SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT
For
Deep Sea Research within the Northwestern Hawaiian Islands

Papahānaumokuākea Marine National Monument
Northwestern Hawaiian Islands
Hawai‘i

National Oceanic and Atmospheric Administration
National Ocean Service, Office of National Marine Sanctuaries

September 2015

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EXECUTIVE SUMMARY

This Supplemental Environmental Assessment (SEA) was prepared in accordance with the National Environmental Policy Act of 1969 (42 U.S.C. § 4321, *et seq*.), as implemented by the Council on Environmental Quality regulations (40 Code of Federal Regulations Parts 1500-1508), and National Oceanic and Atmospheric Administration (NOAA) Administrative Order (NAO) 216-6, which describes NOAA policies, requirements, and procedures implementing NEPA.

In 2014, NOAA's Office of National Marine Sanctuaries (ONMS) proposed to issue two permits; one research permit to Florida State University (FSU) to conduct deep-sea marine research and one conservation and management permit to the University of Alaska – Fairbanks (UAF), School of Fisheries and Ocean Sciences, Seward Marine Center allowing vessel operations to support the aforementioned FSU deep sea research. The UAF operated vessel, R/V *Sikuliaq* would provide transportation for research teams working on permitted projects within Papahānaumokuākea Marine National Monument (PMNM or Monument). Researchers aboard this vessel would also have access to the Autonomous Unmanned Vehicle (AUV) *Sentry* for underwater survey work.

In an effort to enhance these originally proposed research activities and ensure continuity of vessel support ONMS proposes to issue one permit amendment and one new permit ("Proposed Action"). ONMS would amend a research permit to Florida State University (FSU) to extend the depths at which surveys would be conducted to 200 – 700 m and deploy additional instruments attached to a lander at depths between 300 – 700 m, which would stay in place on site and be recovered one year later (in 2016). In addition, one conservation and management permit would be issued to the University of Hawaii Marine Center (UHMC) to conduct vessel operations in support of the aforementioned FSU deep sea research. The UHMC operated vessel, R/V *Kilo Moana* would provide transportation for research teams working on permitted projects within Papahānaumokuākea Marine National Monument (PMNM or Monument).

The purpose of the Proposed Action is to satisfy the Findings of Presidential Proclamation 8031 which authorizes research and conservation and management activities in the Monument designed to enhance understanding of Monument resources and improve resource management decision making (Monument Management Plan, 2008). The Proposed Action is necessary to support research operations that would provide for a better understanding of the deep-sea biota within the Monument through collection of new records and new species and bathymetric habitat mapping. In addition this research would provide more insight into the impacts of trawling and the recovery potential for deep-sea coral and sponge bed communities. This information would allow for better management of deep water areas within the PMNM.

The Proposed Action would not result in impacts on the following resource categories: terrestrial biological resources, soils and topography, land use, traffic, air quality and ambient noise, visual resources, natural hazards, and utilities and other infrastructure. The Proposed Action would not result in significant impacts to marine biological resources, cultural resources, physical conditions (water quality and air quality), solid waste, marine traffic, and hazardous and regulated materials. The Proposed Action would not create environmental health and safety risks that may disproportionately affect children and minority or disadvantaged populations, and would not result in significant cumulative impacts to any environmental resource category.

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ACRONYMS AND ABBREVIATIONS

AUV	Autonomous Underwater Vehicle
CTD	Conductivity, Temperature, Depth
CFR	Code of Federal Regulations
dB	Decibels
EFH	Essential Fish Habitat
EO	Executive Order
FSU	Florida State University
ft	Feet
HAR	Hawai‘i Administrative Record
Hz	Hertz
HDOH	Hawai‘i Department of Health
kHz	Kilohertz
lbs	Pounds
m	Meter(s)
µP	Micropoise
mm	Millimeters
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NWHI	Northwestern Hawaiian Islands
PMNM	Papahānaumokuākea Marine National Monument
Proclamation	Proclamation 8031
R/V	Research vessel
ROV	Remotely Operated Vehicle
SWATH	Small Waterplane Area Twin Hull
SPA	Special Preservation Area
spp.	Species (plural)
SL	Source levels
UHMC	University of Hawaii Marine Center
U.S.	United States
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service

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1.0 PURPOSE AND NEED FOR ACTION

