will typically already be attached. IT IS IMPORTANT THAT THE PEOPLE ON THE STABILIZING TAG LINES KEEP THE LIFT LINE FROM TANGLING ON *Sentry*. This can be done by keeping some tension on the lines thus lifting the lift line up and clear of the vehicle.

• As soon as the lift line is attached the crane should swing outboard to keep *Sentry* from hitting the hull. Note that if the crane pulls *Sentry* sideways it may slip forward or aft

(direction of least resistance) through the water, and thus impact the hull. The pole can be used to push *Sentry* away if necessary.

- As *Sentry* comes out of the water the crane should bring it inboard enough to attach tag lines. These lines attach to the **appropriate** "D" rings welded to the struts between the upper & lower hulls.
- Continue to bring *Sentry* onboard and lower until just above the cradle
- Capture *Sentry* with fore and aft constraints
- Replace outboard leg of cradle and insert poles
- Lower *Sentry* into the cradle
- Secure the vehicle with cargo straps and disconnect all lines so the crane can be secured.

# 4.3 Launch and Recovery Pictures and Sequence

# 4.3.1 Launch



Figure 39 - Sentry is in the cradle and lifted approximately 1-2 inches



Figure 40 - The outboard side of the cradle is removed and the pipes through the center of the vehicle are removed.



Figure 41 - The fore and aft catches are released leaving the vehicle stabilized by the tagline to the air tugger (left) and the fore and aft taglines (right)



Figure 42 - *Sentry* is lifted up from the cradle and out towards the rail.



Figure 43 - As *Sentry* moves over the rail, the forward tagline is slacked and slipped.



Figure 44 - *Sentry* continues to move outboard, the aft tagline is used to point the vehicle away from the vessel, then is slipped right before the vehicle enters the water. As soon as the pin is unloaded, it is pulled and the vehicle descends freely.



Figure 45 - As the vehicle drives towards the stationary vessel, the lift line for the crane is attached using a carbon fiber pole. The vehicle immediately drives full reverse and the pole is potentially used to fend the vehicle while the lift line is tensioned.



Figure 46 - As the lift line is tensioned and the vehicle lifted partially out of the water, fore and aft tag lines are attached using carbon poles and hooks. The tagline to the airtugger is already attached to the lifting bridle.



Figure 47 - The vehicle is slewed back into the cradle and the fore and aft catches are secured first. The side is reattached and the poles reinserted before the vehicle is set into the cradle.

Appendix 2. Description of the monocore deployment procedures.

- 1. Attach line (scientist provided rope) with a bowline knot to the bottom of the CTD rosette and to the top of the monocore (See Appendix 2 Figure 1). Length of line will equate to the safe working distance between the bottom of the rosette and seafloor (e.g., 10 m), determined by ship operations.
- 2. Deploy CTD rosette over side of ship, and allow the monocore to hang below the rosette before lowering CTD to the seafloor. Remove black clip while the core is under tension; this is necessary so that the core can properly sink into the mud once the core has reached the seafloor.
- 3. When the rosette is approximately 50 m above bottom, lower winch speed to 30 m/min.
- 4. Lower CTD to 10 m above bottom or safe working distance used by the ship.
- 5. Raise the CTD rosette slowly, 30m/min until 50 m above bottom, then continue recovering the CTD at speed determined by ship operations.
- 6. Once the CTD is at the surface, recover the monocore.
- 7. Place black clip on top of monocore to ensure the core sample is secured.
- 8. Place monocore in stand (See Appendix 2 Figure 2).





Figure Appendix 2.2 Monocore secured on deck on stand. The monocore weighs about 33 lbs.

