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

MEMORANDUM FOR: Captain Mark Wetzler, NOAA
Commanding Officer, NOAA Ship *Okeanos Explorer*

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

SUBJECT: Project Instruction for EX-17-02
2017 American Samoa Expedition: Suesuego o le Moana o Amerika Samoa (ROV/Mapping)

Attached is the final Project Instruction for EX-17-02, 2017 American Samoa Expedition: Suesuego o le Moana o Amerika Samoa (ROV/Mapping), which is scheduled aboard NOAA Ship *Okeanos Explorer* during the period of February 16 – March 2, 2017. Of the 15 DAS scheduled for this project, 9 DAS are funded by an NOS Line Office Allocation, and 6 DAS are funded by NOAA National Marine Fisheries Service. This project is estimated to exhibit a High Operational Tempo. Acknowledge receipt of these instructions via e-mail to Opsmgr.MOA@noaa.gov at Marine Operations Center-Atlantic.

Ocean Exploration and Research

FINAL Project Instructions

Date Submitted: February 8, 2017

Platform: NOAA Ship *Okeanos Explorer*

Project Number: EX-17-02

Project Title: 2017 American Samoa Expedition: Suesuega o le Moana o Amerika Samoa (ROV/Mapping)

Project Dates: February 16 - March 2, 2017

Prepared by: Kelley Elliott, NOAA
Expedition Manager
Office of Ocean Exploration & Research
Dated: 2/9/2017

Approved by: Craig Russell
Program Manager
Office of Ocean Exploration & Research
Dated: 2/8/2017

Approved by: Captain Scott M. Sirois, NOAA
Commanding Officer
Marine Operations Center - Atlantic
Dated: 2/13/16

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-17-02. Operations for this cruise will be conducted 24 hours/day and consist of daily remotely operated vehicle (ROV), overnight mapping, CTD casts and full shore-based participation via telepresence. Operations will be conducted within several marine protected areas. The expedition will commence on February 16, 2017 in Pago Pago, American Samoa (14° 16.3'S, 170° 41.22'W) and conclude on March 2, 2017 in Apia, Samoa (13°51.03' S, 171°45.08'W). Operations will include the use of the ship's deep water mapping systems (Kongsberg EM302 multibeam sonar, EK60 split-beam fisheries sonars, Knudsen 3260 chirp sub-bottom profiler sonar, and Teledyne Acoustic Doppler Current Profilers), XBT and Underway CTD casts in support of multibeam sonar mapping operations, OER's 6000 m two-body ROV Deep Discoverer and Seirios, and the ship's high-bandwidth satellite connection for continuous real-time ship-to-shore communications. Operations are planned in the Rose Atoll Marine National Monument, National Marine Sanctuary of American Samoa, offshore (not within) of the National Park of American Samoa, and the waters of both American Samoa and Samoa.

NOAA Ship *Okeanos Explorer* systematically explores the ocean every day of every cruise to maximize public benefit from the ship's unique capabilities. With approximately 95% of the ocean unexplored, we pursue every opportunity to map, sample, explore, and survey at planned destinations as well as during transits; "Always Exploring" is a guiding principle. An integral element of *Okeanos Explorer*'s "Always Exploring" model is the ship's seafloor and water column mapping capabilities. The sonars, or a subset the sonars (EM 302, EK 60, Knudsen sub-bottom, ADCPs) on board will be operated at all times throughout the cruise when the ROV is not in the water or CTD rosette operations are not being conducted, allowing for continued exploration and seabed, water column, and/or sub-bottom data collection and selected processing.

This expedition is part of a three year Campaign to Address Pacific monument Science, Technology, and Ocean Needs (CAPSTONE) focused on systematically collecting baseline information to support science and management needs within and around the Monuments and other protected places in the Pacific, and serves as an opportunity for NOAA and the Nation to highlight the uniqueness and importance of these national symbols of ocean conservation. NOAA will work with the scientific and management community to characterize unknown and poorly-known areas through telepresence-based exploration. Baseline information collected during this cruise will support and catalyze further exploration, research and management activities.

Understanding biogeographic patterns between and among the Pacific Monuments and Sanctuaries is a coordinating theme for CAPSTONE science priorities. Themes and objectives for the expedition series include:

- Acquire data to support priority Monument and Sanctuaries science and management needs, including habitat surveys in recently expanded boundary areas;
- Identify and characterize vulnerable marine habitats - particularly potential locations for high density deep sea coral and sponge communities;
- Characterize seamounts within the Prime Crust Zone (PCZ). The PCZ is the area of the Pacific with the highest expected concentration of deep sea minerals, including rare metals and rare earth elements;
- Collect information on the geologic history of Central Pacific Seamounts, including those that are or may be relevant to our understanding of plate tectonics and subduction zone biology and geology; and
- Provide a foundation of publicly accessible data and information products to spur further exploration, research, and management activities.

B.Days at Sea (DAS)

Of the 15 DAS scheduled for this project, 0 DAS are funded by an OMAO allocation, 9 DAS are funded by an NOS Line Office Allocation, 0 DAS are Program Funded, and 6 DAS are funded by NOAA National Marine Fisheries Service. This project is estimated to exhibit a High Operational Tempo due to 24 hour operations consisting of daily ROV dives, occasional CTD rosette casts, overnight mapping operations and continuous shore-side participation via telepresence.

C. Operating Area

EX-17-02 of the CAPSTONE Expeditions is a combined ROV and mapping cruise that will focus operations in American Samoan waters, including the Rose Atoll Marine National Monument and National Marine Sanctuary of American Samoa. Near the end the cruise, the ship will

conduct transit mapping operations to port in Apia, Samoa and if there is time, conduct focused mapping survey operations around Upolo island. Mapping, ROV and CTD rosette operations will focus in depths generally between 250 and 6,000 meters.

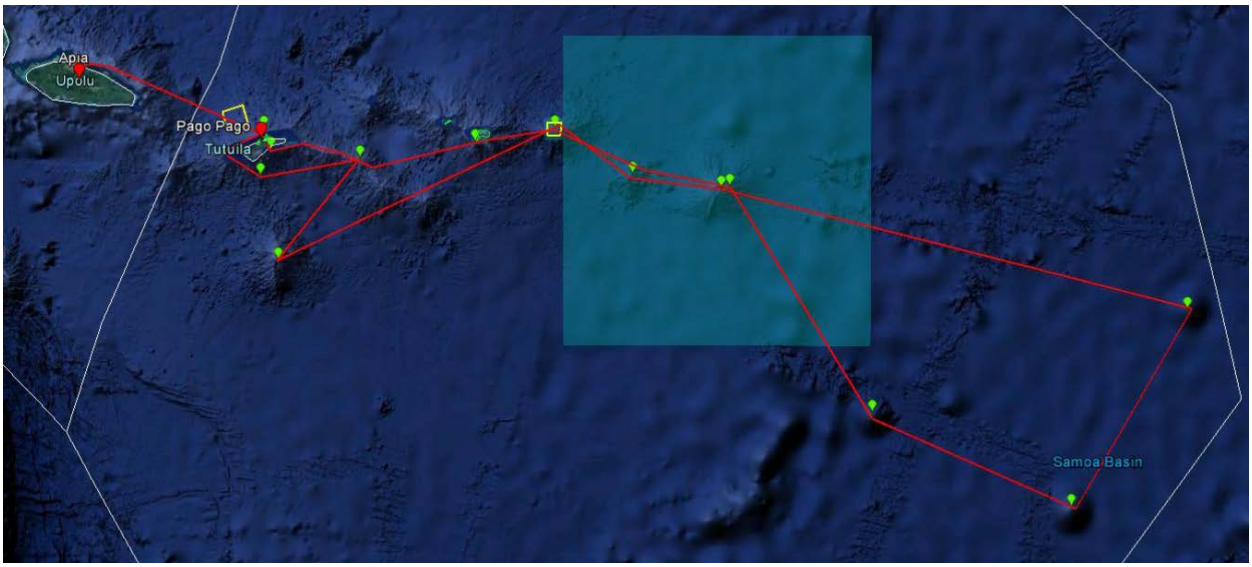

Figure 1: *Map indicating the overall operating area of Okeanos Explorer for EX-17-02. The red line is the generalized cruise track. Focused overnight mapping operations will be planned during the cruise based on available time. The light blue polygons are the boundaries of the Rose Atoll Marine National Monument and National Marine Sanctuary of American Samoa. The green drops are the locations of draft ROV dive sites. The red labelled dots are the port locations of Pago Pago, American Samoa and Apia, Samoa. The yellow boxes are priority areas for focused mapping surveys. The white line is the Exclusive Economic Zone of American Samoa and Samoa.*

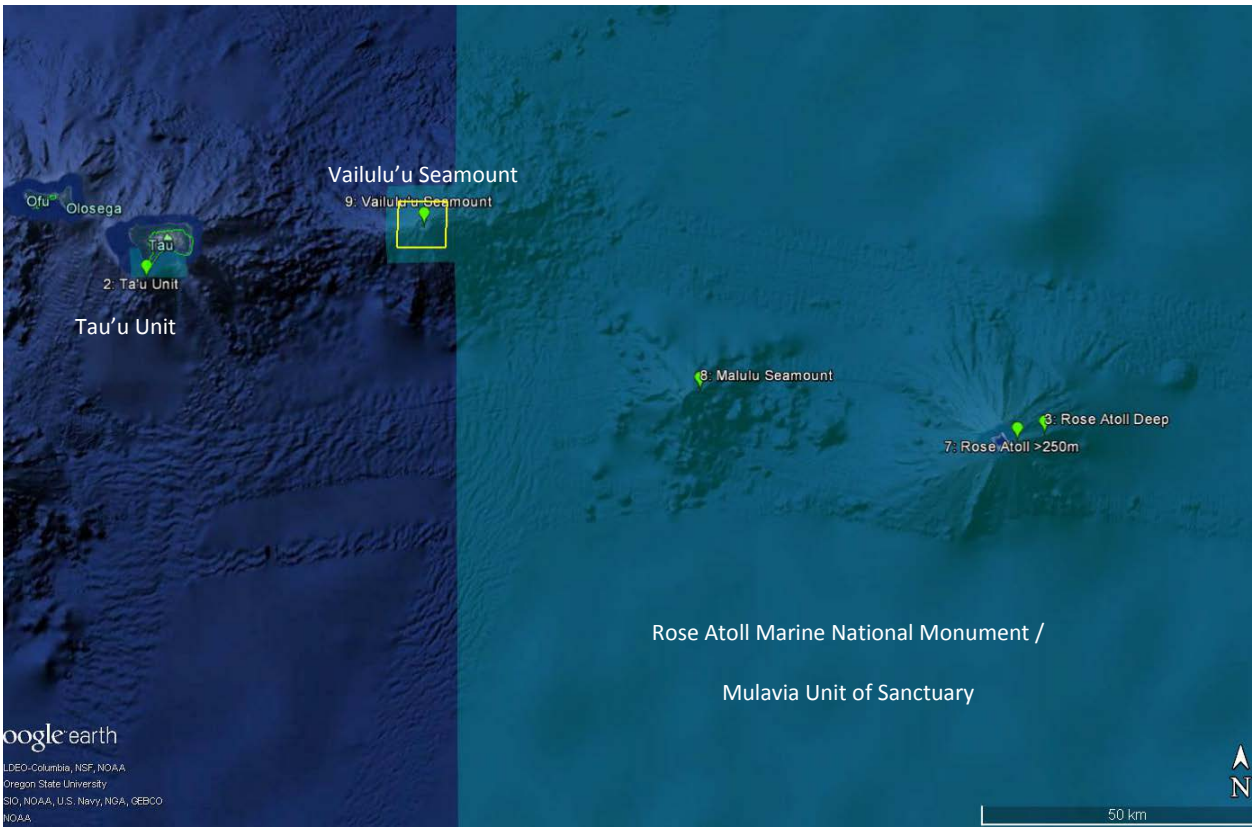

***Figure 2**. Close-up of draft ROV dive sites (green drops) and a priority mapping survey (yellow box) within the National Marine Sanctuary of American Samoa and Rose Atoll Marine National Monument (the light blue polygons).*

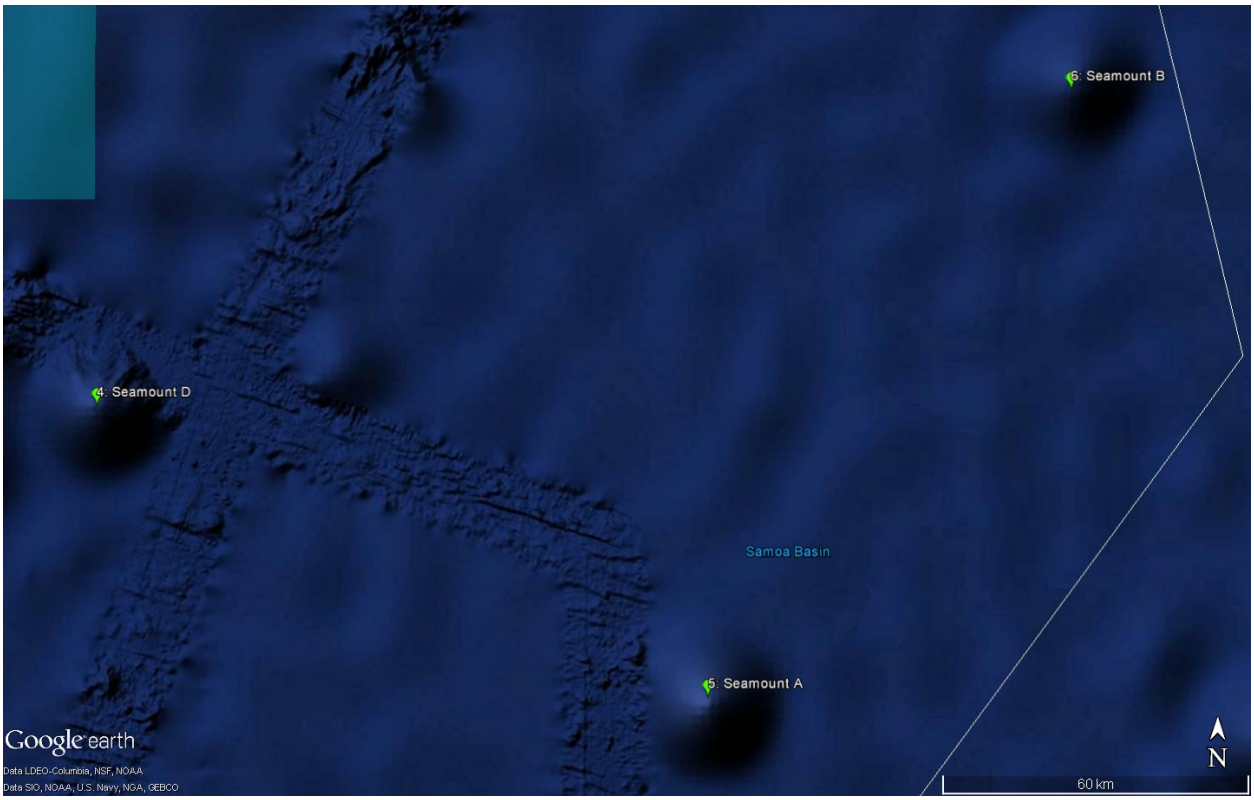

Figure 3. *Close up of draft ROV dive sites (green drops) on unnamed seamounts close to the eastern edge of the American Samoa/Cook Islands EEZ (white line). The light blue polygon is the southeast corner of Rose Atoll MNM/the Mulavia Unit of NMSAS. Mapping operations will need to be conducted overtop of the seamounts the night/morning prior to the dive to finalize the dive track.*

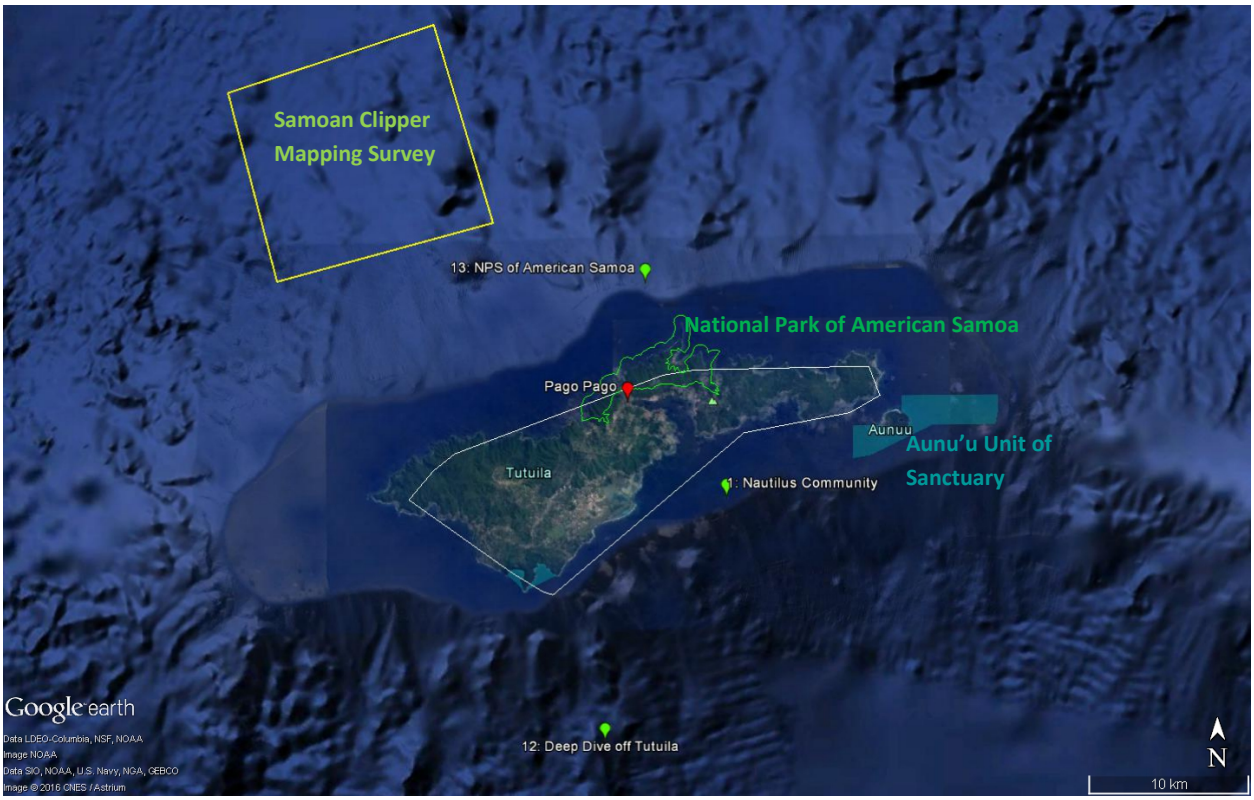

***Figure 4**. Close up of draft ROV dive sites (green dots) and a priority mapping survey (yellow polygon) near Tutuila Island. The green polygon is the boundaries of the National Park of American Samoa (which extends to 100m offshore), and the light blue polygon is the Aunu'u unit of the NMSAS. The requested mapping survey is to support efforts to find a lost plane and maritime archaeology procedures will be employed during the survey to protect location information.*

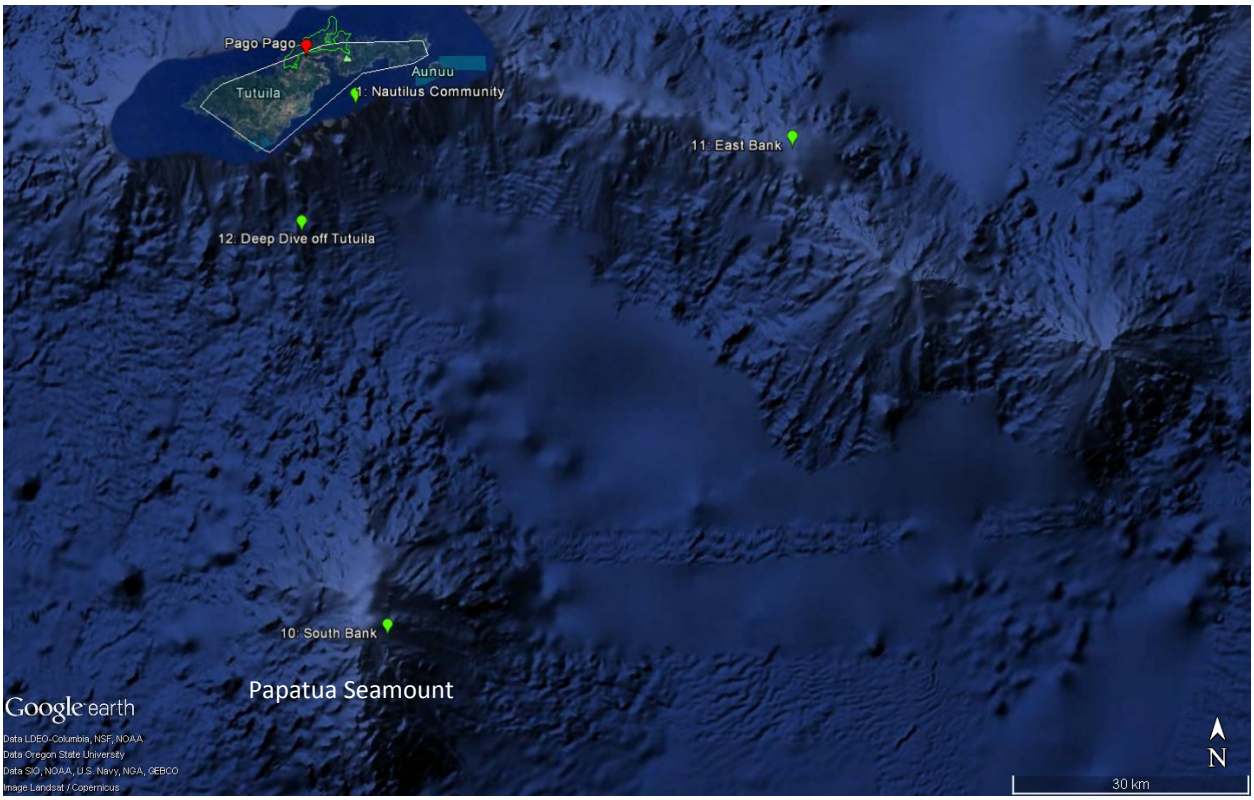

***Figure 5**. Close up of Tutuila Island and Papatua or "South Bank" seamount. The green drops are the locations of draft ROV dive sites. Dive 12 (Deep Dive off Tutuila) will be refined based on newly collected data the night before the dive.*