1.1 Summary of Proposed Action

The National Oceanic and Atmospheric Administration (NOAA) proposes to issue one permit amendment and one new PMNM permit. ONMS would amend the research permit issued to Florida State University (FSU), PMNM-2014-028, to extend the depths at which surveys would be conducted to 200 – 700 m and deploy additional instruments attached to a lander at depths between 300 – 700 m, which would stay in place on site and be recovered one year later (in 2016). ONMS would also issue one conservation and management permit to the University of Hawaii Marine Center (UHMC) for operation of the Research Vessel *Kilo Moana* to allow vessel support operations for the aforementioned research activities within PMNM. The Proposed Action remains part of the originally proposed Phase one portion of proposed research activities and is designed to conduct broad surveys and identify areas where corals occur at each of the target sites. Phase two, would allow permittees to return to the identified sites with a Remotely Operated underwater Vehicle (ROV) to collect specimens and additional video data. The captain and crew of the R/V *Kilo Moana* would provide the support platform as well as multi-beam mapping system to support the proposed project. Both the permit amendment and new permit would be issued for a period of one year, scheduled to end on September 30, 2016. Phase one consists of all previously permitted and analyzed activities and the deployment of additional instruments attached to a lander which would stay in place on site and be recovered one year later (in 2016).

This analysis focuses on (1) proposed amendment to extend the depths at which surveys would be conducted to 200 – 700 m; (2) the newly proposed instrument deployments using a lander to secure the instruments in place for a one year period; and (3) operation of R/V *Kilo Moana in support of separately permitted activities to conduct the proposed deepsea research*.

Purpose and Need

<u>Purpose</u>

The purpose of the Proposed Action is to conduct research on select areas within PMNM to characterize the sea floor to better understand deep sea resources and their recovery rates from the effects of trawling. Such research would ultimately enhance scientists' understanding of Monument resources and improve resource management decision making (Monument Management Plan, 2008).

<u>Need</u>

The need for the Proposed Action is based on the PMNM permit requirements as set forth in Presidential Proclamation 8031, which necessitates a PMNM permit for all activities with limited exceptions. The Proposed Action is necessary to provide access to PMNM marine areas of depths ranging from 200 – 700 m and deployment of a lander for a one year period (October 2015 – October 2016). This activitiy supports research operations that would provide for a better understanding of the deep-sea biota within the Monument through collection of new records and new species and bathymetric habitat mapping and information on recovery potential of habitat and species in these deeper areas from trawling. In addition this research would provide more insight into the impacts of trawling and the recovery potential for deep-sea coral and sponge bed communities. This information would allow for better management of deep water areas within the PMNM.

1.2 Background

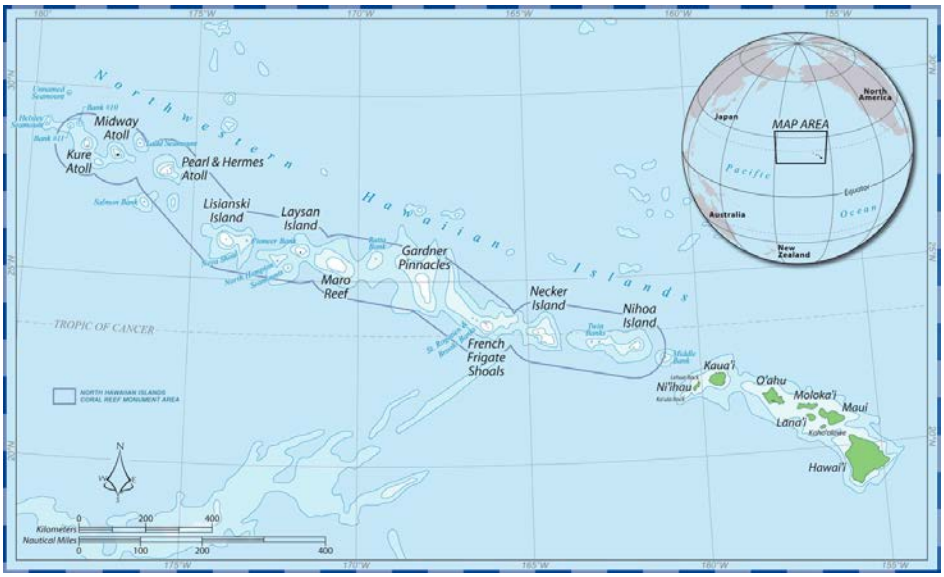
Papahānaumokuākea Marine National Monument (PMNM) – Regulatory Environment