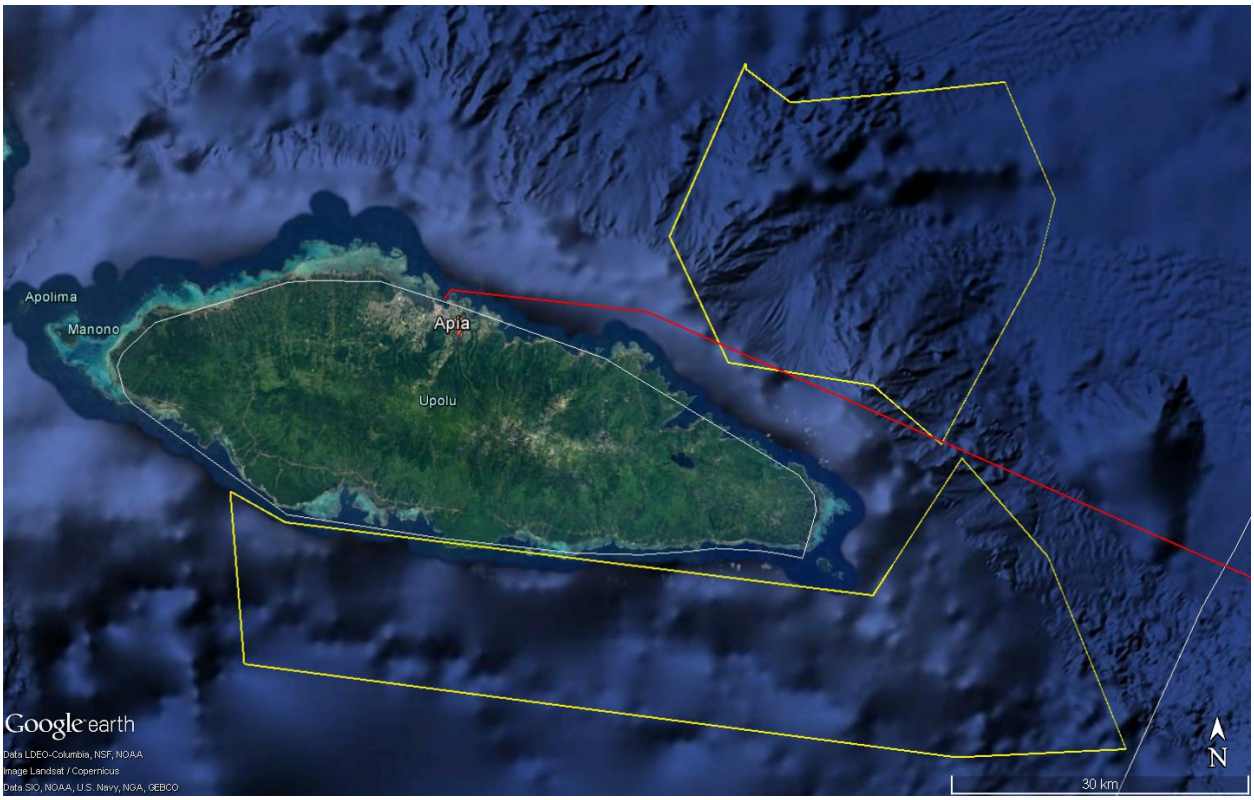

***Figure 6**. Close up of Upolo Island showing the location of the port of Apia where the ship will pull in on March 2, 2017 to complete EX-17-02. The yellow polygons to the northeast and south of the island are mapping survey areas requested by the science community. If time allows and permission is received from Samoa, we will conduct focused mapping surveys here on EX-17-02 before pulling into port in Apia.*

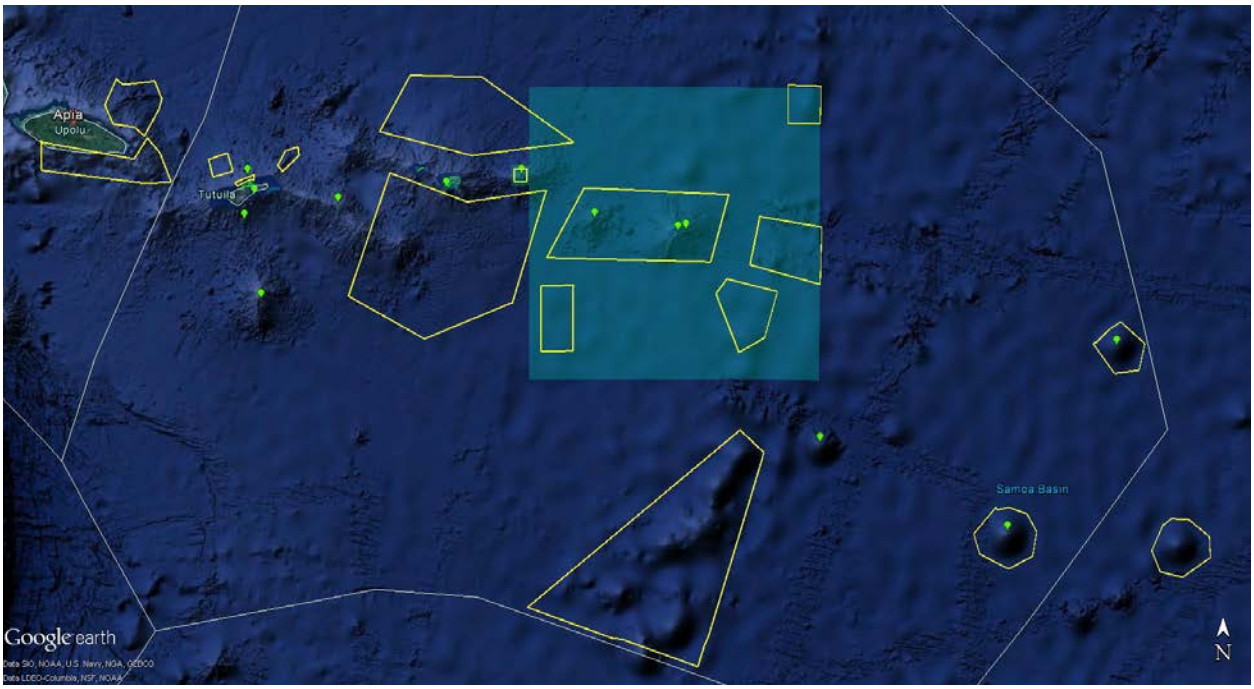

***Figure 7**. Overview of EX-17-02 operating area showing draft ROV dives sites (green drops) and the American Samoa EEZ. The yellow polygons are mapping survey areas requested by the science and management community that are primarily planned for EX-17-04 in April 2017. Available additional time and/or contingency plans during EX-17-02 will include mapping these areas within the American Samoa and Samoan (permit pending) EEZ (excluding the Cook Islands pending permit and permission).*

American Samoa generalized operating area coordinates		
ID	**Latitude**	**Longitude**
SW corner	14.944226° S	171.476177° W
SE corner	16.598808° S	165.914245° W
NE corner	15.091701° S	165.262645° W
NW Midpoint	13.981157° S	168.739126° W
NW corner	13.936890° S	170.949747° W

Table 1: Bounding coordinates of the American Samoa operating area shown in Figure 1.

Samoa generalized operating area coordinates		
ID	**Latitude**	**Longitude**
SW corner	14.068758° S	172.216283° W
SE corner	14.396455° S	171.218493° W
NE corner	13.700622° S	170.895039° W
NW corner	13.457671° S	171.989288° W

Table 2: Bounding coordinates of the Samoa operating area shown in Figure 6.

Draft ROV Dive Site Locations					
Dive #	**Date**	**ID**	**Latitude (S)**	**Longitude (W)**	**Depth (m)**
2/16	1	Depart Pago Pago, AS Nautilus Site	-14.32506010	-170.646807	506
2/17	2	Ta'u Unit	-14.29499268	-169.49861965	508
2/18	3	Rose Atoll - Deep & Midwater Communities	-14.53572	-168.0794	~2500
2/19	4	Seamount D	-15.755	-167.276	TBD
2/20	5	Seamount A	-16.256978	-166.145603	TBD
2/21	6	Seamount B	-15.180228	-165.491497	TBD
2/22	7	Rose Atoll >250m	-14.545944	-168.126719	TBD
2/23	8	Malulu Seamount	-14.46884599	-168.62216597	2781
2/24	9	Vailulu'u Seamount	-14.21765368	-169.05645955	939
2/25	10	South Bank	-14.92248247	-170.62346743	659

2/26	11	East Bank	-14.377	-170.146	TBD
2/27	12	Deep Dive off Tutuila w/ Water Column Transects (1-2 hr Extended dive)	-14.46279663	-170.71667988	2661
2/28	13	National Park of American Samoa	-14.20768737	-170.69099774	758
3/2		Pull into port in Apia	-13.85055556	-171.75138889	N/A

Table 3: Locations of the draft ROV dive sites shown in figures 1-7.

D. Summary of Objectives

February 16 – March 2, 2017 (Pago Pago, American Samoa to Apia, Samoa) Telepresence-enabled ROV, CTD rosette and mapping Operations.

EX-17-02 operations will occur in the U.S. EEZ waters of American Samoa and Samoan waters. This cruise will collect baseline data and information to support priority NOAA science and management needs including in two (and in support of a third) marine protected areas of the Pacific Ocean.

Mission objectives for EX-17-02 include a combination of mapping/operational, science, education, outreach, and data management objectives:

1. Science
    a. Acquire data to support priority Monument and Sanctuary science and management needs;
    b. Explore the diversity and distribution of benthic habitats – including commercially valuable bottom fish precious coral habitats, a Nautilus habitat, deeper high density coral and sponge communities, and hydrothermal vents;
        i. Collect data on: habitat size and extent, animal diversity and density;
        ii. Focus close-up imaging operations on potential new, rare and poorly documented animals as well as dominant members of the communities;
        iii. Collect and preserve biological samples of potential new species, new records, dominant community members if not easily recognized, and other animals to aid in site characterization
    c. Conduct mapping survey operations over Vailulu'u seamount to look for evidence of change since 2005, and to explore vent activity
    d. Conduct mapping survey operations to provide baseline seafloor information in an area where a Samoan Clipper was reported lost, to support future investigation.

e. Collect biological and geological data at sites to aid the understanding of the geologic history of Pacific seamounts.
f. Continue to refine specimen collection protocols and processing procedures;
g. Ground-truth acoustic data using video imagery and characterize associated habitat;
h. Engage a broad spectrum of the scientific community and public in telepresence-based exploration;
i. Successfully conduct operations in conjunction with shore-based Exploration Command Centers and remote science team participants;
j. 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.

2. Remote Science/Exploration Command Centers
   a. Provide operational support and training to scientists and managers to enable remote participation in at-sea operations;
   b. Develop and test best practices for hosting internet-1 based live interactions;
   c. Facilitate outreach and engagement activities and events at the ECCs;
   d. Conduct an outreach event with the Ocean Center in Tutuila, American Samoa;
   e. If developed, test operations with a new Internet1 enabled viewing center at the National University of Samoa;
   f. Test and refine ship-to-shore communications procedures that engage multiple ECCs and other remote participants;
   g. Test and refine operating procedures and products.

3. ROV Engineering
   a. Daytime ROV dives on exploration targets;
   b. Ongoing training of pilots;
   c. Ongoing system familiarization, documentation, and training;
   d. Test and refine new ROV systems and pilot sampling protocol. New systems include sample scoop and 360 degree camera.

4. Video Engineering (VSAT ~15 mb/sec ship-to-shore; 2.5 mb/sec shore-to-ship)
   a. Test terrestrial and high-speed satellite links
   b. Support telepresence-enabled ROV operations;
   c. Collect/create all standard video products;
   d. Continue to refine new highlight video SOPs;
   e. Facilitate live outreach events between ship and shore;
   f. Continue to refine protocols for using YouTube live to host live video;
   g. Test and refine updated video product workflows;
   h. Refine and formalize video product generation SOPs and checklists; and

i. Monitor and improve video/data timestamp agreement.

5. Mapping
    a. Collect high resolution mapping data from all sonars in priority areas as dictated by operational needs as well as science and management community needs;
    b. Support ROV operations with mapping products and expertise;
    c. Conduct mapping operations during transit, with possible further development of exploration targets;
    d. Collect XBT casts as data quality requires during mapping operations;
    e. Create daily standard mapping products;
    f. Collect sun photometer measurements as part of survey of opportunity;
    g. Continue to test the integration of the new EK60 frequencies and the ADCPs; and
    h. Continue to train new Survey Technician on mapping operations and Standard Operating Procedures.
    i. Continue to integrate Qimera into standard multibeam bathymetric data processing routines.
    j. As necessary, conduct contingency mapping on days where ROVs dives are not possible due to weather or other delays.

6. Data Management
    a. Provide a foundation of publicly accessible data and information products to spur further exploration, research, and management activities;
    b. Provide daily products to shore for operational decision making purposes;
    c. Test shipboard integration with updated shore data repository server at the ISC;
    d. Evaluate Aspera software to accelerate ship to shore data transfer;
    e. Monitor and improve video/data timestamp agreement;
    f. Monitor the newly replaced Storage Area Network (SAN) equipment and related procedures;
    g. Refine and formalize updated data management and video product workflow checklists and SOPs;
    h. Integrate ONC eventlog into data management processes;
    i. Install and configure backup Network Attached Storage (NAS) unit;
    j. Cross-train existing ROV dedicated personnel;
    k. Implement updated sample management processes; and
    l. Ensure Marine Archaeology data protection protocols are followed during mapping survey of submerged cultural heritage site.

7. Outreach
    a. Engage the general public in ocean exploration through live video and timely content (daily updates, topical essays and web logs, highlight videos, video clips, still imagery and mapping products) posted on the Ocean Explorer website;

b. Conduct ship tours for the public, students, teachers, managers and officials while in port in both Pago Pago and Apia; and
    i. February 15th in Pago Pago: Student/teacher groups from 8am to noon (groups of 30 each hour ending at noon) and from 1 - 2pm for 30 VIPs.
    ii. March 3rd in Apia: Ship tours for educators, students, public
c. Host live events with teachers, students, media and officials in American Samoa;
    i. February 24th @ 11am: Live interaction with Ocean Center
    ii. February 28th: Possible VIP interaction with Office of Samoan Affairs
d. Host live events with others; and
    i. February 23rd: Open house at NOAA's IRC ECC
e. More TBD.

8. Ship
    a. Continue to refine SOPs for the new VSAT;
    b. Provide a high quality stable internet connection with the new VSAT;
    c. Provide stable and reliable VoIP tele communications
    d. Continue training new deck department personnel in ROV launch and recovery.
    e. Continue to train new Survey Technician and familiarize him/her with Okeanos Operations and his/her responsibilities

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, , Stennis Space Center MS, 39529 USA
- Global Foundation for Ocean Exploration, P.O. Box 417, Mystic, CT 06355
- University Corporation for Atmospheric Research Joint Office for Science Support (JOSS), PO Box 3000 Boulder, CO 80307 USA
- University of Hawai'i at Manoa- 2500 Campus Rd, Honolulu, HI 96822
- 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
- NOAA National Marine Fisheries Service, Pacific Islands Regional Office, 1845 Wasp Blvd, Honolulu, HI 96818
- NOAA National Marine Fisheries Service, Marine National Monuments Program, 1845 Wasp Blvd, Honolulu, HI 96818
- NOAA National Marine Sanctuary of American Samoa, P.O. Box 4318, Pago Pago, American Samoa 96799
- NOAA National Marine Fisheries Service, Pacific Islands Fisheries Science Center, 1845 Wasp Blvd, Honolulu, HI 96818

- Lehigh University, 27 Memorial Dr. W, Bethlehem, PA 18015
- University of California Santa Barbara, Santa Barbara, CA 93106
- Florida Institute for Human and Machine Cognition, 40 S Alcaniz St, Pensacola, FL 32502

F. Personnel (Mission Party)

Table 2: Full list of shore based and sea going mission party members and their affiliations

#	Name (First, Last)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
1	Kelley Elliott	Expedition Coordinator	2/13	3/4	F	OER	USA
2	Matt Jackson	Geology Science Lead	2/13	3/4	M	UCAR/UCSB	USA
3	Santiago Herrera	Biology Science Lead	2/13	3/4	M	UCAR/ Lehigh University	Colombian
4	Jonathan Jackson	Sample Data Manager	2/13	3/4	M	NCEI	USA
5	Meme Lobecker	Mapping Lead	2/10	3/4	F	OER/ERT	USA
6	Amanda Bittinger	Mapping Watch Lead	2/13	3/4	F	UCAR	USA
7	Andrew O'Brien	Engineering Team	2/13	Staying for EX-17-03	M	GFOE	USA
8	Fernando Aragon	Engineering Team	2/13	Staying for EX-17-03	M	GFOE	USA
9	Joshua Carlson	Engineering Team	2/13	3/4	M	GFOE	USA
10	Karl McLetchie	Dive Supervisor	2/13	Staying for EX-17-03	M	GFOE	USA

11	Levi Unema	Engineering Team	2/13	Staying for EX-17-03	M	GFOE	USA
12	Jeffrey Laning	Engineering Team	2/13	Staying for EX-17-03	M	GFOE	USA
13	Bobby Mohr	Engineering Team	2/13	3/4	M	GFOE	USA
14	Sean Kennison	Engineering Team	2/13	Staying for EX-17-03	M	GFOE	USA
15	Don Liberatore	Engineering Team	2/13	Staying for EX-17-03	M	GFOE	USA
16	Annie White	Engineering Team	2/13	3/4	F	GFOE	USA
17	Dan Rogers	Engineering Team	2/13	3/4	M	GFOE	USA
18	Emily Narrow	Engineering Team	2/13	Staying for EX-17-03	F	GFOE	USA
19	Art Howard	Engineering Team	2/13	3/4	M	GFOE	USA
20	Caitlin Bailey	Engineering Team	2/13	Staying for EX-17-03	F	GFOE	USA
21	Roland Brian	Engineering Team	2/13	Staying for EX-17-03	M	GFOE	USA
22	Bob Knott	Engineering Team	2/13	3/4	M	GFOE	USA
23	Bill Clancey	VIP	2/13	3/4	M	IHMC	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 mailto:Chiefops.MOA@noaa.gov	Chief, Operations Division, Atlantic (MOA) LT Joe Carrier, NOAA Telephone: (757) 441-6842 E-mail: Chiefops.MOA@noaa.govmailto:Chiefops.MOA@noaa.gov mailto:Chiefops.MOA@noaa.gov mailto:Chiefops.MOA@noaa.gov
Mission Operations	
Kelley Elliott Expedition Manager NOAA Office of Ocean Exploration and Research Office: (301) 734-1024 / Cell: (202) 689-4587 E-mail: Kelley.Elliott@noaa.govmailto:Kelley.Elliott@noaa.gov mailto:Kelley.Elliott@noaa.gov Elizabeth 'Meme' Lobecker Mapping Manager NOAA Office of Ocean Exploration and Research (ERT) O: (603) 862-1475	CAPT Mark Wetzler, NOAA Commanding Officer NOAA Ship *Okeanos Explorer* Phone: (401) 378-8284 Email: CO.Explorer@noaa.gov LT Aaron Colohan, NOAA Operations Officer NOAA Ship Okeanos Explorer Phone: (808) 659-9197 (Ship's Iridium) E-mail: Ops.Explorer@noaa.govmailto:Ops.Explorer@noaa.gov mailto:Ops.Explorer@noaa.gov

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Other Mission Contacts

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NOAA Ocean Exploration & Research

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Alan Leonardi, Director

NOAA Ocean Exploration & Research

Phone: 301-734-1016/ Mobile: 202-631-1790

E-mail: alan.leonardi@noaa.gov

Vessel Shipping Address

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

Items sent to Honolulu to be forwarded to the ship should arrive at the following address by COB 2/5/17, and absolutely no later than 2/9/17 (These will be sent via air to the ship in American Samoa on 2/10/17).

NOAA Ship Okeanos Explorer

c/o LT JG Aaron Colohan

1897 Ranger Loop, Building 184, Honolulu, HI 96818

Items sent directly to Pago Pago, American Samoa to reach the ship should arrive at the following address by COB 2/10/17 (this is the date of the last flight from Hawaii to Pago Pago prior to the ship's departure):

Polynesia Shipping Services, Inc

PO Box 1478

ATTN: Okeanos Explorer

Pago Pago, American Samoa

2. Diplomatic Clearances

This project involves Marine Scientific Research in waters under the jurisdiction of the U.S. including the territorial government of American Samoa, and Samoa. Appropriate clearances are pending.

- Approval has been received to conduct Marine Scientific Research in the waters of Samoa from the Samoa Ministry of Foreign Affairs and Trade (Appendix A).
- A letter of support to conduct scientific research in the territorial waters of Samoa has been received (Appendix B). A Memorandum of Agreement between NOAA and the Samoa Ministry of Natural Resources and the Environment is in progress and must be finalized before work can be conducted.

3. Licenses and Permits

The expedition is being planned and conducted by NOAA as an agency of the U.S. Federal government, in partnership with NOAA NMFS Pacific Islands Regional Office Marine National Monument Program. We do not require a permit to work in the Rose Atoll Marine National Monument.

A permit from American Samoa's Division of Marine and Wildlife Resources has been received (Appendix C).

Permit NMSAS 2017-001 has been received to conduct work the National Marine Sanctuary of American Samoa (Appendix D).

In order to support or conduct Marine Scientific Research within the U.S. EEZ, work funded, authorized and/or conducted by NOAA must be compliant with the National Environmental Policy Act (NEPA). NOAA Administrative Order (NAO) 216-6 describes NOAA's specific obligations with regard to NEPA compliance. Among these is the need to review all NOAA-supported projects with respect to their environmental consequences. In compliance with NAO 216-6 and NEPA, a memorandum describing the project's scientific sensors' possible effects on the environment has been submitted for the project. As expected with ocean research with limited time or presence in the marine environment, the project has been determined to not have the potential to result in any lasting changes to the environment. As defined in Sections 5.05 and 6.03.c.3 (a) of NAO 216-6, this is a research project of limited size or magnitude or with only short-term effects on the environment and for which any cumulative effects are negligible, and as such, the project is categorically excluded from the need to prepare a full-scale NEPA environmental assessment. The categorical exclusion met the requirements of NAO 216-6 and NEPA, and authorizes the Marine Scientific Research conducted for the project (appendix E).

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 2016 Marianas Expedition and all other planned *Okeanos Explorer* operations during the 2016-17 field season, may affect, but are not likely to adversely affect, ESA-listed marine species. The informal consultation was completed on February 3, 2016 when NOAA OER received a signed letter from the Regional Administrator of NMFS Pacific Islands Regional Office, stating that NMFS concurs with OER's determination that conducting proposed *Okeanos Explorer* cruises are not likely to adversely affect ESA-listed marine species (appendix F).

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

Date	Activities
2/13	Mission personnel arrive to ship in Pago Pago, American Samoa
2/14	Orientation, training and mobilization.
2/15	Ship tours. Orientation, training and mobilization.
2/16	Depart Pago Pago for first ROV dive site just outside of harbor. Conduct ½ day ROV dive. Commence transit exploration mapping overtop of East Bank en route to next dive site.
2/17	Dive 2: Dive in the Ta'u Unit of Sanctuary. Overnight mapping of Vailulu'u crater en route to next dive site.
2/18	Dive 3: Rose Atoll - Deep & Midwater Communities
2/19	Dive 4: Seamount D
2/20	Dive 5: Seamount A
2/21	Dive 6: Seamount B. Long transit to next dive location.
2/22	Dive 7: ½ day shallow dive in afternoon at Rose Atoll.
2/23	Dive 8: Malulu Seamount. Open house at NOAA's IRC ECC.
2/24	Dive 9: Vailulu'u Seamount. Live interaction date with Ocean Center.
2/25	Dive 10: South Bank
2/26	Dive 11: East Bank. Overnight mapping of Dive 12 area to refine site selection.

2/27	Dive 12: Deep Dive off Tutuila
2/28	Dive 13: National Park of American Samoa. Possible live interaction with the Office of Samoan Affairs. Evening/night mapping of Samoan Clipper survey area. Transit mapping to Apia. Cross the dateline en route and skip a day.
3/2	Pull into port in Apia.
3/3	Ship tours. Cruise demobilization.
3/4	Demobilization. Mission personnel depart.

Table 4: Detailed Cruise Itinerary. This is an approximate itinerary and is subject to change based on survey results, field conditions, and discretion of the CO.

B. Staging and Destaging

Minimal staging and destaging is expected as all mission equipment will be onboard already, and the following cruise is another telepresence-enabled ROV cruise.

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. At least one live interaction is planned during the cruise with students, teachers and media at the Ocean Center in Tutuila, American Samoa.
2. **In-Port Events**
    a. Ship tours are planned in Pago Pago on February 15th for teachers who participated in OER's Professional Development Workshop, and agency officials.
    b. Ship tours are also planned in Apia on March 3 for students, teachers, partners and officials.

D. SCUBA Dive Plan

All 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.

E. Applicable Restrictions

Sonar Operations

EM 302, EK 60, ADCP, and sub-bottom profiler data acquisition is 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 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

- NOAA OER 6000 m *Deep Discoverer* ROV
- NOAA *Seirios* Camera Platform
- Kongsberg Simrad EM302 MultibeamEchosounder (MBES)
- Kongsberg Simrad EK60DeepwaterEchosounders and GPTs (18, 70, 120, 200 kHz)
- Knudsen Chirp 3260 Sub-bottom profiler (SBP)
- Teledyne RDI Workhorse Mariner (300 kHz) ADCP
- Teledyne RDI Ocean Surveyor (38 kHz) ADCP
- Teledyne UnderwayCTD
- LHM Sippican XBT Mark21 System(Deep Blue probes)
- AOML Automated XBT Launcher (Deep Blue probes)
- Reson SVP 70 sound speed probe
- Seabird SBE 911Plus CTD
- Seabird 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
- MarineStar GPS
- POS/MV
- Seabird SBE-45 (Micro TSG)
- Kongsberg Dynamic Positioning-1 System
- Two working small boats in seaworthy and reliable working condition for mission operations and SOLAS fast rescue
- Netshares mapping storage system
- IVS Fledermaus Software suite
- SIS Software

- Hypack Software
- Scientific Computing System (SCS)
- ECDIS
- Met/Wx Sensor Package
- Telepresence System
- VSAT High-Speed link (Comtech 20 Mbps ship to shore; 2 Mbps shore to ship)
- Sampling Operations Database Application (SODA)
- Three VoIP telephone lines

B. Equipment and capabilities provided by the scientists

- Microtops II Ozone Monitor Sunphotometer and handheld GPS required for NASA Marine Aerosols Network supplementary project.

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

Item	Use	Approx. locations
95% Denatured Ethanol (35-gallons total)	Sample preservation	Wetlab, under the chemical hood
10% Buffered Formalin (2 gallons)	Sample preservation	Wetlab, under the chemical hood
Chaos Buffer (0.5 gallons) (4 M guanidine thiocyanate, 0.5% N-laurosylsarcosine, 25 mMTris pH 8.0, 0.1 M beta-mercaptoethanol)	Sample preservation (genetics)	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	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	ROV Workshop Fire cabinet
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
Mineral Oil	Vitrea	Hanger, Vehicles
Por-15	Paint Kit	ROV Workshop Fire cabinet
Univis HVI 13	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

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.htmlhttp://aeronet.gsfc.nasa.gov/new_web/maritime_aerosol_network.html

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

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 Informationhttp://www.corporateservices.noaa.gov/ames/administrative_orders/chapter_212/212-15.html

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. Reporting and sending copies of project data to NESDIS (ROSCOP form) is the responsibility of OER.

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 I for detailed data management plans.

Deliverables

1. At sea
    a. Daily plans of the Day (POD)
    b. Daily situation reports (SITREPS)
    c. Summary forms for each ROV dive
    d. Database containing records for each sample collection
    e. Summary forms for each CTD rosette cast
    f. Daily summary bathymetry data files
    g. Raw sonar files (EM 302, EK 60, Subbottom, 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 I for the formal cruise data management plan)

b. XBT 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

Archive

OER and ship will work together to ensure documentation and stewardship of acquired data sets in accordance with NAO 212-15. The Cruise Information Management System is the primary tool used to accomplish this activity.

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 1330 in the forward lounge 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. Daily Situation Reports (SITREPS) will be posted as well and shared daily through e-mail.

1. 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.

2. 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.

3. Post-Project Meeting:

The Commanding Officer is responsible for conducting a meeting no earlier than 24 hrs before or seven days after the completion of a project to discuss the overall success and short comings 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 Expedition Coordinator, and members of the scientific party and is normally arranged by the Operations Officer and Expedition Coordinator.

4. 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 http://www.omao.noaa.gov/fleeteval.htmland 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 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 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 make-up 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 the 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.

All NHSQs submitted after March 1, 2014 must be accompanied by NOAA Form (NF) 57-10-02 - Tuberculosis Screening Document in compliance with OMAO Policy 1008 (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 four 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 Accellion Secure File Transfer which requires the sender to setup an account. Accellion's Web Users Guide 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 one 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
E-mail: MOA.Health.Services@noaa.govmailto:MOA.Health.Services@noaa.gov

Please make sure the medical.explorer@noaa.gov email address is cc'd on all medical correspondence.

Prior to departure, the Expedition Coordinator must provide a listing of emergency contacts to the Operations Officer for all members of the scientific party, with the following information: name, address, relationship to member, and telephone number.

Emergency contact form is included as Appendix J.

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

A daily 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 e-mail and the Very Small Aperture Terminal (VSAT) link. VSAT bandwidth at 15Mbps will be paid by OER and provided by OMAO.

Specific information on how to contact NOAA Ship *Okeanos Explorer* and all other fleet vessels can be found at http://www.moc.noaa.gov/MOC/phone.html#EXhttp://www.moc.noaa.gov/MOC/phone.html%23EX

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
E-mail: 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
*OkeanosExplorer*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

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

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

E. IT Security

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

Foreign National Guest, Santiago Herrera, will sail on EX-17-02. His FNG sponsor is Kelley Elliott. Notification of Santiago's participation in the cruise has been submitted to the NOAA Office of Security. Santiago has been cleared against the denied persons list. Conditional approval from the Western Region Security Office has been received for Santiago to sail, pending signature of the Certification of Responsibilities for a Foreign National Guest within 72 hours of arrival. The CO has been notified of his plans to sail.

Appendix A: Samoa MFAT MSR Approval

GOVERNMENT OF THE INDEPENDENT STATE OF SAMOA

Ministry of Foreign Affairs and Trade

Note No: 17/23

The Ministry of Foreign Affairs and Trade presents its compliments to the Embassy of the United States of America in Apia and has the honour to refer to the latter's Note Verbale 44/16 requesting port courtesies and authorization for Jeremy Potter to conduct marine scientific research in areas requiring the consent of Samoa , during the period of February 5-April 21 2017 from the NOAA research from the research vessel, *Okeanos Explorer*, under the project name CAPSTONE 2017 Mapping Kingman, Palmyra Jarvis.

The Ministry of Foreign Affairs and Trade has further the honor to advise the latter that diplomatic clearance has been granted to *Okeanos Explorer* to conduct marine scientific research for the dates requested (March 1-7 2017 and March 29-April 4 2017)

The Ministry of Foreign Affairs and Trade advises further that diplomatic clearance is granted provided the following conditions are met:

1. A summary of all the data resulting from the research is to be made available to the Ministry of Foreign Affairs and Trade within 6 months of the completion date of the research.
2. Any specimens, whether dead or alive that will be taken out from Samoa's Exclusive Economic Zone during the research are the properties of Samoa and governed under the Intellectual Property Rights Law, therefore appropriate approval must be sought from the Ministry of Natural Resources and Environment and the Ministry of Agriculture and Fisheries through the Ministry of Foreign Affairs and Trade.

PO Box L1859, Apia, Samoa. • Tel (685) 2117 • Fax (685) 21504 • political@mfat.gov.ws

3. At the completion of the research and before departing from Samoa, the team leader must discuss with or communicate to the Ministry of Foreign Affairs and Trade appropriate aspects of the research and explain preliminary findings.

The Ministry of Foreign Affairs and Trade avails itself of this opportunity to renew to the Embassy of the United States of America in Apia the assurances of its highest consideration.

23rd of January 2017

Embassy of the United States of America
APIA

MINISTRY OF FOREIGN AFFAIRS AND TRADE
SAMOA

Appendix B: Samoa MNRE Letter of Support

Government of Samoa

MINISTRY OF NATURAL RESOURCES AND ENVIRONMENT

Matāgaluega o Puna'oa Faalenatura ma le Siosiomaga

Level 3, Tui Atua Tupua Tamasese Efi Building (TATTE), Sogi, P.O Private Bag, Apia, SAMOA.
Website: http://www.mnre.gov.ws/

Telephone: (+685) 67200
Fax: (+685) 23176

Email: info@mnre.gov.ws

Please address all correspondence to the Chief Executive Officer, Private Bag, Apia, Samoa.

Faamolemole faatuatusi uma mai fesootaiga ma i le Ōfisa Sili.

10 January 2017

Craig Russell
Program Manager
Okeanos Explorer Explorations
NOAA Office of Ocean Exploration and Research

Dear Mr. Craig Russell,

APPROVAL TO CONDUCT RESEARCH ONBOARD THE NOAA SHIP *OKEANOS EXPLORER* IN THE WATERS OF SAMOA

I acknowledge receipt of your letter dated on 16th December 2016, regarding the above subject matter. I am also in receipt of your Bioprospecting Application for research permit dated on the same date.

The Ministry of Natural Resources and Environment (MNRE) is fully supportive of this research of seafloor mapping operations to ensure it will provide reliable and useful information primarily in areas where high resolution seafloor bathymetry data currently does not exist and in addition, priority areas of interest to Samoa. This will provide baseline data and invaluable scientific data for Samoa oceanographers, marine researchers and managers in order to make informed decisions with regards to the sustainable use and management of our marine resources.

A Memorandum of Agreement (MOA) must be signed between MNRE and NOAA and any other relevant party to the research, to ensure effective collaboration and working relationship in relation to conducting the research and outline conditions and agreeable responsibilities; in any requirements specified in the MOA. There will be fee(s) applied as part of the requirements of our process.

That said, the Ministry is fully supportive of this scientific exploration in the waters of Samoa.

Please do not hesitate to contact Mrs. Tauti Fuatino Leota (Assistant Chief Executive Officer of the Division of Environment and Conservation) on e-mail: fuatino.leota@mnre.gov.ws or Ms. Maria Satoa on email: maria.satoa@mnre.gov.ws or telephone (685) 67200 for further information.

Sincerely,

Suluimalo Amataga Penaia
CHIEF EXECUTIVE OFFICER

Cc: Chief Executive Officer
Ministry of Foreign Affairs and Trade

Dr. Alan P. Leonardi
Director, Office of Ocean Exploration and Research
NOAA
United States Department of Commerce

Ministry of Natural Resources and Environment
Division of Environment & Conservation

For Official Use Only:		
Date Application was received:		
date	month	year
21	12	2016
Full Payments made: Yes		No
Receipt No. _____		
MNRE official stamp:		

CONSENT APPLICATION FOR COLLECTION OF SAMOA'S BIOLOGICAL AND NON-BIOLOGICAL RESOURCES

Samoa as a party to the Convention on Biological Diversity (CBD) has a complete sovereign right over its biological and non biological resources

1. APPLICANT: (Please type in all required information)

Name:
Craig Russell

Institution:
US NOAA, Office of Ocean Exploration and Research

Nationality:
United States of America

Country of domicile:
United States

Passport number:

Current Address: 7600 Sand Point Way NE
Seattle, WA 98115, US

Samoan address:
Port of Apia, Samoa

Phone Number:
206-526-4803

Permanent Address:
7600 Sand Point Way NE
Seattle, WA 98115
United States of America
.

Fax Number:
none

E-Mail Address:
craig.russell@noaa.gov

2. PURPOSE OF COLLECTION

2.1 What is the purpose of the collection? (Please provide supporting evidence)

Oceanographic data (depth, backscatter, ocean currents) data will be collected using acoustic devices including multibeam sonar, single beam sonar, sub-bottom profiler and Acoustic Doppler Current Profiler (ADCP)

2.2 How will the information be collected (e.g. by reference books, note taking,

All the acoustic data will be digitally collected.

2.3 What tests/laboratory analysis will be carried out on the material to be collected and what is the purpose of each test?

No tests or laboratory analysis will be carried out onboard. These data sets will be freely made available through a national archive and will aid in developing better bathymetric maps of the world oceans.

3. DETAILS OF WHAT IS TO BE COLLECTED

3.1 List and name the materials to be collected

No physical materials will be collected

3.2 List any other material to be collected (soil symbionts, etc.):

Not applicable

4. COLLECTION: Not applicable

4.1 Persons to be involved in the collection

Name	Address	Qualifications
CAPT Mark Wetzler, NOAA	NOAA Ship *Okeanos Explorer* 1897 Ranger Loop, Ford Island Bldg. 184 Honolulu, HI 96818	Commanding Officer NOAA Ship *Okeanos Explorer*
Brian Kennedy	1315 East West Highway, Silver Spring, MD 20905	Expedition coordinator
Kelley Elliott	1315 East West Highway, Silver Spring, MD 20905	Expedition coordinator
Elizabeth Lobecker	1315 East West Highway, Silver Spring, MD 20905	Expedition coordinator
Derek Sowers	1315 East West Highway, Silver Spring, MD 20905	Expedition coordinator
Michael White	1315 East West Highway, Silver Spring, MD 20905	Expedition coordinator
TBD Science Team	TBD	TBD
TBD Remotely Operated Vehicle Engineering Team	TBD	TBD
TBD Data Management Team	TBD	TBD
TBD Video Team	TBD	TBD
TBD Mapping Team	TBD	TBD
Ship's Officers and Crew	TBD	TBD

*TBD: To be decided

4.2 Proposed area(s) and dates of collection (if known)

The acoustic data will be collected while transiting through Samoan waters. Expedition dates extend from January 18 through April 21, 2017. Expedition dates and approximate locations of the track lines are summarized in the following tables.

Expedition Dates (subject to changes customary of research expeditions):

Expedition	Date	Activities
EX1701	**18 Jan 2017**	Depart Honolulu, Hawaii, USA
	10 Feb 2017	Arrive Pago Pago, American Samoa
EX1702	**16 Feb 2017**	Depart Pago Pago, American Samoa
	02 March 2017	Arrive Apia, Samoa
EX1703	**17 March 2017**	Depart Apia, Samoa
	29 March 2017	Arrive Apia, Samoa
EX1704	**04 April 2017**	Depart Apia
	21 April 2017	Arrive Pago Pago, American Samoa

Transits:

Transit through Samoan waters		
	Approximate Latitude (+N,-S)	Approximate Longitude (+E,-W)
EX1701 - Enter Samoan waters	-12.551	-170.892
EX1701 - Depart Samoan waters	-13.453	-170.819
EX1702 - Enter Samoan waters	-14.076	-171.056
EX1703 - Depart Samoan waters	-12.418	-171.391
EX1703 - Enter Samoan waters	-12.132	-171.971
EX1704 - Depart Samoan waters	-13.941	-170.985

Focused Mapping Areas:

Upolu (North Mapping area bounding box)	
Latitude	Longitude
-13.612	-171.489
-13.645	-171.451
-13.630	-171.252

-13.730	-171.208
-13.956	-171.313
-13.903	-171.376
-13.883	-171.508
-13.770	-171.560

Upolu (South Mapping area bounding box)	
Latitude	Longitude
-13.977	-171.957
-14.090	-171.380
-13.968	-171.296
-14.057	-171.217
-14.232	-171.148
-14.236	-171.306
-14.146	-171.965

4.3 Specify expected number or quantity of material to be collected (if known)

No physical material will be collected.

4.4 Describe how collection will be physically performed

No physical collection will be performed.

4.5 List the in-country entities likely to benefit from the activity and in what way.

It is in the best interest of all stakeholders to fully understand the extent of living marine resources that exist in the largely unexplored deep sea. The information and data generated by this project will enable baseline characterization of deepwater areas within Samoa, and the data collected will inform resource managers including the Ministry of Natural Resources and the Environment and the Ministry of Agriculture and Fisheries. The acquisition of high-resolution seafloor mapping data is an essential precursor to making significant biological, geological, archaeological and oceanographic discoveries. These data are both expensive and difficult to acquire - all collection costs are funded by the US Government and its domestic partners.

In addition, the vessel port calls at the port of Apia provide education and outreach opportunities. Ship tours are planned to introduce local students, teachers and officials to deep-sea exploration technologies, and share the findings of cruise activities. These are all opportunities to bring attention to the deep-water habitats and resources in Samoa.

4.6 To what degree will reliance be made on traditional knowledge?

No traditional knowledge will be used or relied on for planned activities.

4.7 Please specify whether specimens collected are listed in Appendix I, II or III of the Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES).

Not applicable (No specimen will be collected)

5. POTENTIAL IMPACTS

5.1 Describe the potential impacts of the activity. Include:

This is a research project of limited size or magnitude with only short-term effects on the environment and for which any cumulative effects are negligible. As expected with ocean research with limited time or presence in the marine environment, project operations do not have the potential to result in any lasting changes to the environment.

5.2 Describe the nature of any expected research and development plans

The goal of NOAA Ship *Okeanos Explorer* operations to is provide a foundation of publicly accessible data and information products to enable follow-on exploration, research and management activities. The data and information we collect is made publicly accessible as soon as possible after the cruise to enable interested students, scientists and managers to access and use the data. Anyone can use the data once available through the National Centers for Environmental Information.

A standard suite of data and information products are generated for each cruise. Standard data and products include: a cruise plan, multibeam and XBT raw and processed data (including seafloor bathymetry and backscatter, and water column backscatter data), EK60 raw data, ADCP raw data, Knudsen 3260 sub-bottom profiler raw data, mapping data report, and the cruise report.

These data and products are made publicly accessible to ANYONE through the National Centers for Environmental Information and NOAA OER's Digital Atlas within 30-90 days of cruise completion. Once these data are publicly available, we will notify key management groups and scientists interested in the data, including MNRE. Furthermore, our team develops and presents expedition summaries and key findings in various venues including by not limited to: our oceanexplorer.noaa.gov website, an annual Oceanography Supplement publication and major ocean science conferences.