The purposes and management regime for the Monument, as well as restrictions and prohibitions regarding activities in PMNM, are set forth in the Proclamation 8031 (71 Federal Register 36443, June 26, 2006) (Proclamation). Activities within the PMNM are subject to permit approval by the Monument Co-Trustees which include: NOAA National Ocean Service, USFWS Hawaiian and Pacific Islands National Wildlife Refuge Complex, and State of Hawai‘i Department of Land and Natural Resources. All Federal permits including PMNM permits are subject to National Environmental Policy Act (NEPA) compliance. Proposed activities that impact State jurisdiction may also be subject to State of Hawaii, Hawaii Revised Statutes 343 environmental review. The Proposed Action would be conducted in federal waters both in and around the Monument.

According to NAO 216-6, the purpose for a Supplemental Environmental Assessment (SEA) is to determine whether significant environmental impacts could result from a Proposed Action. An SEA is appropriate where environmental impacts from the Proposed Action are expected, but it is uncertain that those impacts would be significant. Specific factors that the PMNM believe are relevant include the potential effects of the proposed research on unique characteristics of this geographic region. For a comprehensive description of the background of the Proposed Action, inclusive of all previously analyzed activities, refer to the Environmental Assessment for Papahānaumokuākea Marine National Monument dated October 2014.

All previously permitted research activities, co-led by Dr. Baco-Taylor and Dr. Brendan Roark were analyzed in the October 2014 Environmental Assessment for Papahānaumokuākea Marine National Monument, which is incorporated in this document by reference. Deployment of additional instruments using a lander to secure for a period of one year and the use of the R/V *Kilo Moana* as the support vessel on which research activities would be conducted in the Monument is analyzed further in this SEA.

Figure 1-1 Map of Papahānaumokuākea Marine National Monument, Hawai‘i



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2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVE

2.1 Introduction

This document provides analyses and supporting documentation for the agency to determine whether a Finding of No Significant Impact is warranted. To make this determination, two alternatives are being considered: (1) not issuing a new PMNM permit and permit amendment to conduct proposed research activities (no action alternative) or (2) issuing a new PMNM permit and permit amendment to conduct research activities using a lander in deeper depths for a year to better understand the effect of trawling within PMNM (Proposed Action – preferred alternative). This chapter presents a discussion of the Proposed Action, No Action Alternative, and a summary of environmental effects. The Proposed Action and the No Action Alternative are analyzed in terms of how well they meet the purpose and need of the project, as described in Chapter 1.

The PMNM permit process considers a range of conditions and ways to mitigate effects (e.g., timing, location, methods, and materials) and, where warranted, special terms and conditions are placed on PMNM permits, prior to issuance to ensure protection of natural and cultural resources within PMNM. Special terms and conditions inherently evaluated in this document under the Proposed Action are discussed throughout and include, but are not limited to, actions that would mitigate potential impacts to endangered species and the environment during vessel and research operations.

2.2 Description of Proposed Action and Alternative

Proposed Action

NOAA's Office of National Marine Sanctuaries (ONMS) proposes to issue one research permit amendment to PMNM-2014-028, to extend the depths at which surveys would be conducted to 200 – 700 m and deploy additional instruments attached to a lander, within a depth range of 300 – 700 m, which would stay in place at the deployment site and be recovered one year later (in 2016); and one conservation and management permit to the University of Hawaii Marine Center (UHMC) for operation of the Research Vessel *Kilo Moana* to allow vessel support operations for the aforementioned research activities within PMNM. Objectives of the research activities that would be authorized by the Proposed Action include underwater surveys and vessel support operations onboard R/V *Kilo Moana,* including multibeam mapping and water sampling. All activities, including multibeam mapping and water sampling activities were previously analyzed in an Environmental Assessment for Papahānaumokuākea Marine National Monument dated October 2014 and therefore are not further analyzed in this document.