6. FUNDING

6.1 How is the collection supported and by whom?

NOAA Ship *Okeanos Explorer* is a public vessel of the United States of America. Funding for *Okeanos Explorer* originates from the federal budget of the United States of America, specifically the Department of Commerce and the National Oceanic and Atmospheric Administration. NOAA has agreed to provide the ship, multibeam and other sonar systems, and their own technicians required for this cruise.

Signature of Applicant:

Date: 12/16/2016

Application Approved by:

Chief Executive Officer
MNRE

Appendix C: American Samoa DMWR Permit

SCIENTIFIC PERMITS SERIES NO: 2017/001

January 19, 2017

This Constitutes the Department's official action on:
SCIENTIFIC COLLECTION PERMITS APPLICATION SERIES NO: 001
NAME OF APPLICANT: KELLY P. ELLIOTT
ADDRESS OF APPLICANT: 1315 East-West Hwy
SSMC3 RM 10262, Silver Spring MD 20910

TITLE OF PROPOSED STUDY: 2017 CAPSTONE American Samoa Expedition

ACTION: X **APPROVED**

_____ **DISAPPROVED**

IF APPROVED, EFFECTIVE DURATION OF PERMIT: February 1 to April 30, 2017

IF APPROVED, SPECIFY CONDITIONS: Regular update of activities and copies of relevant request to the Department of Marine & Wildlife Resources.

REASONS FOR DISAPPROVAL: N/A

NAME OF SIGNATURE OF PERMITTING OFFICIAL: _____

Selaina Tuimavave Vaitautolu
Acting Director
Dept. Marine & Wildlife Resources

DEPARTMENT OF MARINE AND WILDLIFE RESOURCES
AMERICAN SAMOA GOVERNMENT
P.O. BOX 3730
Pago Pago, AS 96799 U.S.A.

SCIENTIFIC STUDY & COLLECTION PERMIT APPLICATION

This application must be completed prior to all scientific studies requiring the observation, collection, handling, &/or manipulation of live or dead entities of both marine and wildlife species whether in part or in whole.

NAME OF APPLICANT: Kelley P. Elliott
ADDRESS: 1315 East-West Hwy, SSMC3 RM 10262, Silver Spring, MD 20910, USA
EMAIL ADDRESS: Kelley.Elliott@noaa.gov
INSTITUTIONAL AFFILIATION: U.S. Department of Commerce, National Oceanic and Atmospheric Instution, Office of Ocean Exploration and Research
INSTITUTIONAL ADDRESS: 1315 East-West HWY, SSMC3 10th Floor, Silver Spring MD 20910

TITLE OF STUDY: 2017 CAPSTONE American Samoa Expedition

OBJECTIVES OF STUDY:
NOAA Ship *Okeanos Explorer* is the nation's first and only federal vessel with a mandate to systematically explore our mostly unknown ocean for the purpose of discovery and the advancement of knowledge. The 2017 CAPSTONE American Samoa Expedition is a part of a major multi-year foundational science effort focused on deepwater areas of U.S. marine protected areas (MPAs) in the central and western Pacific. The overarching goal of the multi-year CAPSTONE project is to extend and improve the understanding of the distribution and diversity of deepwater habitats within MPAs, and collect data and information to support priority monument and sanctuary science and management needs.

The fundamental driver of the multi-leg American Samoa Expedition is to better understand unknown and poorly known areas of our ocean which include diverse living marine resources, and unique geologic phenomena. Data and information from the cruises will build on previous work, and provide a foundation of baseline data to improve management and spur further exploration and research. NOAA priorities for the work include a combination of science, education, outreach, and open data objectives that will support management decisions at multiple levels.

- Acquire data to support priority Monument and Sanctuary science and management needs;
- Explore the diversity of benthic habitats and features (e.g. seamounts, hydrothermal vents, deep-sea coral habitats, bottom fish habitats);
- Identify and map vulnerable marine habitats – particularly high-density deep-sea coral and sponge communities;

- Investigate the geologic history of Pacific seamounts, including potential relevance to plate tectonics and subduction zone biology and geology; and
- Engage a broad spectrum of the scientific community and public in telepresence-based exploration; and
- Provide a foundation of publicly accessible data and information products to spur further exploration, research, and management activities.

Operations will use the ship's deep water mapping systems, NOAA's 6000m remotely operated vehicles (ROV), Conductivity Temperature Depth (CTD) rosette, underway CTD, and a high-bandwidth satellite connection for real-time ship to shore communications. Like previous expeditions in the Gulf of Mexico, western Atlantic, Hawai'i and Indonesia, NOAA will work with the scientific community and public to characterize unknown and poorly-known areas through telepresence-based exploration. Data and information from the Expedition will be made publicly available to provide a foundation of publicly-accessible baseline information to improve management and spur further exploration and research.

We propose to conduct activities within the American Samoa Exclusive Economic Zone, including within the Rose Atoll Marine National Monument, the National Marine Sanctuary of American Samoa and within territorial waters to explore and improve understanding of the distribution and diversity of deep water habitats. The activity would occur during five cruises from February 1 to April 30, 2017. Operations will be focused in 250 meters and deeper. No activities would occur on land.

DESCRIPTION OF SPECIMEN(S) TO BE COLLECTED, IF ANY:
During ROV operations, only very selective specimens that have the potential to contribute significant scientific discoveries will be collected. On average only 4-6 total biological and geological specimens will be collected per dive. Biologic samples will focus on potential new species or new records for the region, and the dominant morphotype animal (such as a coral or sponge) in a habitat. When possible, only a sub-sample will be taken of biologic specimens (e.g., only a piece or branch of corals and sponges will be collected, not the entire organism). Selective rock specimens, that have the potential to contribute significant scientific discoveries, as outlined in the expedition goals, will also be targeted. These are expected to include rocks from seamounts and manganese-coated rocks. 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. All samples will be preserved onboard and made freely and publicly accessible to the science community through National Repositories.

Water samples may also be collected using our CTD rosette instrument. The CTD instrument package is used to obtain conductivity, temperature, depth and other oceanographic data (dissolved oxygen, light scattering, oxygen reduction potential). At least one, and potentially several, CTD casts are planned for this cruise. CTD casts would be conducted at selected sites including locations where ROV dives are conducted to allow for an improved understanding of the environmental conditions by measuring the physical or chemical properties of the water column overlying or hosting a particular habitat. No water samples have been requested at this time, however if they are requested and collected they would likely be frozen for later analysis. The results from any analysis would be made publicly available.

DESCRIBE COLLECTION METHODS TO BE USED:

ROV Operations: biological and geological specimens

The purpose of conducting ROV operations is to conduct interdisciplinary site characterization at priority targets in American Samoa. Interdisciplinary site characterization would be achieved by visually surveying priority targets while simultaneously acquiring environmental data with in situ sensors mounted on the ROVs (conductivity, temperature and depth; dissolved oxygen; light scattering; and oxygen reduction potential). ROV targets include seamounts, hydrothermal vents, deep-sea coral and sponge communities and bottom fish habitats. The combined dives will enable scientists and managers to have a better understanding of the diversity and distribution of deep water habitats in American Samoa including the Rose Atoll Marine National Monument and National Marine Sanctuary of American Samoa, and should contribute to enhanced protection of these resources.

The *Okeanos Explorer* is equipped with a dedicated, fully integrated, two-body ROV system. ROV operations are conducted primarily during daylight hours while the vessel is stopped and holding station using dynamic positioning. ROV operations will typically take place within several meters of the seafloor, and are conducted in a way to minimize seafloor disturbances. On occasion, the ROV is set down on the seafloor in order to acquire very close imagery of habitats or features of interest or to collect samples. The ROV also has a temperature probe that may be shallowly inserted into the seafloor sediment to measure the depth or temperature of features of interest.

During these dives, limited sampling operations are planned with the ROV to collect very selective specimens that have the potential to contribute significant scientific discoveries. These specimens would be collected using the ROV's manipulator arms or scoop. Biological specimen collections will focus on potential new species or new records for the region, and the dominant morphotype animal (such as a coral or sponge) in a habitat. When possible, only a sub-sample will be taken of biological specimens (e.g., only a piece or branch of corals and sponges will be collected, not the entire organism). Selective rock specimens, that have the potential to contribute significant scientific discoveries, as outlined in the expedition goals, will also be targeted. These are expected to include rocks from seamounts and manganese-coated rocks. 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. On average only 4-6 total biological and geological specimens will be collected per dive.

CTD Rosette: water samples and sensor data

Water samples may also be collected using our CTD rosette instrument. The CTD instrument package is used to obtain conductivity, temperature, depth and other oceanographic data (dissolved oxygen, light scattering, oxygen reduction potential). The instrument is attached to an open cylindrical steel frame approximately 1.15 m in diameter and 1.4 m high with a 24-position rosette carousel containing 24 2.5 L Niskin bottles for collecting water samples. The system would be lowered to a maximum depth of 6800 m by an embedded scientific winch and wire while the vessel would be stopped and hold station using dynamic positioning. The average time to conduct a CTD casts varies from one to several hours depending on water depth (the CTD is

lowered through the water column at 60m/min). CTD casts would be conducted at selected sites including locations where ROV dives are conducted to allow for an improved understanding of the environmental conditions by measuring the physical or chemical properties of the water column overlying or hosting a particular habitat. No water samples have been requested at this time, however if they are collected they would likely be frozen for later analysis. The results from any analysis would be made publicly available.

Mapping Operations: acoustic data

The ship will conduct sonar mapping operations at all times during non-ROV or non-CTD rosette operations throughout the cruise. NOAA Ship *Okeanos Explorer* has a suite of scientific sonars, each with a unique exploration application. All of these systems are routinely used by the ocean science community and have provided invaluable scientific data for oceanographers, marine researchers and managers. Each sonar's acoustic signal is designed to be narrowly focused to provide precise information about a specific, narrowly defined area of the seafloor or water column beneath the ship. The sonars include a Kongsberg EM302 30 kHz multibeam system; 18 kHz, 38 kHz, 70 kHz, 120 kHz, 200 kHz and 333 kHz Kongsberg EK60 split-beam fisheries sonars (the 333 kHz and 38 kHz will not be operational since we don't currently have the hardware general purpose transceiver to run it, but is included just in case); a Knudsen 3.5 kHz chirp sub-bottom profiler sonar; and 300 kHz and 38 kHz Teledyne Acoustic Doppler Current Profilers (ADCPs). The multibeam maps broad swaths for seafloor bathymetry/backscatter and water column feature detection (e.g. gaseous seeps), the split-beam sonars gather calibrated target strength measurements of biologic and gaseous targets in the water column, the sub-bottom profiler provides data useful for interpreting sub-seafloor geology, and the ADCPs provide information about current velocity and direction at various depths through a water column profile. Additionally, expendable bathythermographs (XBTs) and the ship's UnderwayCTD (UCTD) will be deployed at regular intervals in association with multibeam data collection. All of these systems are routinely used by this exploration vessel.

DURATION OF STUDY OR COLLECTION PERIOD:

The activity would occur during five cruises from February 1 to April 30, 2017. The requested dates cover a conservative estimate of the timing that NOAA Ship *Okeanos Explorer* will arrive in American Samoa and can commence work in the region, through a few days after the last cruise departs and is likely to conduct work in American Samoa. During the cruises, 15 deployments of the ROV are planned in American Samoan waters, resulting in 120 hours total dive time (~8 hours for each dive). The Expedition cruise legs, dates and focus areas are below:

EX-17-01 (January 18 – February 10, 2017): 24-day mapping cruise from Honolulu, HI to Pago Pago, American Samoa with focused mapping work in: Kingman/Palmyra and Jarvis units of the Pacific Remote Islands Marine National Monument (PRIMNM); the Pheonix Islands Protected Area (PIPA) part of Kiribati; Tokelau and Swains Island Unit of the National Marine Sanctuary of American Samoa (NMSAS).

EX-17-02 (February 16 – March 2, 2017. Pago Pago, American Samoa - Apia, Samoa): 14-day cruise with daytime remotely operated vehicle (ROV) dives and overnight CTD rosette and mapping operations focused on American Samoan waters.

EX-17-03 (March 7 - 29, 2017. Apia, Samoa - Apia, Samoa): A 23-day cruise with daytime remotely operated vehicle dives and overnight CTD rosette and mapping operations focused on PIPA and the Howland/Baker Unit of the PRIMNM. One dive is planned in the Swains Island unit of the National Marine Sanctuary of American Samoa at either the start or end of the cruise.

EX-17-04 (April 4 – April 21, 2017. Apia, Samoa - Pago Pago, American Samoa): An 18-day mapping cruise focused on American Samoa including unmapped or poorly mapped areas of the Rose Atoll Marine National Monument and National Marine Sanctuary of American Samoa deeper than ~250m.

EX-17-05 (April 27 – May 19, 2017. Pago Pago, AS to Honolulu, HI): A 23-day cruise with daytime remotely operated vehicle (ROV) dives and overnight CTD rosette and mapping operations focused on the Cook Islands and the Jarvis and Kingman/Palmyra Units of the PRIMNM. One dive is planned in or just outside of the Aunu'u Unit of the National Marine Sanctuary of American Samoa at the start of the cruise.

SPECIFIC LOCATION(S) OF STUDY &/or COLLECTING/SAMPLING AREA(S): Mapping, ROV and CTD rosette operations will focus in depths generally between 250 and 6,500 meters, with some mapping planned. CTD rosette operations have been requested in waters south of Tutuila and at Vailulu'u seamount. No activities would occur on land.

Figure 1: Overview map showing the general locations of ROV dives in American Samoa. The red dots are the draft locations of ROV dive sites, and where samples would be collected. The yellow boxes are priority areas for focused mapping surveys. Focused overnight mapping operations will be planned during the cruise based on available time. The light blue polygons are the boundaries of the Rose Atoll Marine National Monument and National Marine Sanctuary of

American Samoa. The green labelled dots are the port locations of Pago Pago, American Samoa and Apia, Samoa. The white line is the publicly available Exclusive Economic Zone of American Samoa and Samoa.

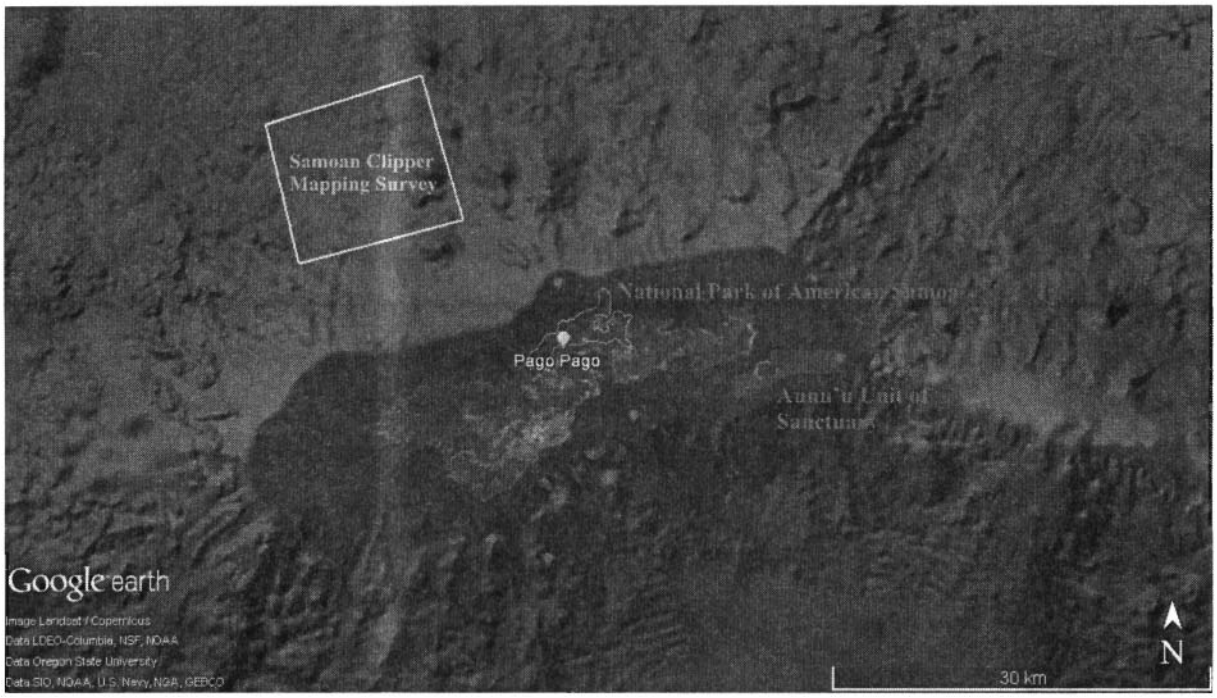


Figure 2. Close-up of draft ROV dive sites (red dots) and a priority mapping survey (yellow polygon) near Tutuila Island. The green polygon is the boundaries of the National Park of American Samoa (which extends to 100m offshore), and the light blue polygon is the Aunu'u unit of the National Marine Sanctuary of American Samoa. The requested sonar mapping survey is to support efforts to find a lost plane and maritime archaeology procedures will be employed during the survey to protect location information.

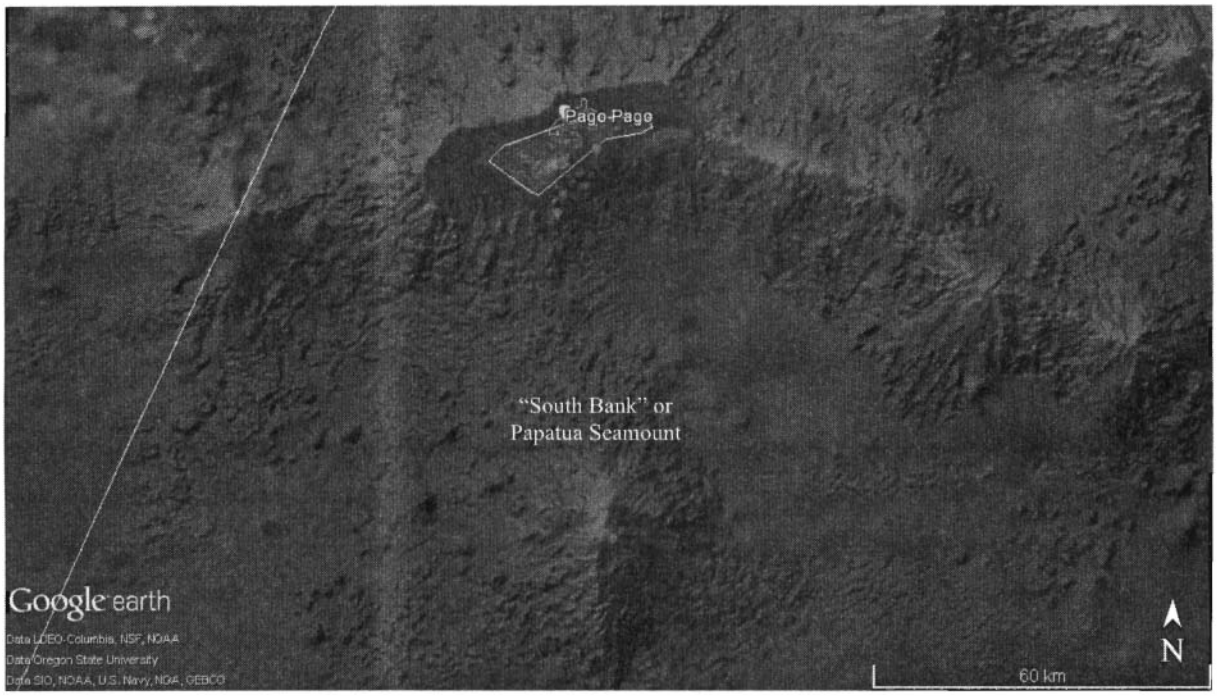


Figure 3. Close up of Tutuila Island and Papatua or "South Bank" seamount. The red dots are the locations of draft ROV dive sites.

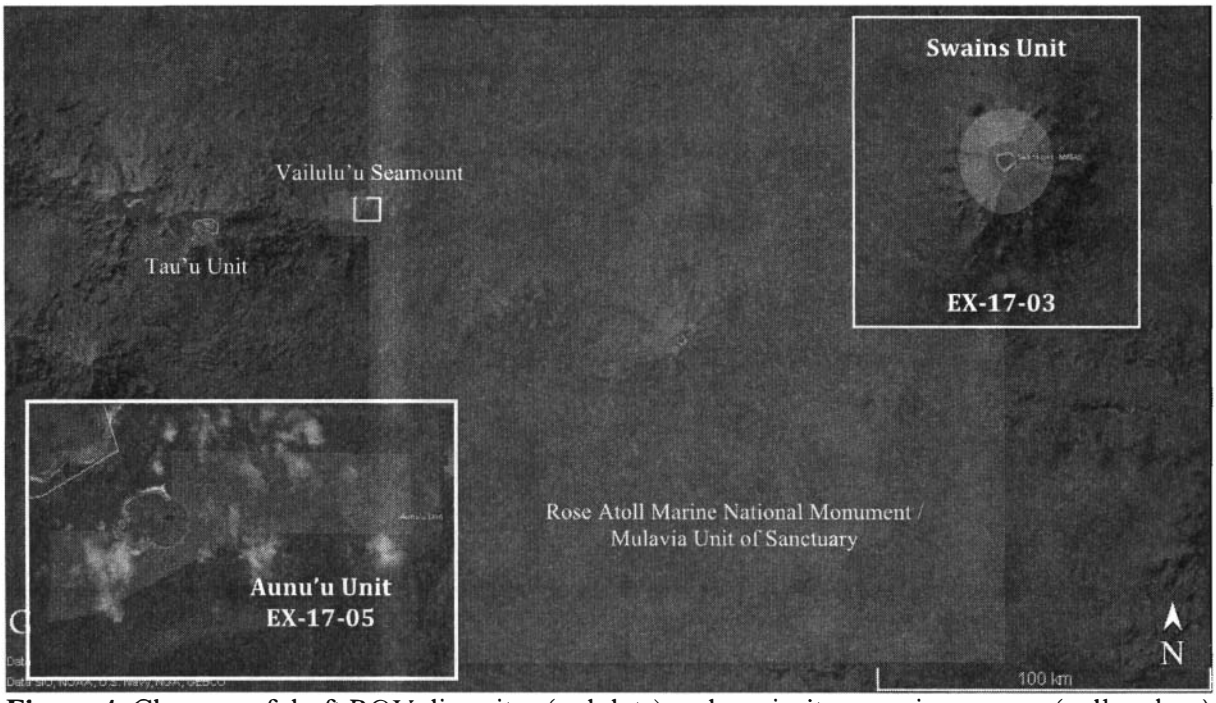


Figure 4. Close up of draft ROV dive sites (red dots) and a priority mapping survey (yellow box) within the National Marine Sanctuary of American Samoa and Rose Atoll Marine National Monument (the light blue boxes).