R/V *Kilo Moana*

The UHMC operates the R/V *Kilo Moana,* a 186 ft small waterplane area twin hull (SWATH) oceanographic research vessel owned by the U.S. Navy. It can accommodate up to 28 scientists and technicians and 20 crewmembers. The ship was designed as a multi-purpose oceanographic research vessel with extensive equipment for geophysical (2 multibeam ecosounders, subbottom profiler, gravimeter and magnetometer), physical oceanographic (Doppler current profilers, CTDs, pCO2); meteorological and radioisotope research. The ship is equipped with eight different laboratories and over 4,000 sq. ft. of exterior working space. It also has an incinerator for burning trash, but would not use the incinerator while

operating within PMNM boundaries. This requirement would be a condition of the proposed PMNM permits. The ship has a dedicated series of saltwater ballast tanks along with an IMO approved ballast water treatment system, but no de-ballasting operations would take place within PMNM boundaries.

Vessel anchoring has the potential to impact the ecosystem depending on several factors, such as size of the ship or vessel, anchor system, weather conditions, and the location and vicinity of the anchorage relative to sensitive ecosystems (e.g. coral reefs). Anchors and chains can destroy coral and live rock affecting fishes, other benthic organisms and their habitat. The R/V *Kilo Moana* would only anchor in emergency situations and efforts would be made to drop anchor in areas that are free of coral. While there is no intention on the part of the permit applicants to anchor the R/V *Kilo Moana* and its small vessels, the restrictions on anchoring within PMNM would be a condition of the proposed PMNM permits.

The R/V *Kilo Moana* would be required to obtain a hull and rat inspection prior to entering the Monument and certificates of completion must be provided to the PMNM permit coordinator, as conditions in each PMNM issued permit.

The Marine Sanitation Device (MSD) aboard R/V *Kilo Moana* is an Orca II, Type II MSD. Solids are filtered and eliminated through a biological process within the sewage treatment tank and solids separation via the MSD. The sewage holding tank aboard R/V *Kilo Moana* is 1,800 gallons and is generally pumped once a day. All sewage would be treated and the grey water retained until at a minimum of 3 nm from all PMNM Special Preservation Area (SPA) boundaries. As a result of the sewage treatment system and the ship's routine maintenance schedule, potential for accidental spills and or discharge would be minimized.

The ship's fuel capacity is ~130,000 gallons with a range of 50 days at sea. The ship uses low sulfur diesel as required to meet Environmental Protection Agency Tier II emissions of the diesel generator engines. The ship has six (6) fuel storage tanks and two (2) day tanks onboard, for the emergency generator and the incinerator. The largest storage tank is 23,015 gallons and the smallest is 4,019 gallons and the other tanks range between those two extremes. The ship is constructed with a double bottom so none of the fuel (or any polluting liquids) are next to the skin of the ship. The ship's fuel storage system is designed to minimize potential for discharge.

The ship would carry up to 3,421 gallons of lubrication oil via two separate storage tanks for engines and Z-drives as they use different grade oils). Hydraulic fluid would be kept in drums within the spaces where the hydraulic power unit is located. These oils and fluids are kept in the designated holding tanks located in the engine room. There are no lube oil changes scheduled during the project period therefore R/V *Kilo Moana* would generate less than one gallon of oil per day. Used oil is stored in a designated labeled drum until return to port. Excess oils from maintenance and repairs are cleaned up with cloth rags and/or oil absorbent pads, which would be or stored and disposed of ashore.

Although an oil spill at sea is unlikely, the crew would address the spill in accordance with the U.S. Coast Guard (USCG) Non Tank Vessel Response Plan, USCG #47001 and Shipboard Oil Pollution Emergency Plan. In the case of a hazardous material spill, the crew would follow procedures described in the Safety Management System Manual.

R/V *Kilo Moana* is equipped with a Conductivity, Temperature, Depth (CTD) rosette and current meter with the same specifications as was analyzed in the an EA for PMNM dated October 2014 and therefore is not further discussed in this document.

Kongsberg Multi-beam system onboard R/V *Kilo Moana*

R/V *Kilo Moana* is equipped with two Kongsberg multi-beam systems onboard that use active sonar to map the depth and contours of the sea floor (bathymetry). The two systems are the Kongsberg EM710 (for shallower depths) and Kongsberg EM122 (for deeper depths), which operate at frequencies of 70-100 kilohertz (kHz) and 30 kHz, respectively, and typical source levels (SL) of 229 decibels (dB) re 1 micropoise (µP), respectively. These multi-beam systems are identical in capacity and functionality as those onboard the R/V *Sikuliaq,* and were previously described and analyzed in the original EA for PMNM completed in October 2014. As such, the multi-beam systems are not further analyzed in this document.