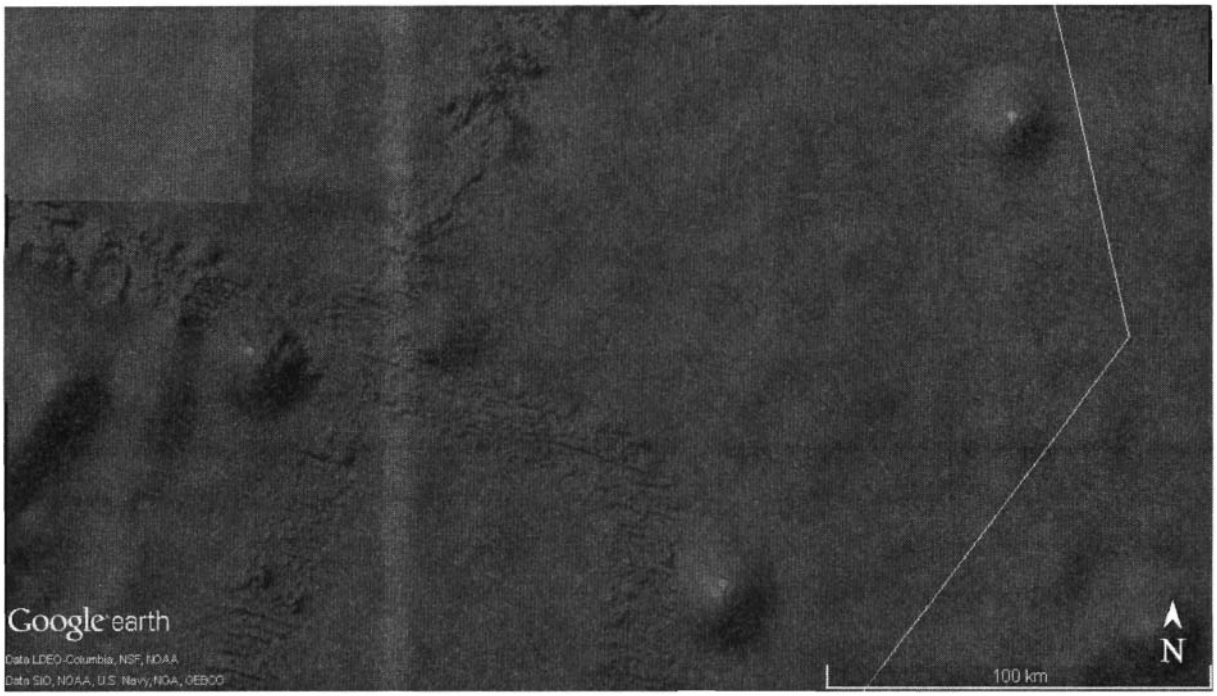


Figure 5. Close up of draft ROV dive sites (red dots) on unnamed seamounts close to the eastern edge of the American Samoa EEZ (white line). The light blue polygon is the southeast corner of Rose Atoll Marine National Monument. Mapping operations will need to be conducted overtop of the seamounts the night/morning prior to the dive to finalize the dive track.

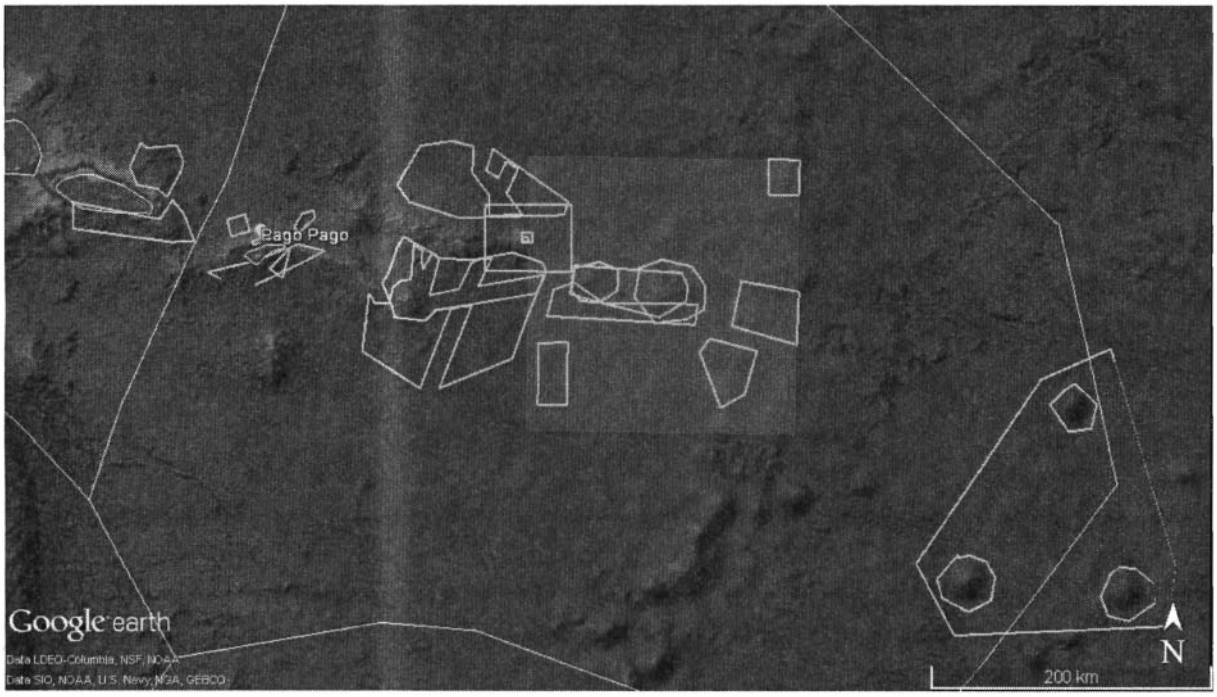


Figure 6. Overview map showing areas where seafloor mapping activities are planned – especially during EX-17-02 and EX-17-04 cruises. The orange polygons are mapping survey

areas requested by the science and management community. Mapping operations will focus on areas 250 meters and deeper.

IF HANDLING &/OR MANIPULATION OF LIVE ANIMALS, DESCRIBE PROTOCOL(S):

ROV Operations:
Once a sample is brought onboard, it will be photographed, documented, and information entered into a sample database. Rocks will be dried and photographed. Aliquots of coral and sponge specimens will be preserved for taxonomic analysis (ethanol), genetic analysis (CHAOS or other buffer), and in some cases, histological examination (10% buffered formalin). All other animals will be preserved in either formalin or ethanol, depending on which preservative is more desirable for the particular taxa.

An additional small tissue sample will be taken of all biological specimens when doing so will not be overly destructive to the specimen. This tissue sample will be preserved onboard for later genomic DNA and RNA extraction at the Ocean Genome Legacy Center (OGL) in Northeastern University.

All samples will remain on the ship until it returns to Honolulu, HI in summer 2017. The samples will then be taken to OER Science Advisor, Dr. Chris Kelley's lab at the University of Hawaii at Manoa for temporary storage. There they will be prepared and transferred to a repository (with preliminary identification provided along with photographs and a deed of gift).

IF SAMPLES COLLECTED WILL BE SUBJECTED TO FURTHER PROCESSING (e.g., genetic analysis or other biochemical analysis, museum prep), DESCRIBE HOW AND WHERE:

All biological and geological samples will be provided to a public repository to be described and made publicly accessible to the scientific research community. Scientists can then request access to the samples to conduct additional analysis, however this is outside the scope of our project.

FINAL DISPOSITION OF SAMPLES OR ANIMALS:
Selected coral and sponge specimens will be split, with one piece going to Bishop Museum in Hawaii, and the other to the Smithsonian to ensure access to as many researchers as possible. If it is determined that splitting will be too destructive to a particular specimen, it will be provided to the Smithsonian Institution intact in order to provide public access to as many researchers as possible. Crustaceans and any other organisms found on the corals and sponges will be provided to the Smithsonian. All other animals will be provided to the Smithsonian.

Tissue samples will be provided to the Ocean Genome Legacy Center (OGL) at Northeastern University. The results of genomic analysis are made publicly available through OGLs website.

All geological samples will be sent to the Oregon State University's Marine Geology Repository to be made publicly accessible. OSU will receive the samples, curate them, describe them from a

petrology point of view (e.g. mineral content, texture, alteration, rock name), microphotograph them and prepare them for future redistribution.

No water samples have been requested at this time, however if they are collected they would likely be frozen for later analysis. The results from any analysis would be made publicly available through the NOAA's National Centers for Environmental Information.

JUSTIFICATION FOR REQUEST TO COLLECT, SAMPLE, HANDLE, &/OR MANIPULATE ANIMALS OF PARTS THEREOF:
The acquisition of high-resolution seafloor mapping data is an essential precursor to making significant biological, geological, archaeological and oceanographic discoveries. The *Okeanos Explorer* cruises will collect seafloor mapping data in areas previously unmapped with sonar or modern sonar, and to supplement previous work. These maps form the basis for selecting ROV dive targets.

ROV dives take the next major step in baseline habitat characterization by using the ROV system to visually investigate unknown and little known deep water habitats within American Samoa identified as priority scientists and managers. CTD casts may be conducted to collect additional information about the physical and chemical properties of the water column, including at sites of interest identified from mapping and ROV investigation.

These dives will be the next step in a baseline habitat characterization, and directly contribute to a better understanding of the deep water habitats, ecosystems and geology of American Samoa. The dives will enable scientists and managers to have a better understanding of the diversity and distribution of deepwater habitats. It is this understanding that enables effective management decisions, and provides continuous support for the monuments, sanctuaries and their protection of these resources. The collective understanding established from the multi-year CAPSTONE expeditions will increase understanding of deep-sea biogeographic patterns across the Central and Western Pacific.

PROJECTED STARTING DATE OF STUDY:
The starting date of the first cruise is January 18th, however the ship will not arrive in American Samoan waters until early February. I have listed project dates of February 1 (the start date) to April 30, 2017. The requested dates cover a conservative estimate of the timing that NOAA Ship *Okeanos Explorer* will arrive in American Samoa and can commence work in the region, through a few days after the last cruise departs and is likely to conduct work in American Samoa. The Expedition cruise legs, dates and focus areas are detailed in the "Duration of Study or Collection Period" section above.

NAME OF LOCAL COLLABORATOR(S) &/OR LOCAL INSTITUTIONAL AFFILIATION,
Local managers have identified many of the priority sites for acoustic mapping and remotely operated vehicle dives in American Samoan waters. The names and affiliations of key partners are included below:

Genevieve (Gene) Brighouse*

National Marine Sanctuary of American Samoa, Superintendent
**We have met with the entire Sanctuary team and will be collaborating with them closely, especially on outreach activities.*

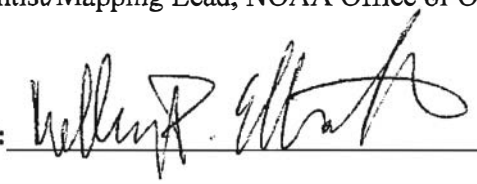
Fatima Sauafea-Le'au
NOAA Fisheries - PIRO
Habitat Conservation Division
American Samoa Field Office

Brian Peck
Rose Atoll Marine National Monument, Superintendent
Rose Atoll National Wildlife Refuge, Manager
US Fish and Wildlife Service

Dr. Tim Clark
Marine Ecologist
National Park of American Samoa

We also met with representatives from other American Samoa agencies in November 2016 to share our draft project plans and request additional input and feedback. This included Dr. Ruth Matagi-Tofiga, Director of the Department of Marine and Wildlife Resources. Other agencies and officials included the Office of Samoan Affairs, the American Samoa Governor's Coral Reef Advisory Group, American Samoa Environmental Protection Agency, and the American Samoa Power Authority.

OTHER COLLABORATING SCIENTISTS:
Dr. Chris Kelley, CAPSTONE Science Advisory, University of Hawaii at Manoa
Dr. Santiago Herrera, Biology Science Team Lead, Lehigh University
Dr. Matthew Jackson, Geology Science Team Lead, University of California Santa Barbara
Elizabeth Lobecker, Physical Scientist/Mapping Lead, NOAA Office of Ocean Exploration and Research

SIGNATURE OF APPLICANT: 

DATE: Jan. 3, 2017

MAIL or RETURN THIS FORM TO THE ADDRESS ON THE TOP OF THE FRONT PAGE.

FOR OFFICE USE ONLY

APPLICATION SERIES No. _____

DATE APPLICATION RECEIVED: _____

RECEIVED BY: _____

APPLICATION FEE Receipt No. & Amount: _____

REVIEWER'S COMMENTS:

This is an important research initiative to explore and understand the deep-water habitats of American Samoa. These are habitats that are generally out of reach but the technologies borned by this expedition will map and sample environments and living things in the deep.

RECOMMENDED ACTION: Approve

NAME AND SIGNATURE OF REVIEWER: Dr. Domingo Ochavillo

DATE: 9 January 2017

Appendix D: NMSAS Permit

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE

National Marine Sanctuary of American Samoa
P.O. Box 4318
Pago Pago, AS 96799

January 19, 2017

MEMORANDUM FOR: THE RECORD

FROM: Gene Brighouse
National Marine Sanctuary of American Samoa

SUBJECT: Decision Memo for Permit # NMSAS-2017-001

The National Oceanic and Atmospheric Administration's National Marine Sanctuary Program (NMSP) has decided to issue permit number NMSAS-2017-001 to Kelley Elliott for the project entitled: 2017 American Samoa Expedition. This memorandum documents the rationale for this decision and compliance with all required consultations generated by this action.

BACKGROUND

Project Summary:
NOAA Ship Okeanos Explorer is the nation's first and only federal vessel with a mandate to systematically explore our mostly unknown ocean for the purpose of discovery and the advancement of knowledge. Operating under a partnership with NOAA's Office of Ocean Exploration and Research and the Office of Marine and Aviation Operations, the 2017 CAPSTONE American Samoa Expedition is a part of a major multi-year foundational science effort focused on deepwater areas of U.S. marine protected areas (MPAs) in the central and western Pacific. The overarching goal of the CAPSTONE project is to extend and improve the understanding of the distribution and diversity of deepwater habitats within MPAs, and collect data and information to support priority monument and sanctuary science and management needs.

Data and information from the Expeditions will provide a foundation of publicly-accessible baseline information to improve management and spur further exploration and research. Like previous expeditions in the Gulf of Mexico, western Atlantic, Hawai'i and Indonesia, NOAA will work with the scientific community and public to characterize unknown and poorly-known areas through telepresence-based exploration. Operations will use the ship's deep water mapping systems, NOAA's 6000m remotely operated vehicles (ROV), underway CTD, CTD rosette, and a high-bandwidth satellite connection for real-time ship to shore communications.

We propose to conduct activities in and around the National Marine Sanctuary of American Samoa to explore and improve understanding of the distribution and diversity of deep water habitats. The activity would occur during five cruises from February 1 to April 30, 2017. Operations will be focused in 250 m and deeper. No activities would occur on land.

Direct impacts:
A standard suite of operations are conducted on Okeanos Explorer and have been determined to not have the potential to result in any lasting changes to the environment. As defined in Sections 5.05 and 6.03.c.3 (a) of NAO 216-6, this is a research project of limited size or magnitude or with only short-term effects on the environment and for which any cumulative effects are negligible. Full details of the potential short-term impacts are described in the attached Categorical Exclusion.

Indirect impacts:
No indirect impacts on sanctuary resources will result from this activity.

Cumulative impacts:
A standard suite of operations are conducted on Okeanos Explorer and have been determined to not have the potential to result in any lasting changes to the environment. As defined in Sections 5.05 and 6.03.c.3 (a) of NAO 216-6, this is a research project of limited size or magnitude or with only short-term effects on the environment and for which any cumulative effects are negligible. Full details of the potential short-term impacts are described in the attached Categorical Exclusion.

Site-specific impacts and review criteria:
Activity shall be conducted with adequate safeguards for the environment. Environment shall be returned to, or will regenerate to, the condition which existed before the activity occurred.

NATIONAL ENVIRONMENTAL POLICY ACT

Categorical Exclusion:
After reviewing NOAA Administrative Order (NAO) 216-6, including the criteria used to determine significance, the NMSP has concluded that the issuance of this permit would not have a significant effect, individually or cumulatively, on the human environment. Further, we have determined that the proposed action is categorically excluded from the requirement to prepare an environmental assessment or environmental impact statement in accordance with Section 6.03c.3(a) Research Program of NAO 216-6, specifically:

The proposed research activity is of limited size and magnitude and, based on analysis of past projects in the permitted activity area, has been found to have negligible cumulative effects. I certify that this action is not likely to result in significant impacts as defined at 40 CFR 1508.27 and is not an exception to this CE category as defined by section 5.05c of NAO 216-6.

Based on this, the NMSP has concluded that an environmental assessment is not warranted for the issuance of this permit.

MAGNUSON-STEVENS ACT / ESSENTIAL FISH HABITAT

Section 305(b) (2) of the Magnuson-Stevens Fishery Conservation and Management Act requires any federal action agency to complete an Essential Fish Habitat consultation for any action authorized by the agency that may adversely affect EFH. The issuance of this permit will

adversely impact designated EFH within National Marine Sanctuary of American Samoa. Therefore, consultation with NMFS Pacific Islands Regional Office was conducted on November 30, 2016. Recommendations to minimize or mitigate for impacts to EFH have been taken into consideration and incorporated into the final action.

MARINE MAMMAL PROTECTION ACT

The issuance of this permit is not likely to result in the take of any marine mammal protected under the Marine Mammal Protection Act. Therefore, a separate permit to take a marine mammal is not required.

COASTAL ZONE MANAGEMENT ACT

The NMSP has determined that the proposed activity is not reasonably likely to affect any land or water use or natural resource of the coastal zone of American Samoa. In addition, national marine sanctuary permits and authorizations are not listed under the American Samoa Coastal Zone Management Program (CZMP) as activities that generally require a consistency determination. Furthermore, American Samoa CMP has not contacted the NOAA Office of Ocean and Coastal Resource Management with a request to review this permit. Therefore, a federal consistency determination is not required for this action.

ENDANGERED SPECIES ACT

The NMSP has determined that the proposed activity is not likely to adversely affect ESA-listed marine species. Consultation with the National Marine Fisheries Service Pacific Islands Regional Office as required by Section 7 of the Endangered Species Act was conducted on January 14, 2016. Recommendations generated through consultation have been taken into consideration and incorporated into the final action.

NATIONAL HISTORIC PRESERVATION ACT

Section 106 of the National Historic Preservation Act requires federal agencies to consider the impact of their actions on historic properties. The NMSP has determined that the proposed activity is not likely to affect any historic properties. No consultations with the Advisory Council on Historic Preservation, State Historic Preservation Officer, or Tribal Historic Preservation Officer were conducted.

OTHER CONSULTATIONS

No other consultations were required or considered for this action.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE

National Marine Sanctuary of American Samoa
P.O. Box 4318
Pago Pago, AS 96799

January 19, 2017

Ms. Kelley Elliott
NOAA Office of Ocean Exploration and Research (OER
1315 East-West Hwy
SSMC3 Room 10262
Silver Spring, MD 20910

Dear Ms. Elliott:

The National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries (ONMS) has approved the issuance of permit number NMSAS-2017-001 to conduct activities within National Marine Sanctuary of American Samoa (sanctuary) for research purposes. Activities are to be conducted in accordance with the permit application and all supporting materials submitted to the sanctuary, and the terms and conditions of permit number NMSAS-2017-001 (enclosed).

This permit is not valid until signed and returned to the ONMS. Retain one signed copy and carry it with you while conducting the permitted activities. Additional copies must be signed and returned, by either mail or email, to the following individuals within 30 days of issuance and before commencing any activity authorized by this permit:

Gene Brighouse
Superintendent
National Marine Sanctuary of American Samoa
P.O. Box 4318
Pago Pago, AS 96799
Gene.Brighouse@noaa.gov

National Permit Coordinator
NOAA Office of National Marine Sanctuaries
1305 East-West Highway (N/ORM6)
SSMC4, 11th Floor
Silver Spring, MD 20910
nmspermits@noaa.gov

Your permit contains specific terms, conditions and reporting requirements. Review them closely and fully comply with them while undertaking permitted activities.

If you have any questions, please contact Gene Brighouse at 011-684-633-6500. Thank you for your continued cooperation with the ONMS.