Autonomous Underwater Vehicle (AUV) *Sentry*

The AUV *Sentry* and its proposed research use was described and analyzed in the original EA completed in October 2014 and therefore is not further discussed in this document.

NOAA Deep-sea Coral Lander & Instrumentation

A NOAA deep-seal coral lander (shown in Appendix 1) would be constructed and deployed near Pioneer Bank within PMNM for a period of approximately one year. The footprint of the lander would be 1 meter on each of the four sides. The lander would contain CTD, oxygen, chlorophyll, turbidity, current velocity and direction, a sediment trap, as well as settling plates to enable larval recruitment to occur during the one year deployment. A deep marker beacon would be attached to the lander to allow researchers to locate the lander upon recovery. Weights and floatation devices would also be attached to the lander to ensure the lander stays in place during the duration of its deployment as well as successful recovery. Prior to launch, researchers would conduct photo surveys of the site with the AUV *Sentry* to determine the appropriate site upon which to deploy the lander ensuring avoidance of deep sea coral colonies and maximum protection of the seafloor habitat. The lander would be deployed from the ship and placed on the seafloor using a weight tension release system and winch. During recovery of the lander the ROV *Jason II* would be used to release the lander unit from the weights allowing the unit to float to the surface. Each component of the lander and attached instruments are described below.

Lander & acoustic release

The lander would include approximately 9 glass spheres with plastic hardhats or syntactic foam used as a floatation device. The frame is constructed using aluminum piping and is square shaped and 1 m in length all sides. One steel plate, identical to the AUV *Sentry* ascent wieight, which was previously analyzed in the EA for PMNM dated October 2014, would be used and ballasted on the seafloor upon ascent and recovery of the lander.

The weight is composed of:

- 4x Alvin plates
- 1x galvanized steel eyebolt with shoulder and nut: 3.25” x ½” - 13 thread

- 1x stainless steel shackle: ¼”
- 1x galvanized steel washer: ½”
- 1x wire rope lanyard: 1/8” in diameter, 12” long, galvanized steel, looped and crimped at both ends

The Deep Marker Beacon Sonardyne Type 7835 is a positioning transponder that allows subsea devices to be uniquely acoustically marked for up to 4.5 years. This unit passively listens and can respond to defined frequencies allowing for the determination of the units range and direction. The unit operates at a frequency of 35 to 55 kHz and source levels of 183-186 dB. The ROV *Jason II* will be used to locate the lander in 2016. This device is powered by an Alkaline battery pack (7835-000-01) and the entire device is encased in stainless steel and long term galvanic corrosion is minimized by incorporated zinc anodes.

CTD, Oxygen, Current velocity & direction device

The Seaguard II Platform with a multi-group recorder including four analog and 20 AiCaP sensor inputs with 2 GB SD storage cards and a Lithium battery (7V/35Ah) would be attached to the lander. The four analog sensor inputs are: (1) conductivity and temperature sensor, (2) Oxygen Optode MkII IW AiCaP smark sensor, (3) Depth AiCAP smart sensor, and (4) WET Labs Environmental Characterization Optics fluorometer (ECO FLNTU) would be plugged directly into Seaguard II Platform housing. This instrument serves as a data logger and power source for a series of smart sensors that are connect directly or by cable to the Seaguard II Platform housing, of which is connected directly to the lander.

A deepwater DCPS 600 kHz 3D Broadband acoustic doppler current profiler sensor would be part of the Seaguard II Platform. This acoustic pofiler operates at a frequency of 600 kHz with ping rates of up to 10 Hz. Acoustic measurements would occur every 4-6 hours with short periods of pings lasting less than three minutes per occurrence. When the doppler recorder is not in use, it would be in sleep mode and no noise emission would occur. The entire system is encased in Titanium and stainless steel to minimize leakage and corrosion.

Larval Recruiting Panels

These settlement frames are composed of a frame (35 x 35 x 35 cm) made of plastic (3 cm diameter) with mild steel feet (to enable welding). Each frame has nine blocks made of 3 different materials (plastic, carbonate (stone) and green scrubby) and each block measures either 4 x 4 x 4 or 5.6 x 5.6 x 5.6 cm, secured to the frame using a nylon threaded rod and nylon nuts. A block of wood slats (5 x 3 x 20 cm) is attached lengthwise onto a side of the frame using a nylon rod. The different materials represent the different type of habitats (e.g., carbonate rocks) or structures (plastics) that larvae may recruit to.