Sincerely,

Gene Brighouse
Superintendent

Enclosure

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE

National Marine Sanctuary of American Samoa
P.O. Box 4318
Pago Pago, AS 96799

NATIONAL MARINE SANCTUARY of AMERICAN SAMOA
RESEARCH PERMIT

Permittee:
Ms. Kelley Elliott
NOAA Office of Ocean Exploration and Research (OER
1315 East-West Hwy
SSMC3 Room 10262
Silver Spring, MD 20910

Permit Number: NMSAS-2017-001
Effective Date: February 1, 2017
Expiration Date: April 30, 2017

Project Title: 2017 American Samoa Expedition

This permit is issued for activities in accordance with the National Marine Sanctuaries Act (NMSA), 16 USC §1431 *et seq.*, and regulations thereunder (15 CFR Part 922). All activities must be conducted in accordance with those regulations and law. No activity prohibited in 15 CFR Part 922 is allowed except as specified in the activity description below.

Subject to the terms and conditions of this permit, the National Oceanic and Atmospheric Administration (NOAA), Office of National Marine Sanctuaries (ONMS) hereby authorizes the permittee listed above to conduct research activities within National Marine Sanctuary of American Samoa (NMSAS or sanctuary). All activities are to be conducted in accordance with this permit and the permit application received January 03, 2017. The permit application is incorporated into this permit and made a part hereof; provided, however, that if there are any conflicts between the permit application and the terms and conditions of this permit, the terms and conditions of this permit shall be controlling.

Permitted Activity Description:
The following activities are authorized by this permit:

Permitted research activities utilizing methods as described in the research application include: Damaging, destroying or possessing any invertebrate, coral, bottom formation or marine plant; Alteration of seabed; collection of bottom-dwelling species throughout the sanctuary.

Specimens to be collected are very unlikely to already reside in a repository as the dives and collections are discovery-based. Only very selective specimens that have the potential to contribute significant scientific discoveries will be collected during ROV operations. Biologic samples will focus on potential new species or new records for the region, and the dominant morphotype animal (such as a coral or sponge) in a habitat. Selective rock specimens, that have the potential to contribute significant scientific discoveries, as outlined in the expedition goals, will also be targeted. These are expected to include rocks from seamounts and manganese-coated rocks.

When possible, only a sub-sample will be taken of biologic specimens (e.g., only a piece or branch of corals and sponges will be collected, not the entire organism). 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. All samples will be preserved onboard and made freely and publicly accessible to the science community through National Repositories.

No further violation of sanctuary regulations is allowed.

Permitted Activity Location:
The permitted activity is allowed only in the following location(s):

Throughout the sanctuary.

Special Terms and Conditions:

The permittee may not anchor within the Sanctuary boundaries.

The permittee may not permanently mark any of the reefs.

The permittee shall submit an annual report of all activities conducted under this permit to the NMSAS Permit Coordinator no later than one year from completion of field activities. The report should include a synopsis of research results to date, as well as information regarding daily activities such as location (latitude and longitude) and depth of surveys, discovery or disturbance of historical artifacts, or equipment lost. Appropriate photographs that may be used by NOAA are appreciated, and will be credited to the photographer.

Any scientific publications and/or reports resulting from activities conducted under the authority of this permit must include the notation that the activity was conducted under permit number NMSAS-2017-001. Additionally, the permittee and his/her respective institution(s) are required to acknowledge during any media coverage (press releases, video/photo, or other means) that the research activities occurred within the NMSAS and under permit.

NOAA reserves the right to place an observer aboard the ship engaged in operations conducted under this permit. The NOAA observer(s) may document the permittee's activities for the purpose of determining whether the permitted activities are conducted in accordance with the terms and conditions of this permit and the applicable statute and regulations. The NOAA observer(s) may also provide limited advice and technical assistance, if requested by the permittee. The NOAA observer(s) will not be present for the purpose of safety of permittees, nor for the purpose of approval of activities not specifically authorized by this permit.

General Terms and Conditions:

1. Within 30 (thirty) days of the date of issuance, the permittee must sign and date this permit for it to be considered valid. Once signed, the permittee must send copies, via mail or email, to the following individuals:

Gene Brighouse Superintendent National Marine Sanctuary of American Samoa P.O. Box 4318 Pago Pago, AS 96799 Gene.Brighouse@noaa.gov	National Permit Coordinator NOAA Office of National Marine Sanctuaries 1305 East-West Highway (N/ORM6) SSMC4, 11th Floor Silver Spring, MD 20910 nmspermits@noaa.gov

2. It is a violation of this permit to conduct any activity authorized by this permit prior to the ONMS having received a copy signed by the permittee.

3. This permit may only be amended by the ONMS. The permittee may not change or amend any part of this permit at any time. The terms of the permit must be accepted in full, without revision; otherwise, the permittee must return the permit to the sanctuary office unsigned with a written explanation for its rejection. Amendments to this permit must be requested in the same manner the original request was made.

4. All persons participating in the permitted activity must be under the supervision of the permittee, and the permittee is responsible for any violation of this permit, the NMSA, and sanctuary regulations for activities conducted under, or in junction with, this permit. The permittee must assure that all persons performing activities under this permit are fully aware of the conditions herein.

5. This permit is non-transferable and must be carried by the permittee at all times while engaging in any activity authorized by this permit.

6. This permit may be suspended, revoked, or modified for violation of the terms and conditions of this permit, the regulations at 15 CFR Part 922, the NMSA, or for other good cause. Such action will be communicated in writing to the applicant or permittee, and will set forth the reason(s) for the action taken.

7. This permit may be suspended, revoked or modified if requirements from previous ONMS permits or authorizations issued to the permittee are not fulfilled by their due date.

8. Permit applications for any future activities in the sanctuary or any other sanctuary in the system by the permittee might not be considered until all requirements from this permit are fulfilled.

9. This permit does not authorize the conduct of any activity prohibited by 15 CFR § 922, other than those specifically described in the "Permitted Activity Description" section of this permit. If the permittee or any person acting under the permittee's supervision

conducts, or causes to be conducted, any activity in the sanctuary not in accordance with the terms and conditions set forth in this permit, or who otherwise violates such terms and conditions, the permittee may be subject to civil penalties, forfeiture, costs, and all other remedies under the NMSA and its implementing regulations at 15 CFR Part 922.

10. Any publications and/or reports resulting from activities conducted under the authority of this permit must include the notation that the activity was conducted under National Marine Sanctuary Permit NMSAS-2017-001 and be sent to the ONMS officials listed in general condition number 1.

11. This permit does not relieve the permittee of responsibility to comply with all other federal, state and local laws and regulations, and this permit is not valid until all other necessary permits, authorizations, and approvals are obtained. Particularly, this permit does not allow disturbance of marine mammals or seabirds protected under provisions of the Endangered Species Act, Marine Mammal Protection Act, or Migratory Bird Treaty Act. Authorization for incidental or direct harassment of species protected by these acts must be secured from the U.S. Fish and Wildlife Service and/or NOAA Fisheries, depending upon the species affected.

12. The permittee shall indemnify and hold harmless the Office of National Marine Sanctuaries, NOAA, the Department of Commerce and the United States for and against any claims arising from the conduct of any permitted activities.

13. Any question of interpretation of any term or condition of this permit will be resolved by NOAA.

Your signature below, as permittee, indicates that you accept and agree to comply with all terms and conditions of this permit. This permit becomes valid when you, the permittee, countersign and date below. Please note that the expiration date on this permit is already set and will not be extended by a delay in your signing.

Kelley R. Elliott 1-26-17

Ms. Kelley Elliott Date
NOAA Office of Ocean Exploration and Research (OER

1-19-17

Gene Brighouse Date
Superintendent
National Marine Sanctuary of American Samoa

0 document(s) attached.

Appendix E: Categorical Exclusion

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
OCEANIC AND ATMOSPHERIC RESEARCH
Office of Ocean Exploration and Research
Silver Spring, MD 20910

January 3, 2017

MEMORANDUM FOR: The Record

FROM: Craig Russell, Program Manager, *Okeanos Explorer* Expeditions
Office of Ocean Exploration & Research (OER)

SUBJECT: NEPA Categorical Exclusion for NOAA Ship *Okeanos Explorer*
Cruise EX-17-02, Vicinity of American Samoa (ROV & Mapping)

This memorandum documents the applicability of a Categorical Exclusion under the National Environmental Policy Act to the NOAA Ship *Okeanos Explorer* Cruise EX-17-02 activities that NOAA's Office of Ocean Exploration & Research (OER) is undertaking for 14 days in American Samoa and Samoa. NAO 216-6, Environmental Review Procedures, requires all proposed projects to be reviewed with respect to environmental consequences on the human environment. The proposed action is to collect data using the sonar mapping systems, two-body remotely operated vehicle (ROV) and CTD rosette system on the NOAA vessel *Okeanos Explorer*.

Description of the Project

This Categorical Exclusion addresses NOAA Ship *Okeanos Explorer* cruise EX-17-02 "Vicinity of American Samoa (ROV & Mapping)" led by Kelley Elliott, Expedition Manager for NOAA OER. This expedition serves as an opportunity for NOAA and the Nation to highlight the uniqueness and importance of the Pacific Monuments and Sanctuaries, which are national symbols of ocean conservation. Operations conducted during this expedition and the broader 3-year CAPSTONE campaign support NOAA missions to understand and predict changes in climate, weather, oceans and coasts, and share the knowledge and information with others. Much of this year's work will contribute to and complement NOAA's Deep Sea Coral Research and Technology Program's three-year Pacific Islands Regional Initiative.

This project is part of the NOAA Office of Ocean Exploration and Research's "FY17 Science Program" and entails ocean acoustic mapping activities ranging from 50 - 6500m water depths, water column profiling measurements using CTD, XBT, and UnderwayCTD casts, and a two-body remotely operated vehicle (ROV) designed to increase knowledge of the marine environment. The latitude and longitude bounding coordinates for the operating area of the cruise are -13.9° to -14.9° S and -165.2° to -171.4° W.

EX-17-02 is a telepresence-enabled ROV cruise that will be conducted from February 16 to March 2, 2017 in the waters of Samoa and American Samoa, including the Rose Atoll Marine National Monument (RAMNM) and National Marine Sanctuary of American Samoa (NMSAS). Operations

will be focused primarily on deep water areas 250m and deeper. The cruise will start in Pago Pago, AS and end in Apia, Samoa. A tandem 6,000 meter ROV system will be deployed and CTD rosette casts may be conducted during the expedition. ROV dive targets include seamounts, hydrothermal vents and bottom fish habitats.

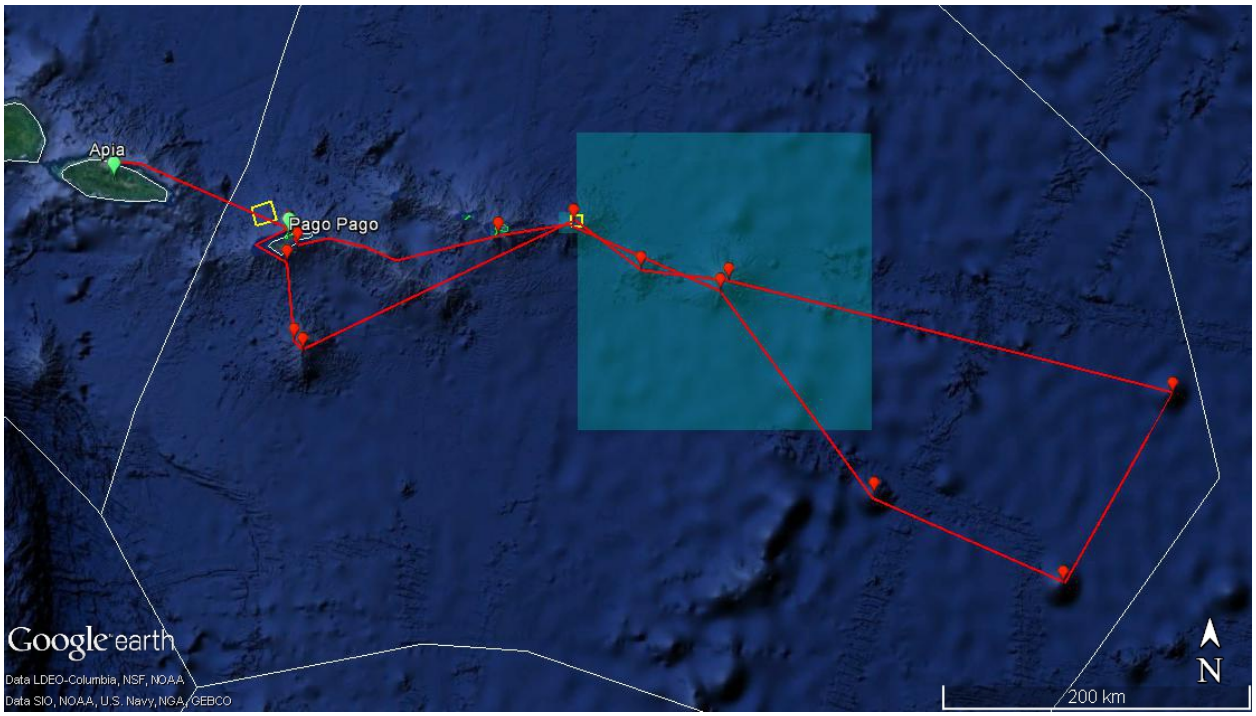


Figure 1: *Map indicating the overall operating area of Okeanos Explorer for EX-17-02. The red line is the generalized cruise track. Focused overnight mapping operations will be planned during the cruise based on available time. The light blue polygons are the boundaries of the Rose Atoll Marine National Monument and National Marine Sanctuary of American Samoa. The red drops are the draft locations of ROV dive sites. The green labelled dots are the port locations of Pago Pago, American Samoa and Apia, Samoa. The yellow boxes are priority areas for focused mapping surveys. The white line is the publicly available Exclusive Economic Zone of American Samoa and Samoa.*

The overarching goal of the project is to extend our breadth of knowledge about the distribution and diversity of deep water habitats within the operating area. The information and data generated by this project will lead to a better understanding of the deep water habitats and ecosystems of the RAMNM, the NMSAS and the marine environment around the Islands and Atolls of American Samoa and Samoa, providing basic information about the rich and unique biological resources and habitats of this region. Ideally, the findings from this cruise will spur further exploration and research and ultimately contribute to effective resource management decisions.

ROV Operations

The purpose of conducting ROV operations is to conduct interdisciplinary site characterization at priority targets in American Samoa. Interdisciplinary site characterization would be achieved by

visually surveying priority targets while simultaneously acquiring environmental data with in situ sensors mounted on the ROVs (conductivity, temperature and depth; dissolved oxygen; light scattering; and oxygen reduction potential). ROV targets include seamounts, hydrothermal vents and bottom fish habitats. The combined dives will enable scientists and managers to have a better understanding of the diversity and distribution of deep water habitats in American Samoa including the RAMNM and NMSAS, and should contribute to enhanced protection of these resources. ROV operations are not planned in Samoan waters.

The *Okeanos Explorer* is equipped with OER's dedicated, fully integrated, two-body ROV system. ROV operations are conducted primarily during daylight hours while the vessel is stopped and holding station using dynamic positioning. ROV operations will typically take place within several meters of the seafloor, and are conducted in a way to minimize seafloor disturbances. On occasion, the ROV is set down on the seafloor in order to acquire very close imagery of habitats or features of interest. Common procedure includes visually scanning the seafloor to ensure the the ROV landing surface does not include corals or other animals, however some animals may reside beneath the sediment or may be too small to see. The ROV also has a temperature probe that may be shallowly inserted into the seafloor sediment to measure the depth or temperature of features of interest. Finally, though every effort is made to prevent any unnecessary seafloor disturbance, it is likely that at some point the ROV will inadvertently touch some benthic fauna (e.g., sea whip) or that water moving through the ROV thrusters will stir up small amounts of seafloor sediment. Any disturbance would likely be similar to that seen during normal near bottom SCUBA dives. During EX-17-02, up to 13 deployments of the ROV would occur during the expedition, resulting in 104 hours total dive time (~8 hours for each dive). 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.

During these dives, limited sampling operations are planned with the ROV to collect very selective specimens that have the potential to contribute significant scientific discoveries. Biological specimen collections will focus on potential new species or new records for the region, and the dominant morphotype animal (such as a coral or sponge) in a habitat. When possible, only a sub-sample will be taken of biological specimens (e.g., only a piece or branch of corals and sponges will be collected, not the entire organism). Selective rock specimens, that have the potential to contribute significant scientific discoveries, as outlined in the expedition goals, will also be targeted. These are expected to include rocks from seamounts and manganese-coated rocks. 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. On average only 4-6 total biological and geological specimens will be collected per dive.

Ultra Short Base Line Acoustic Navigation (USBL):

The Tracklink TL10000MA system is used to track and record the position of the ROVs during the course of a dive. It functions by the transmission of an acoustic pulse from the surface ship, which travels through the water column and triggers a responding acoustic pulse from the ROV.

The measurement of the travel time and direction of arrival of the responding acoustic pulse from the ROV enables calculation of the position of the submerged ROV with respect to the surface ship. Integration of this relative position information with the surface ship position as determined by GPS allows the calculation of the position of the ROV on the seafloor. In this way, observations made by the ROV can be geo-referenced to standard latitude, longitude and depth coordinates. The USBL is used during ROV operations, which are conducted daily and primarily during daylight hours while the ship holds station using dynamic positioning. Although such frequencies are within the hearing range of marine mammals, the USBL navigation system is commonly used by researchers and has no known adverse impact on marine life.

The Tracklink operates at frequencies from 7.5 kHz to 12.5 kHz. Acoustic emissions by the USBL system occur at the surface from the hull of the ship, and at both of the ROVs as they travel through the water column and at the seafloor. The repetition rate of emissions is typically no faster than once every 2 seconds, increasing by 1.33 seconds for every 1000 meters of depth of the ROVs. The character of these emissions is detailed below:

Surface transceiver, *Okeanos Explorer*:
Tracklink model TL10000MA
Frequency of operation: 7.5 kHz - 12.5 kHz Spread Spectrum
Beam width: 120º directed at nadir
Peak electrical power: 100 W
Peak acoustic power: 187db relative to 1 micro Pascal at 1 meter.

ROV transponder, Seirios:
Tracklink model TL10010C
Frequency of operation: 7.5 kHz - 12.5 kHz Spread Spectrum
Beam width: 210º directed at zenith
Peak electrical power: 200 W
Peak acoustic power: 190db relative to 1 micro Pascal at 1 meter.

ROV transponder, Deep Discoverer:
Tracklink model TL10015C
Frequency of operation: 7.5 kHz - 12.5 kHz Spread Spectrum
Beam width: 30º directed at zenith
Peak electrical power: 500 W
Peak acoustic power: 200db relative to 1 micro Pascal at 1 meter.

Mapping

The acquisition of high-resolution seafloor mapping data is an essential precursor to making significant biological, geological, archaeological and oceanographic discoveries. The *Okeanos Explorer* cruises will collect seafloor mapping data in areas previously unmapped with sonar or modern sonar, and to supplement previous work. These maps form the basis for selecting ROV dive targets. ROV cruises would take the next major step in baseline habitat characterization by using the ROV system to visually investigate unknown and little known deep water habitats

within American Samoa identified as priority scientists and managers. CTD casts may be conducted to collect additional information about the physical and chemical properties of the water column, including at sites of interest identified from mapping and ROV investigation.

As is standard procedure on exploration cruises with this vessel, the ship will conduct sonar mapping operations at all times during non-ROV or non-CTD rosette operations throughout the cruise. Acoustic instruments that will be operational during the project are a 30 kHz multibeam echosounder (Kongsberg EM 302), Kongsberg EK60 singlebeam echosounders (18, 38, 70, 120, and 200,kHz), Teledyne Acoustic Doppler Current Profilers (38 and 300 kHz), and a 3.5 kHz sub-bottom profiler (Knudsen Chirp 3260). Additionally, expendable bathythermographs (XBTs) and the ship's UnderwayCTD (UCTD) will be deployed at regular intervals in association with multibeam data collection. All of these systems are routinely used by this exploration vessel.

Bridge Officers and Watch Standers will be on watch during all hours and will look for marine mammals and other observable species potentially sensitive to the sound of the sonars. If cetaceans are sighted, knowledgeable personnel will follow established best management practices to minimize disturbance. If cetacean species are present within 400 m of the ship, the vessel will stop until the animals depart the area.

Multibeam:

Multibeam sonar data will produce high-resolution bathymetry and acoustic backscatter maps. These maps will provide critical baseline information to scientists and resource managers interested in identifying and expanding our understanding of the important biological habitats and ecological connections in Samoa and American Samoa, and to improve understanding of the geological history of the region. Additionally, the data collected will help scientists better understand the size and character of seafloor habitats in the area, allowing for improved targeting of future exploration and research, including the selection of sites for further investigation with a ROV. Multibeam data will be collected at planned ROV dive sites, during transits between ROV dives and to/from ports, and at unmapped or poorly mapped areas in the vicinity of ROV dive sites.

Expendable bathythermographs (XBT):

XBTs are deployed to obtain sound velocity profiles. The profiles are required to calibrate the multibeam system and ensure accurate bathymetric mapping. During mapping operations water column sound velocity profiles will be conducted every 4-6 hours. If the UnderwayCTD is not yet ready for collecting these profiles, the data will be gathered using XBTs.

UnderwayCTD

The UnderwayCTD (UCTD) is a piece of equipment used to gather conductivity/temperature/depth (CTD) measurements or sound velocity measurements while the ship is moving. Accurate measurements of sound speed as a function of depth down to approximately 760 meters are needed every 3-6 hours during multibeam sonar mapping operations. The ship currently obtains sound velocity profiles using expendable probes (XBTs). These sound speed measurements are essential for ray-tracing calculations used by the EM302 multibeam sonar system in order to accurately collect bathymetry and backscatter data. To get

these essential data, the *Okeanos Explorer* can either use an XBT or the UCTD equipped with a sound velocity probe. OER has installed the UCTD in order to minimize the use of XBTs while still gathering essential sound velocity profile data needed in order to accurately collect high quality multibeam sonar data. The UCTD has a re-usable probe that is dropped through the water column to log data then retrieved by rewinding the line onto a motorized spool. The UCTD was installed on the ship in December 2015 on the starboard aft railing. When working correctly, UCTD casts will be used instead of XBTs to obtain water column profile data in order to avoid leaving behind expendable XBT waste in the ocean.