<u>Remotely Operated Vehicle</u>

No Remotely Operated Vehicles (ROV) are currently proposed for use during Phase One. An ROV would be used during Phase Two of this research project and currently the ROV *Jason II* is the vessel identified for use. While Phase Two has not been proposed nor permitted for access to PMNM, the ROV *Jason II* is analyzed below as a part of the above referenced recover efforts of the lander as well as the anticipated survey efforts that would be proposed under Phase Two of this research activity.

The ROV *Jason II* is a two-part remotely operated submersible vehicle (ROV) system that can dive up to 6,500 m below the ocean's surface. The system consists of the vehicle and launching garage (aka, Medea), a winch/A-frame unit, and the associated power and control consoles. The ROV is ballasted with syntactic foam and attached lead blocks. Both types of ballast are fixed to the vehicle and are not released. No liquid ballast is used. The compact hydrodynamic design and neutrally buoyant tether cable allow close up inspections with a high degree of maneuverability. From Medea a cable runs up to a winch on the ship, securing the Medea and ROV *Jason II*. The ROV unit is controlled in real time by researchers in a control room on the ship's deck. The ROV *Jason II* has a Teledyne Reson SeaBat 7125 multibeam sonar that operates at a frequency range of 200 kHz – 400 kHz with maximum ping rates of up to 50 Hz and beam widths measuring at -3 dB. The purpose and use of the ROV *Jason II* is currently not known and therefore cannot be further analyzed at this time.

In preparation for any research cruise, the maintenance crews would wash the ROV with fresh water and Simple Green™ prior to departure and again following any maintenance onboard the R/V *Kilo Moana*.

Project Locations

Figure 2-1 Project Locations Map

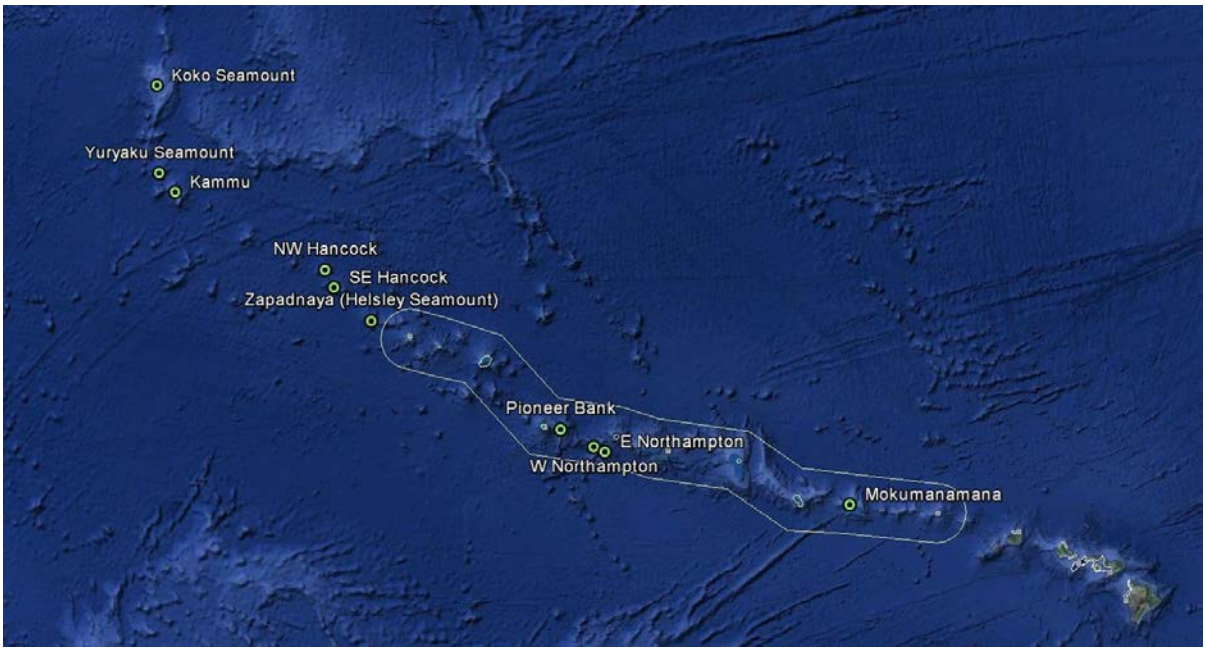

Figure 2-2 Project Location Coordinates

Feature Name	Lat N	Long E/W	*Last Year Trawled	Coral Observations
Koko Smt	35 15.0	171 35.0	Ong	ns
Yuryaku Smt	32 40.2	172 16.2	Ong	ns
Kammu	32 10.0	173 00.0	Ong	ns
NW Hancock	30 16.2	178 43.2	1986 - ong	ns
SE Hancock	29 47.4	179 04.2	1986	ns
Zapadnaya	28 54.0	-179 36.0	1977	Yes
Pioneer Bank	26 00.0	-173 26.0	Never	Yes
W Northampton	25 30.6	-172 24.6	Never	ns
E Northampton	25 22.2	-172 04.2	Never	ns
Mokumanamana	23.576	-164 70.2	Never	ns

All positions from SBN earthref.org. *NOAA Report (2008), ong = ongoing. ns = not surveyed on previous explorations for precious corals in the NWHI.

Table 2-1 Vessel Specifications

Facility	Specifications	
R/V *Kilo Moana*	Built: 2002 Ownership: U.S. Navy Length (overall): 186 ft Beam (max across reamer): 88 ft Draft: 25 ft (Max) 23 in (Min) Gross Tonnage: 3,060 tons Displacement: 2,542 tons Speed: Cruising 12 knots; Full 15 knots; Minimum <1 knot Range: 50 days Fuel Capacity: 130, 000 gallons Endurance: 50 days (food and fresh water)	
ROV *Jason II*	Length: 3.4 meters Width: 2.2 meters Height: 2.4 meters Life Support: Max Operating Depth: 6,500m Max Transit Speed: 1 knot (slower when sampling occurs) Descent/Ascent Rate: 30 m/min Sonar: Teledyne Reson SeaBat 7125 multibeam Sonar frequency range: 200 – 400 kHz	

No Action Alternative

Under the No Action alternative, the activity would not occur. As a result, the permit amendment request to PMNM-2014-028 issued to Dr. Amy Baco-Taylor of the Florida State University and issuance of a separate permit for support vessel services to Mr. Ross Barnes of the University of Hawaii would be denied.

A research or conservation and management permit denial would be based on applicants inability to meet the Findings as defined in PMNM regulations 50 CFR Part 404.11, for the Proposed Action. Per PMNM regulations, to issue a permit, an applicant must provide information to demonstrate the following: (1) the activity can be conducted with adequate safeguards for the resources and ecological integrity of the Monument; (2) the activity will be conducted in a manner compatible with the purposes of the Proclamation, considering the extent to which the conduct of the activity may diminish or enhance Monument resources, qualities, and ecological integrity, any indirect, secondary or cumulative effects of the activity, and the duration of such effects; (3) there is no practicable alternative to conducting the activity within the Monument; (4) the end value of the activity outweighs its adverse impacts on Monument resources, qualities, and ecological integrity; (5) the duration of the activity is no longer than necessary to achieve its stated purpose; (6) the applicant is qualified to conduct and complete the activity and mitigate any potential impacts resulting from its conduct; (7) the applicant has adequate financial resources available to conduct and complete the activity and mitigate any potential impacts resulting from its conduct; (8) the methods and procedures proposed by the applicant are appropriate to achieve the proposed activity's goals in relation to their impacts to Monument resources, qualities, and ecological integrity; (9) the applicant's vessel has been outfitted with a mobile transceiver unit approved

by NOAA's Office of Law Enforcement (OLE) and complies with the requirements of 50 CFR Part 404.5; and (10) there are no other factors that would make the issuance of a permit for the activity inappropriate.

Under this alternative, the activity described in this document would not be carried out within PMNM. No additional scientific information would be collected and no new and potentially beneficial knowledge on NWHI ecology would be gained.

3.0 AFFECTED ENVIRONMENT

3.1 Overview

This chapter describes the environmental setting and baseline conditions of the environmental resources within and adjacent to the project location. The Proposed Action has potential to impact marine biological resources, cultural resources, physical conditions (water and air quality), solid waste, marine traffic, and hazardous and regulated materials. These resource categories are described here and carried through the impact analysis presented in Chapter 4.0. Preliminary project screening indicated that the Proposed Action would not affect many of the resources typically addressed in NEPA impact documents. These resources are described here, but not carried through the impact analysis.