Split Beam Sonars:

Kongsberg EK 60 split-beam sonars are used to collect information about the water column, such as at gas plume or seep sites, and to obtain information about biomass. The EK60 split-beam sonar is used as a quantitative scientific echosounder to identify water column acoustic reflectors - typically biological scattering layers, fish, or gas bubbles – providing additional information about water column characteristics and anomalies. Fishery scientists have developed methods to analyze EK60 data to support fish stock assessment (e.g. Atlantic herring, pollock, capelin) and to predict hot spots of large fish in coral reefs. Split-beam sonars are also being used to help develop "acoustic signatures" of different marine species, which will greatly enhance existing efforts to assess abundance, distribution, and behavior using remote sensing methods. Additionally, split beam sonars are being used to estimate gaseous seep flux rates and improve assessments of their contribution to ocean and atmospheric chemistry. The *Okeanos Explorer* has five operational EK60 transducers at the following frequencies: 18 kHz, 38 kHz, 70 kHz, 120 kHz, and 200 kHz. One or more of these sonars will be operated during the majority of the cruise.

Sub Bottom Profiler:

The primary purpose of the Knudsen 3260 (3.5 kHz chirp) sonar is to provide echogram images of surficial geological sediment layers underneath the seafloor to a maximum depth of about 80 meters below the seafloor. The Sub Bottom Profiler is normally operated to provide information about the sedimentary features and the bottom topography that is simultaneously being mapped by the multibeam sonar. The data generated by this sonar is fundamental in helping geologists interpret the shallow geology of the seafloor. The profiler will be run intermittently to gather test data sets and to evaluate syncing options with other sonars.

CTD Operations

The CTD instrument package is used to obtain conductivity, temperature, depth and other oceanographic data (dissolved oxygen, light scattering, oxygen reduction potential). At least one, and potentially several, CTD casts are planned for this cruise. The instrument is attached to an open cylindrical steel frame approximately 1.15 m in diameter and 1.4 m high with a 24-position rosette carousel containing 24 2.5 L Niskin bottles for collecting water samples. The system would be lowered to a maximum depth of 6800 m by an embedded scientific winch and wire while the vessel would be stopped and hold station using dynamic positioning. The average time to conduct a CTD casts varies from one to several hours depending on water depth (the CTD is lowered through the water column at 60m/min). CTD casts would be conducted at selected sites

including locations where ROV dives are conducted to allow for an improved understanding of the environmental conditions by measuring the physical or chemical properties of the water column overlying or hosting a particular habitat. The CTD will not touch the seafloor and will have limited time and presence in the marine environment.

Effects of the Project

OER has conducted a Biological Evaluation for all operations to be conducted as part of the program's 2015-2017 expeditions in the Pacific Ocean. On February 7, 2016 OER received concurrence from the NOAA National Marine Fisheries Service Protected Resources Division that under Section 7 of the Endangered Species Act (ESA), the activities slated to occur during the 2016-17 expeditions are not likely to adversely impact ESA-listed marine species, and would have insignificant effects on designated or proposed critical habitat. The ESA Section 7 concurrence letter is provided as Appendix A.

OER has also consulted with NOAA's Habitat Conservation Division on the potential impacts of our operations to Essential Fish Habit (EFH) as defined in the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855 et seq. §305(b)). They concurred that our operations would not adversely affect EFH provided adherence to OER proposed procedures and their provided guidance. This concurrence letter is provided as Appendix B.

Exposure to noise from the use of the scientific sonars on the *Okeanos Explorer* may result in avoidance behavior or other finite disturbance to this environment and its marine mammals and fish. The methods used to map the ocean during this cruise are used routinely by NOAA and UNOLS research vessels, are non-destructive in nature, and not known to cause harm. Nonetheless, exposure to noise from use of the abovementioned geophysical equipment may result in avoidance behavior or other finite disturbance to this environment and its marine mammals, sea turtles and fish.

Standard practice during all *Okeanos Explorer* cruises and operations include Officers or Watch Standers on the Bridge around-the-clock, monitoring the surrounding ocean for the presence of other ships, unanticipated hazards, and marine animals – especially cetaceans. If a cetacean is observed, the Mapping Watch Stander or Science Lead is notified and if appropriate the team then proceeds with protocols to continue monitoring the animal or shut down mapping or other ship operations until the animal has departed the area for an appropriate period of time. If cetacean species are observed within 400 m of the ship, the vessel would stop until the animals depart the area 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.

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. During the 2016-2017 field season, these procedures will include monitoring for the presence of sea turtles and, when appropriate, taking protection measures. It is understood that visual monitoring for the presence of marine mammals at night is not typically effective due to

limited visibility – however no practicable alternative is currently available. Modest ship transit speeds (<9-10 knots) and avoidance behavior of mammals to noise that may bother them should make it highly unlikely that a marine mammal would get close enough to the ship's sonar transducers to cause temporary or permanent hearing impacts.

Multibeam Echosounder (MBES)

The Kongsberg EM 302 MBES is hull-mounted on the *Okeanos Explorer* and operates at 30 kHz. The transmitting beamwidth is 0.5° fore–aft and 150° athwartship. In the deepest operating mode the maximum source level of the EM302 is 243 dB re 1 microPa. When operating in shallow modes the source level is 238 dB re 1 microPa. The EM302 is a focused sonar array that uses selective angular directivity and transmits short pulses at limited ping rates (Lurton & DeRuiter 2011). These two characteristics of this type of sonar decrease the potential sound exposure level as well as decrease the probability of the animals being subjected to temporary threshold shift intensity levels affecting hearing.

Dr. Xavier Lurton (IFREMER) has recently created a simplified model of the specific behavior of the *Okeanos Explorer's* EM302 system in terms of direct radiated level inside the water. Model output graphics showing radiated sound transmission patterns in the horizontal and vertical planes of the water column are provided below. This analysis represents our best estimates of radiated sound levels given the current configuration of the sonar. The assumptions behind the model are:

1) The Deep Mode of the EM302 was used (i.e., longest pulse length and highest power -- or worst case scenario).
2) The model uses the current best understanding of the directivity pattern of the sonar that includes both the individual transducer directivity and the transmit sector beam forming.
3) The model does not include any masking effects by the hull or gondola. The draft of the transducer "gondola" on the Okeanos Explorer is 5.65 m below the water line. This configuration causes a baffle effect from the gondola structure and the hull above, and further reduces the likelihood of direct ensonification of an animal on or near the surface, especially a short distance away from the ship.
4) A value of 6 dB/km @ 30 kHz was used as a first-order approximation of the absorption coefficient representative of oceanographic conditions in the vicinity of the Main Hawaiian Islands.

Figure 1 (below) shows horizontal plane (top-down) views of sound pressure levels at three different receiving depths within the water column directly below the transducer: 10m, 50m, and 200m. These figures demonstrate the remarkably narrow zone of ensonification in the along-track direction. Note the difference in the 160 dB/µPa isopleth in the beam plane and elsewhere around the ship. For all but this plane, the isopleth occurs at 400 m or less from the ship. For animals directly within the beam plane, sound pressure levels drop below 160 dB/µPa within 1500 m of the ship near the surface, and within 1800 m at a depth of 200 m. Submerged animals more than 400 m from the ship that are caught in the ensonification volume as the ship

passes will be only briefly subjected to the elevated sound levels occurring inside the transmitter beam pattern. Furthermore, the narrow fan-shaped beam patterns of the *Okeanos Explorer* system provide ample possibilities for the animals to quickly escape the sound. The only possible scenario for more extended exposure would be if the animal were to suddenly start moving in the exact direction and speed as the ship while within the narrow ensonification beam, which is unlikely. This very selective spatial pattern of the sound radiation makes this configuration very different from seismic airgun sources (omnidirectional) or military mid-frequency active sonars that are often directed horizontally through the water column.

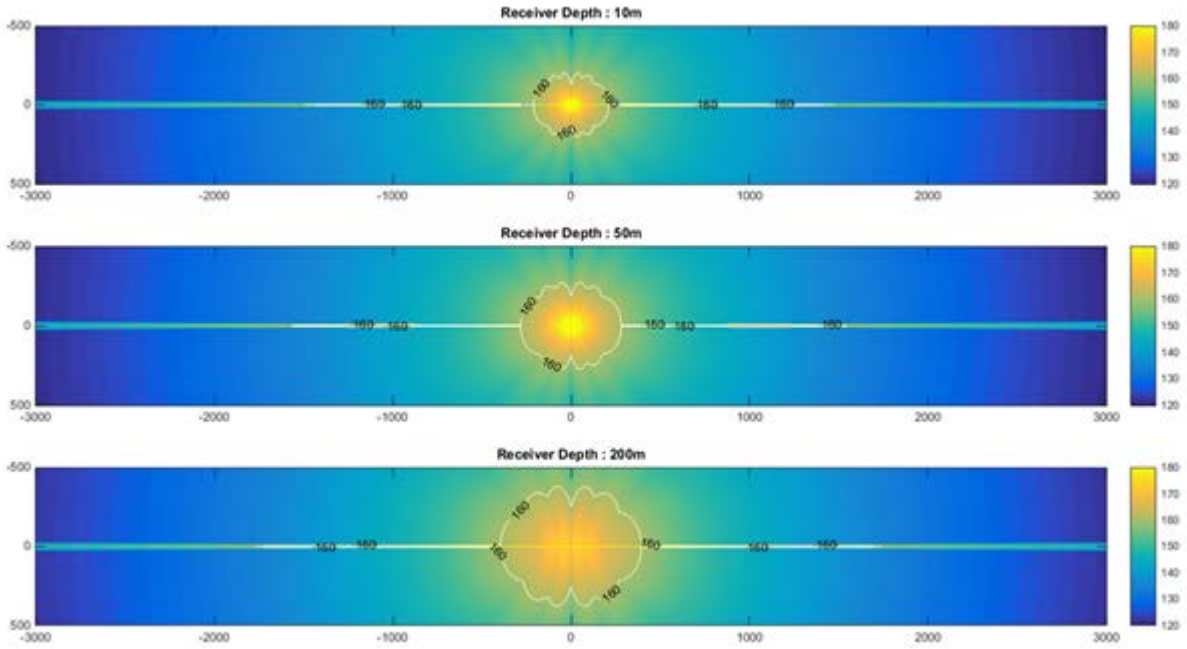


Figure 2: Top down view image of the EM302 radiated beam pattern at several depths (10m, 50m and 200m created by Dr. Xavier Lurton (IFREMER). The ship track is straight up, the Y axis is distance in meters while the X axis in distance in meters. The color scale is signal strength in decibels (dB).

Figure 3 (below) shows the across track radiation pattern for the full water column below the EM302 transducer, with a close up of the near surface region. The 160 and 180 dB/µPa isopleths are plotted to show ranges from the sonar relevant to potential PTS and TTS impacts on cetaceans.

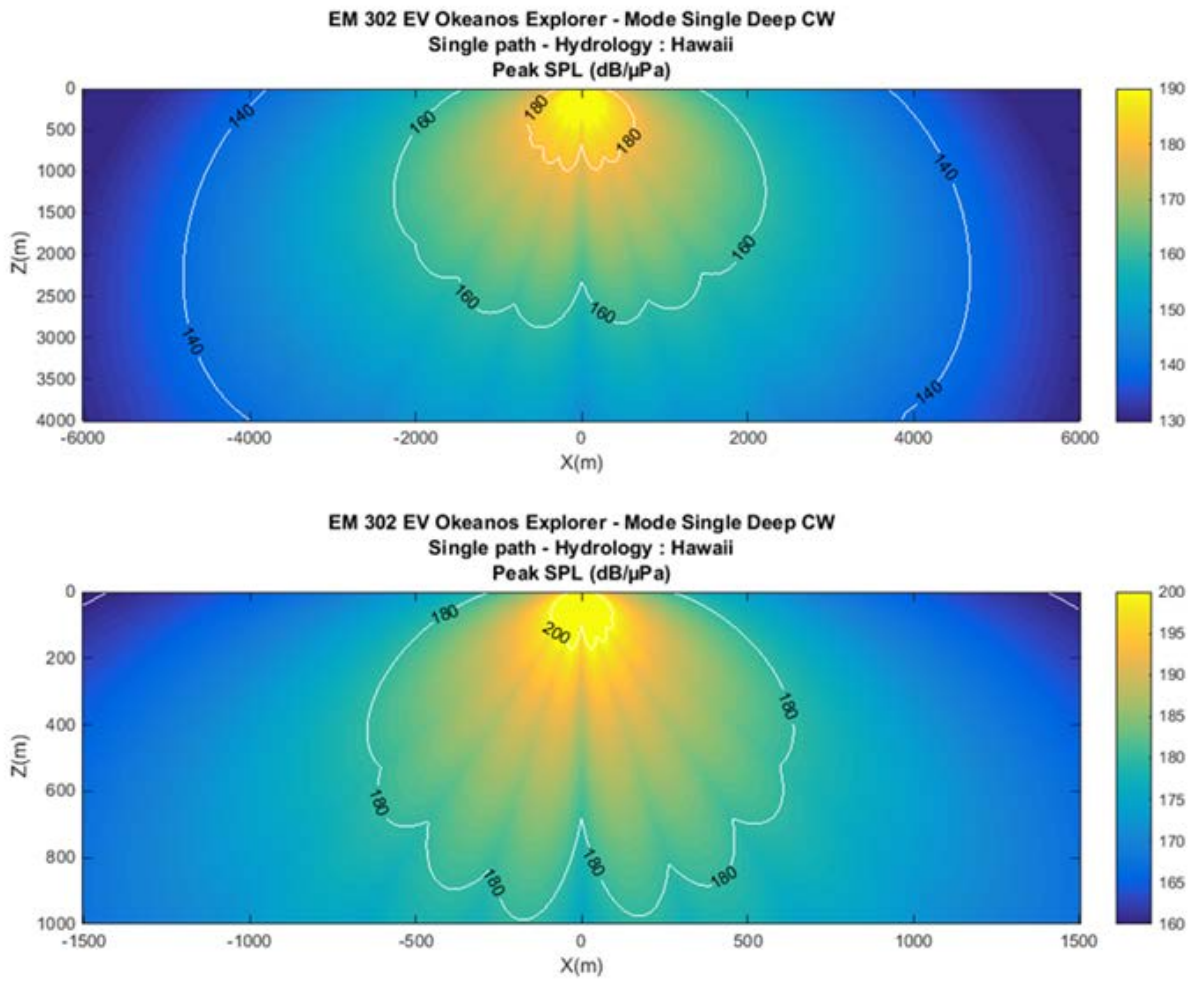


Figure 3: Model created by Xavier Lurton (IFREMER) of the EM302 radiated transmission patterns with the 140, 160 and 180 dB/µPa isopleths plotted for the full water column (top) and of the near surface region (bottom) of a single ping, looking forward through the water column in the along track direction. The y axis is depth below sea surface in meters, and the x axis is distance in meters. The color scale is signal strength in decibels (dB).

Transmit pulse forms and rates are yet two other differences that distinguish multibeam sonar from other types of sonar and acoustic sources and further reduce their potential threat to ESA-listed species. Sound is not transmitted continuously from these systems but rather in extremely short pulses (i.e., pings). Ping durations obtained from the EM302 manual (page 36) are very brief -- 0.7 to 5.0 milliseconds. The ping rate or in other words, how frequently pings are emitted, is depth dependent and is provided for different depths in tables 2 and 3 of the manual and show that at a depth of 400 m, the ping rate is 30 pings/min, decreasing to 3.6/min at 4000 m. Another way of putting it is that when the ship is mapping in 400 m of water, any submerged animal within the ensonification volume will be subjected to only a 0.7 millisecond ping every 2 seconds. When the ship is mapping in 4,000 m of water, a submerged animal could potentially experience a 5-40 millisecond ping every 17 seconds. The fore-aft width of the

ensonification volume at 200 m distance from the ship is approximately 4 meters. Based on a mapping speed of 8 knots and using this width as an example, this distance will be traversed by the ship in 1 second. Therefore, a submerged stationary animal 200m from the ship while it is surveying depths of 400 m should be subjected to at most a single ping of 0.7 milliseconds of duration. If the encounter occurs where the water depth is 4,000 m, the chances are low that it will even be subjected to a single ping.

The low operating frequencies, low duty cycles (because of the narrow fore-aft width of the beam), and short pulse lengths portend limited exposure to the MBES pulse for fish, marine mammals and turtles. Based on observed responses to other types of pulsed sounds, and the likely brevity of exposure to the bathymetric sonar sounds, pinniped and sea turtle reactions to the sonar sounds are expected to be limited to a startle or an otherwise brief response of no lasting consequence. In general, marine animals are expected to exhibit no more than short-term and inconsequential responses to these systems given their characteristics.

As a precautionary measure, to circumvent disturbance and/or possible startling of nearby animals, initial pinging of the multibeam sonar will always be started in the "soft start" mode. The soft start mode is a delay function, starting the sonar transmissions at a low output level and then gradually increasing to the level required for optimal bathymetry data collection. The multibeam power on soft start is set to -20 decibels (20 decibels lower than the full source power setting) with a 10 minute ramp up time to the normal power setting. The soft start feature keeps source levels dampened in case there are cetaceans in the immediate vicinity of the ship, and provides them with time to move away from the ship before the system operates at full power.

Because the EK60, SBP, and ADCP sonars are of lower intensity than the multibeam, and are typically run simultaneously with the multibeam, these protective measures will help avoid inadvertent exposure of marine mammals, sea turtles, and hammerhead sharks to all three sonars. 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. This approach essentially mimics the approach of the "soft-start" mode of the multibeam.

Expendable bathythermographs (XBT):

The very fine wire connecting the XBT probe to the ship is extremely easy to break by hand once the probe reaches maximum depth. The low tensile strength of the wire should represent a minimal entanglement risk for marine animals. The expended materials are unlikely to result either in any significant environmental impacts to the sea floor or in a significant degradation of marine water quality. Over a period of years, these materials would degrade, corrode, and become incorporated into the sediments.

UnderwayCTD

The *Okeanos Explorer* proposes to use the UCTD during the 2017 field seasons as much as possible as a more environmentally-friendly alternative to XBTs, since it does not leave anything

in the ocean after gathering the measurements. Given the limited duration of casts (<1 hour) entanglement risk is considered low.

The UCTD should always be nearly directly behind the ship, either freefalling, or being reeled back in. When UCTD profiling casts are conducted in deep water, the probe has its own tail spool that has hundreds of meters of line wound on to it. This tail spool allows the probe to freefall through the water column with very little drag, since it does not have to pull all the line between the probe and the ship as it falls. Once the probe is dropped off the back of the ship, all of the line on the tail spool must be paid out before it is even possible to begin rewinding the line to reel back in the probe. If a marine mammal is spotted while the probe is falling, we will still have to wait until all the line on the tail spool is paid out prior to starting recovery. Therefore once a deep water UCTD cast is started, there is really not a practicable way to make it much shorter or abort it.

If a marine mammal is spotted by the bridge while the UCTD is in the water, the ship will slow down to 3-5 knots (as possible given what the Engineering Department needs to do with the engines to make this happen), and maintain heading. The Survey Department will finish the UCTD cast as quickly as possible by rewinding the line as soon as they measure the time by which all of the tail spool line should have completed paying off the spool. Slowing the ship down and maintaining heading are the only measures practicable to minimize the risk of entanglement. We will also monitor for entanglement during probe recovery.

Split Beam Sonars:
EK60 and ADCP sonar calibration work planned near Hawaii is specifically planned for an area outside any marine managed areas, Sanctuaries, known sensitive habitats, and state waters. There are no known impacts of EK60 split-beam sonars on marine animals, and there are used routinely by NOAA to assess water column biomass.

Sub Bottom Profiler:
Marine mammal responses to the sub-bottom profiler are likely to be similar to those for other pulsed sources. The pulsed signals from the sub-bottom profiler are much weaker than those from the multibeam echosounder described above. Since they are usually operated simultaneously with other higher-power acoustic sources, behavioral responses are not expected, unless marine mammals are very close to the source. In fact, most animals will move away in response to the approaching higher-power sources or the vessel itself before being close enough for there to be the possibility of effects from the less intense sounds of the sub-bottom profiler.

ADCPs:
Both ADCP instruments on the *Okeanos Explorer* are manufactured by Teledyne RD Instruments. Teledyne has provided OER with a proprietary technical memorandum dated April 28, 2015 that provides sound pressure levels associated with their ADCP instruments. Source levels for the ADCPs are far less than the EM302 multibeam. The acoustic beams from the ADCPs are also very focused, with sound energy levels that decrease rapidly away from the main lobe of the

transducer. Given the more limited ranges, narrow beams, and sound pressure values reported for the ADCPs, they are expected to have minimal impacts on species of concern. Teledyne states that it has never received a report any marine mammals being affected by its ADCPs.

CTD and ROV Operations

The planned cruise would include the deployment of a CTD, which would be deployed over the side of the vessel with a cable, and an ROV, which would be deployed off the aft deck with a cable; creating the potential for entanglement should any animals encounter the cable or tether. However, ship officers maintain watch for and avoid protected marine species in the area during CTD and ROV operations and no deployment would occur if sea turtles, marine mammals or scalloped hammerhead sharks are within 50 yards of the vessel, and all individuals participating in the activity would closely monitor the instrument cables at all times while they are deployed. Based on these measures, and given that protected marine species would likely be widely scattered throughout the proposed areas of operation, we consider it extremely unlikely that any of those animals would come into contact with any of the cables, and have determined that the risk of entanglement would be discountable.

In Summary

In general, these scientific techniques are routinely used by NOAA. As expected for ocean research with limited duration or presence in the marine environment, this project will not have the potential for significant impacts. Knowledgeable experts, who are aware of the sensitivities of the marine environment, will conduct the at-sea portions of this project. Providing the United States, the Territory of American Samoa, and Samoa with scientifically robust and quality-controlled oceanographic data is a key benefit that will result from the cruise.

The survey activities will be localized and of short duration in any particular area at any given time. The survey also will not bring about any permanent influence on marine mammals, their habitats, or the food sources they utilize. This project will not result in any notable or lasting changes to the human environment. In sum, the survey activities are not expected to have any significant impacts of a direct or cumulative nature.

Categorical Exclusion

The geographic scope of this action is small and the temporal duration is short. It is a research project of limited size or magnitude and with only short-term effects on the environment, and for which any adverse or cumulative impacts are negligible, consistent with the class of CE in Section 6.03.c.3(a) of NOAA Administrative Order (NAO) 216-6. It does not trigger any exceptions in section 5.05c of the NAO that would require an environmental assessment or environmental impact statement.

Appendix F: ESA Section 7 LOC

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1845 Wasp Blvd., Bldg 176
Honolulu, Hawaii 96818
(808) 725-5000 • Fax: (808) 725-5215

Mr. John McDonough
Deputy Director
NOAA Office of Ocean Exploration and Research

Dear Mr. McDonough:

This letter responds to your January 14, 2016 Request for Consultation by the Office of Exploration and Research (OER) regarding efforts aboard the NOAA vessel *Okeanos Explorer* with the proposed action consisting of activities to explore and improve understanding of the distribution and diversity of deep water habitats in the Pacific, and in particular in the Marine National Monuments. You have requested our concurrence under Section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. §1531 et seq.), with your determination that the proposed action may affect but is not likely to adversely affect green, hawksbill, leatherback, olive ridley, and north Pacific loggerhead sea turtles; Main Hawaiian Islands false killer whale distinct population segment, humpback whales, blue whales, fin whales, sei whales, sperm whales, north Pacific right whales, the Indo-West Pacific and Central Pacific distinct population segment of the scalloped hammerhead shark, Hawaiian monk seals; and the coral species *Acropora globiceps,* A. *jacquelineae, A. retusa, A. speciosa, Euphyllia paradivisa, Isopora crateriformis,* and *Seriatopora aculeata.*

Proposed Action/Action Area: The proposed activity is more fully described in your request for consultation and the associated biological evaluation (CAPSTONE 2016). The proposed action (Okeanos Explorer cruises) includes the use of various ship and submersible-deployed electronic systems to collect data on the distribution and diversity of deep water habitats in the Marine National Monuments. The activity would occur during two years with up to 20 research cruises scheduled between February 2016 and December 2017. The expedition teams (26 crew and up to 20 rotating scientists and/or technicians on each cruise leg) would be authorized to conduct mapping and Remotely Operated Vehicle (ROV) surveys using the Okeanos Explorer's multibeam, split beam, subbottom profiler and acoustic Doppler current profiler (ADCP) sonar systems, utilizing the ship's conductivity-temperature-depth (CTD) sampling rosette for various water measurements and deploying an ROV. No activities are scheduled to occur on land.

The suite of sonars aboard the vessel includes a Kongsberg EM302 30 kHz multibeam system, which collect bathymetry and backscatter data; several Simrad EK 60 split-beam sonars that

range from 18 to 333 kHz which are designed to gather measurements of biological and gaseous targets in the water column; and a Knudsen 3.5 kHz chirp sub-bottom profiler. The 300 kHz and 38 kHz ADCPs provide information about current velocity and direction at various depths. Sonar mapping activities will be conducted throughout the proposed action area and during transits to and from sites where operations will be conducted in an effort to fill in gaps in data knowledge and to build on data already collected. The maps generated from these activities will improve understanding of the geology and important biological habitats in the project area.

Conductivity, temperature and depth data will be collected by both an Underway CTD and a CTD rosette instrument. The CTD rosette, which is deployed while the ship is stopped and holding dynamic position, is lowered by a winch and wire to a maximum depth of 6800 m to collect water samples through 24 2.5 L niskin bottles. The CTD rosette will be deployed at select sites where ROV operations are conducted to allow for an improved understanding of the environmental conditions at that particular site. The deployment and retrieval of the CTD rosette takes up to several hours (depending on depth), while the Underway CTD can be deployed while the ship is moving, saving hours of time and fuel. The instrument is mounted on the stern railing and outfitted with a re-useable probe that is deployed and retrieved through the use of motorized spool. The Underway CTD will be used to collect water column profiles to a maximum depth of 700 m.

ROV operations will be designed to provide interdisciplinary site characterization at priority targets in and around monuments, sanctuaries and protected areas, through visual observation of priority targets while acquiring environmental data with onboard sensors. Sampling will be focused on corals and sponges, but will target specimens believed to be new species or new records for an area. No ESA-listed corals would be sampled. As many as 200 deployments of the ROV may occur during the 2016 – 17 field season resulting in 1600 hours of total dive time. The dives will better enable scientists and managers to understand the diversity and distribution of deep water habitats.

The action area covered by the accompanying biological evaluation encompasses the marine environments of Papahānaumokuākea Marine National Monument (PMNM); Oahu and the big island of Hawai'i; the area south and west of Molokai, Lana'i, and Kaho'olawe, the Geologists Seamounts located about 100 nm south of Honolulu; the Musicians Seamounts located about 150 nm NNE of Nihoa Island; all of the Pacific Remote Island Areas composing the Pacific Remote Islands Marine National Monument (PRIMNM); the Commonwealth of the Northern Marianas Islands (CNMI) and the Marianas Trench Marine National Monument (MTMNM); the vicinity of American Samoa and the National Marine Sanctuary of American Samoa (NMSAS); the Rose Atoll Marine National Monument (RAMNM); and the vessel transit areas between Honolulu, Hawai'i, Guam, Saipan, Kwajalein, Pago Pago where ESA-listed marine species or their habitats may be impacted by the proposed activities.

Species That May Be Affected: OER determined that the proposed action may affect but is not likely to adversely affect green sea turtles (*Chelonia mydas*), hawksbill sea turtles (*Eretmochelys imbricata*), North Pacific distinct population segment of loggerhead sea turtles (*Caretta caretta*),

olive ridley sea turtles (*Lepidochelys olivacea*), leatherback sea turtles (*Dermochelys coriacea*), Main Hawaiian Islands false killer whale distinct population segment (*Pseudorca crassidens*), humpback whales (*Megaptera novaeangliae*), sperm whales (*Physeter macrocephalus*), fin whales (*Balaenoptera physalus*), blue whales (*Balaenoptera musculus*), sei whales (*Balaenoptera borealis*), north pacific right whales (*Eubalaena japonica)*, the Indo-West Pacific and Central Pacific distinct population segments of the scalloped hammerhead shark (*Sphryna lewini*), Hawaiian monk seals (*Neomonachus schauinslandi*), Hawaiian monk seal critical habitat and the coral species *Acropora globiceps, A. jacquelineae, A. retusa, A. speciosa, Euphyllia paradivisa, Isopora crateriformis,* and *Seriatopora aculeata.* Detailed information about the biology, habitat, and conservation status of sea turtles can be found in their recovery plans and other sources at http://www.nmfs.noaa.gov/pr/species/turtles/. The same can be found for Hawaiian monk seals and cetaceans at http://www.nmfs.noaa.gov/pr/species/mammals/; and more information on listed corals can be found at http://www.fpir.noaa.gov/PRD/prd_coral.html.

Critical Habitat: The proposed action would take place within designated monk seal critical habitat. Critical habitat was designated under the ESA for the Hawaiian monk seal on April 30, 1986 and revised on May 26, 1988 (53 FR 18988) and again on August 21, 2015 (80 FR 50926). Designated critical habitat includes all beach areas, lagoon waters, and ocean waters out to a depth of 200 m around Kure Atoll; Midway Islands (except Sand Island), Pearl and Hermes Reef, Lisianski Island, Laysan Island, Gardner Pinnacles, French Frigate Shoals, Necker Island, Maro Reef, and Nihoa Island, and includes the seafloor and all subsurface waters and habitat within 10 meters of the seafloor. Around the Main Hawaiian Islands, critical habitat extends in designated areas from the beach out to the 200 meter depth contour, and includes the seafloor and subsurface waters within 10 meters of the seafloor.

Analysis of Effects: In order to determine that a proposed action is not likely to adversely affect listed species, NMFS must find that the effects of the proposed action are expected to be insignificant, discountable, or beneficial as defined in the joint USFWS-NMFS Endangered Species Consultation Handbook: (1) insignificant effects relate to the size of the impact and should never reach the scale where take occurs; (2) discountable effects are those that are extremely unlikely to occur; and (3) beneficial effects are positive effects without any adverse effects (USFWS & NMFS 1998). This standard, as well as consideration of the probable duration, frequency, and severity of potential interactions, was applied during the analysis of effects of the proposed action on ESA-listed marine species, as is described in detail in the OER consultation request. The OER determined that the risk of collisions with vessels and the risk of entanglement would be discountable; and that the risk from exposure to elevated noise level, disturbance from human activity, as well as exposure to wastes and discharges would result in insignificant effects on ESA-listed sea turtles, marine mammals, sharks and corals; and that the potential effects of the proposed action to designated or proposed critical habitat would also be insignificant.

Considering the information and assessments presented in the OER consultation request, and in the best scientific information available about the biology and expected behaviors of the ESA-listed marine species considered in this consultation; NMFS agrees that: 1) the list of ESA-listed species and critical habitats potentially exposed to the effects of the action is correct, 2) the suite

of identified stressors is comprehensive, and 3) the assessment of exposure risk and significance of exposure to those stressors is accurate. Therefore, NMFS agrees that:

- the risk of collisions with vessels for marine mammals, turtles, sharks and the listed coral species in the action area is discountable;
- the risk of entanglement with marine mammals, sea turtles and sharks is discountable; and,
- ESA-listed species in the action area are unlikely to respond to anticipated elevated noise levels, disturbance from human activity, and exposure to wastes and discharges. Further, if any response were to occur, it would be temporary in nature and never reach the scale where it would affect the individual's health, and as such, have insignificant effects.

Conclusion: NMFS concurs with your determination that conducting the proposed Okeanos Explorer cruises are not likely to adversely affect ESA-listed marine species. This concludes your consultation responsibilities under the ESA for species under NMFS's jurisdiction. However, this consultation focused solely on compliance with the ESA. Additional compliance review that may be required of NMFS for this action (such as assessing impacts on Essential Fish Habitat) would be completed by NMFS Habitat Conservation Division in separate communication, if applicable.

ESA Consultation must be reinitiated if: 1) a take occurs; 2) new information reveals effects of the action that may affect listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the identified action is subsequently modified in a manner causing effects to listed species or designated critical habitat not previously considered; or 4) a new species is listed or critical habitat designated that may be affected by the identified action.

If you have further questions please contact Richard Hall on my staff at (808) 725-5018. Thank you for working with NMFS to protect our nation's living marine resources.

Sincerely,

Michael D. Tosatto
Regional Administrator

cc: Justin Rivera, Papahanaumokuakea Marine National Monument
Aaron Nadig, ESA Section 7 Program, USFWS, Honolulu

NMFS File No.: PIR-2016-9774
PIRO Reference No.: I-PI-16-1347-AG

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Campaign to Address Pacific Monument Sciecne, Technology and ocean Needs (CAPSTONE) 2016. Request for Informal Consultation. Letter from John McDonough to Ann Garrett dated January 14, 2016 and attachments.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered Species Consultation Handbook. Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act.
http://www.nmfs.noaa.gov/pr/pdfs/laws/esa_section7_handbook.pdf

Appendix G: EFH Consultation

EFH Consultation Response for CAPSTONE cruises

Richard Hall - NOAA Federal <richard.hall@noaa.gov> Wed, Nov 30, 2016 at 4:21 PM
To: Kelley Elliott - NOAA Affiliate <kelley.elliott@noaa.gov>
Cc: Ian Lundgren - NOAA Affiliate <ian.lundgren@noaa.gov>, Samantha Brooke <samantha.brooke@noaa.gov>, Kasey Cantwell - NOAA Affiliate <kasey.cantwell@noaa.gov>

Kelley,

On November 14, 2016, the Office of Exploration and Research (OER), through personal communication, initiated a request for an Essential Fish Habitat consultation for a series of cruises by the NOAA Ship *Okeanos Explorer*. The cruises would run from early-December 2016 through late-September 2017, and include the waters around the Main Hawaiian Islands, the Musician Seamounts (north of Hawaii), the American Samoa Archipelago; Johnston, Howland, Baker, Jarvis, Kingman and Palmyra Atolls of the Pacific Remote Islands, and portions of the Cook Islands. The operational minimum depth during the cruises would be 250 m, with the majority of the cruise activities would be in water depths over 500 m.

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855 et seq.) requires review of federally permitted projects for potential impacts to EFH (§305(b)). Pursuant to this authority, I have reviewed and provided comments as necessary for the Habitat Conservation Division of NOAA's Pacific Islands Regional Office.

The proposed cruises are the final legs of the larger 2-year Campaign to Address Pacific Monuments Science, Technology and Ocean Needs (CAPSTONE Project), which is designed to improve the understanding of the distribution and diversity of deepwater habitats within the Pacific monuments and protected areas.

The primary activities to be conducted during this series of cruises would be: remotely operated vehicle (ROV) dives to conduct engineering trials and sonar calibration and testing during two shakedown cruises scheduled for the waters of the Main Hawaiian Islands (no biological or geological samples would be collected); and mapping and ROV dives in the waters of American Samoa, West Samoa, the Pacific Remote Islands, the Musician Seamounts, and portions of the Cook Islands. Five cruises would be dedicated mapping cruise, resulting in 92 days of constant mapping, while six cruises would be combined ROV and mapping cruises which would result in approximately 96 ROV dives and 110 days of overnight mapping. Other activities to be performed during the cruises would include: deployment and recovery of a conductivity-temperature-depth (CTD) sampling rosette and underway CTDs, and possible deployment of Argo floats to acquire ocean chemistry data. During ROV dives various biological and geological samples would be collected.

In order to avoid/minimize impacts to EFH, the OER and the *Okeanos Explorer* have proposed to institute the following procedures:

- The vessel would employ the use of dynamic positioning during ROV dives (no anchoring);
- 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 confirm that the area is sand, mud, or hard-bottom;
- Sample collections would be limited (typically 4 - 6 total rocks and primary biological specimens per dive) that represent new species, new records, or the dominant morphotype animal in a community. Clonal biological specimens (corals, sponges) would be subsampled; and
- Instruments deployed to collect water samples and current data (except for expendable instruments) would not be allowed to contact the seafloor;

In addition to the management practices proposed by OER and the *Okeanos Explorer*, NMFS provides the following guidance to further avoid/minimize impacts to EFH from the proposed cruise activities and vessel operations:
1. Except in an emergency, the vessel should not anchor while at sea;
2. The vessel should adhere to MARPOL discharge regulations at all times during the proposed cruises;
3. The ROV should be thoroughly rinsed between dives, allowed to dry, and checked for the presence of biological

organisms to prevent the spread of invasive or non-endemic species from one location to another.
4. The use detergents and other pollutants which may be washed into the marine environment should be avoided or held to a minimum;

Based on my review of the documents provided, and through our personal communications, NOAA Fisheries has determined that the proposed cruises of the NOAA Ship *Okeanos Explorer* would not adversely affect EFH provided adherence to OER proposed procedures and the NMFS guidance made above. Thank you for the opportunity to review the plans for the upcoming field season of the *Okeanos Explorer*, and to provide our comments. This completes your obligation to consult with our office with regards to EFH for this series of actions. If you have any questions or comments feel free to contact me at your convenience.

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Appendix H: NASA Maritime Aerosols Network Survey of Opportunity

Survey or Project Name

Maritime Aerosol Network

Lead POC or Principle Investigator (PI & Affiliation)

POC: Dr. Alexander Smirnov

Supporting Team Members Ashore

Supporting Team Members Aboard (if required)

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: Data Management Plan

Data Management Plan
Okeanos Explorer (EX1702): Vicinity of American Samoa (ROV/Mapping)

OER Data Management Objectives

Test, refine, and document the newest requirement updates to the Sampling Operations Database Application (SODA) and the onboard sampling protocol updates. Monitor data pipelines for first FY17 ROV mission, making any needed adjustments as necessary.

1. General Description of Data to be Managed

1.1 Name and Purpose of the Data Collection Project

Okeanos Explorer (EX1702): Vicinity of American Samoa (ROV/Mapping)

1.2 Summary description of the data to be collected.

Operations will include the use of the ship's deep water mapping systems (Kongsberg EM302 multibeam sonar, EK60 split-beam fisheries sonars, Knudsen 3260 chirp sub-bottom profiler sonar, and Teledyne Acoustic Doppler Current Profilers), XBT and Underway CTD casts in support of multibeam sonar mapping operations, OER's 6000 m two-body ROV Deep Discoverer and Seirios, and the ship's high-bandwidth satellite connection for continuous real-time ship-to-shore communications.

1.3 Keywords or phrases that could be used to 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, American Samoa, Samoa, Rose Atoll, Malulu Seamount, Vailulu'u Seamount, South Bank, East Bank, Tutuila Island, Upolo Island, Papatua, National Marine Sanctuary of American Samoa, Rose Atoll Marine National Monument, Ta'u Unit, Pago Pago, Apia, Prime Crust Zone, deep sea minerals, habitat surveys, deep sea coral and sponge communities, Central Pacific Seamounts, plate techtonics, subduction zone biology, subduction zone geology, biogeographic patterns, CAPSTONE, Campaign to Address Pacific monument Science, Technology, and Ocean Needs

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

Okeanos ROV Cruises

1.5 Planned or actual temporal coverage of the data.

Dates: 2/16/2017 to 3/2/2017

1.6 Planned or actual geographic coverage of the data.

Latitude Boundaries: -16.6 to -13.4

Longitude Boundaries: -172.3 to -165.2

1.7 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, ADCP, Bottom Backscatter, CTD (processed), CTD (product), CTD (raw), Dive Summaries, EK60 Singlebeam Data, Expedition Cruise Report, HDCS, Highlight Video, Images, Mapping Summary, Multibeam (image), Multibeam (processed), Multibeam (product), Multibeam (raw), NetCDF, Raw Video (digital), Raw Video (physical), Salinity data, Sample Logs, SCS Output (compressed), SCS Output (native), Selected Raw Video, Sub-Bottom Profile data, Temperature data, Water Column Backscatter, XBT (raw)

1.8 What platforms will be employed during this mission?

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

2. Point of Contact for this Data Producing Project

Overall POC:	Kelley Elliott, NOAA Office of Ocean Exploration and Research, kelley.elliott@noaa.gov
Title:	Expedition Coordinator
Affiliation/Dept:	NOAA Office of Ocean Exploration and Research
E-Mail:	kelley.elliott@noaa.gov
Phone:	(301) 734-1024

3. Point of Contact for Managing the Data

Data POC Name:	Andrew O'Brien, Jonathan Jackson, Susan Gottfried
Title:	Onboard Data Manager, Sample Data Manager, Stewardship Data Manager
E-Mail:	andrew.obrien@tgfoe.org, jonathan.jackson@noaa.gov, susan.gottfried@noaa.gov

4. Resources

4.1 Have resources for management of these data been identified? True

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

unknown

5. Data Lineage and Quality

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

SCS data shall be delivered in its native format as well as an archive-ready, documented, and compressed NetCDF3 format to NCEI-MD; multibeam data and metadata will be compressed and delivered in a bagit format to NCEI-CO

5.2 What quality control procedures will be employed?

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

6. Data Documentation

6.1 Does the metadata comply with the Data Documentation Directive? True

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

not applicable

6.2 Where will the metadata be hosted?

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

URL: https://www.ncddc.noaa.gov/oer-waf/ISO/Resolved/2017

Meta Std: ISO 19115-2 Geographic Information with Extensions for Imagery and Gridded Data will be the metadata standard employed; a NetCDF3 standard for oceanographic data will be employed for the SCS data; the Library of Congress standard, MAchine Readable Catalog (MARC), will be employed for NOAA Central Library records.

6.3 Process for producing and maintaining metadata:

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

7. Data Access

7.1 Do the data comply with the Data Access Directive? True

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

Not Applicable

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

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

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

Org: National Centers for Environmental Information

URL: https://explore.noaa.gov/digitalatlas

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

Hold Time: not applicable

Authority: not applicable

7.4 Prepare a Data Access Statement

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

8. Data Preservation and Protection

8.1 Actual or planned long-term data archive location:

Data from this mission will be preserved and stewarded through the NOAA National Centers for Environmental Information. Refer to the Okeanos Explorer FY16 Data Management Plan at NOAA's EDMC DMP Repository (EX_FY16_DMP_Final.pdf) for detailed descriptions of the processes, procedures, and partners involved in this collaborative effort.

8.2 If no archive planned, why?

Okeanos Explorer (EX1702): Vicinity of American Samoa (ROV/Mapping)

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

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

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

8.5 Prepare a Data Use Statement

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

Appendix J:

EMERGENCY CONTACT DATA SHEET–NOAA SHIP *OKEANOS EXPLORER*

Scientists sailing aboard *Okeanos Explorer* should fill out the form found at the following link location: https://docs.google.com/a/noaa.gov/forms/d/1pcoSgPluUVxaY64CM1hJ75l1iIYirTk48G-lv37Am_k/viewform with their emergency contact information