Terrestrial Biological Resources, Soils and Topography – There are no terrestrial or coastal components to the Proposed Action and therefore no impacts to terrestrial biological resources or impacts to soils and topography are anticipated.

Land Use – There are no terrestrial or coastal components to the Proposed Action and no impacts or conflicts involving land use are anticipated.

Noise – No impacts to ambient noise are anticipated as a result of the Proposed Action, except for minimal boat motor noise.

Visual Resources – There are no surface or land-based components to the Proposed Action that would impact the aesthetics or visual appearance of the PMNM.

Natural Hazards – The Proposed Action would not impact, induce, or intensify the natural potential for flooding, erosion, earthquake, volcanic, or hurricane activities within the PMNM.

Utilities and Other Infrastructure – The Proposed Action would not result in the construction of utilities or permanent infrastructure in the PMNM.

These resources would not be impacted by the No Action Alternative.

The following sections briefly describe the resource categories analyzed under this SEA. Complete descriptions of each of the resource categories can be found in the Environmental Assessment completed in October 2014, which is incorporated by reference.

3.2 Marine Biological Resources

PMNM encompasses an area of approximately 139,797 square miles (362,075 square kilometers),spans a distance of approximately 1,200 miles and includes islands, coral atolls, seamounts, banks, and shoals. This diverse ecosystem is home to many species of coral, fish, birds, marine mammals, and other flora and fauna, including the endangered Hawaiian monk seal, the threatened green turtle, and the endangered leatherback and hawksbill turtles. The area is also rich in history and represents a place of great cultural significance to Native Hawaiians.

R/V *Kilo Moana* would provide transportation for research teams working on permitted projects within PMNM. Researchers aboard this vessel would also have access to the AUV *Sentry* for underwater work. Vessel and AUV operations to survey the seafloor would be conducted at depths of between 200 – 700 m. The descriptions of these target islands below are summarized from the Papahānaumokuākea Marine National Monument Final Management Plan (2008), which is incorporated by reference.

The Northwestern Hawaiian Islands (NWHI)

The NWHI can be characterized as a large marine and terrestrial ecosystem exposed to a wide range of oceanographic conditions and environmental and anthropogenic stressors. The following paragraphs provide descriptions of important marine biological resources for the northern islands and atolls in the NWHI occur near the target sites of the Proposed Action.

Maro Reef (Koʻanakoʻa)

Maro Reef is a submerged open atoll with less than one acre of emergent land. The shallow water reef ecosystem covers nearly half a million acres and is the largest coral reef in the NWHI. It is biologically rich with 95 percent coral cover in some areas, one of the highest observed in the NWHI. Because of Maro's structural complexity, the shallow reef is poorly charted and has been largely unexplored.

Laysan Island (Kauō)

Laysan is the second largest island in the NWHI, with approximately 915 land acres. Laysan is surrounded by 100,000 acres of coral reef. The land cover of Laysan consists of vegetation and sandy dunes including a 100-acre hypersaline lake (one of only five natural lakes in Hawaiʻi). About two million birds nest here – boobies, frigate birds, terns, shearwaters, noddies, albatrosses – as well as the endangered Laysan duck (*Anas laysanensis*) and finch (*Telespyza cantans*).

Lisianski Island (Papaʻāpoho)

Lisianski Island, the second largest NWHI atoll is over 12 miles at its widest point and includes 400 acres of land. Lisianski is a low sand and coral island approximately 20 million years old and reaches a height of 40 feet above sea level. The coral cover around the island totals 310,000 acres.

Pearl and Hermes Atoll (Holoikauaua)

Pearl and Hermes is a large atoll with several small islets forming 80 acres of land and nearly 300,000 acres of coral reef habitat. The atoll extends over 20 miles across and 12 miles wide. The islets provide important dry land respites for seals, turtles, and birds in need of rest, protection from predators, or nesting grounds.

Midway Atoll (Pihemanu)

Midway Atoll consists of three small sandy islets, also known as the “Midway Islands,” totaling 1,540 acres and a large elliptically shaped barrier reef measuring approximately five miles in diameter. The atoll is surrounded by approximately 88,500 acres of coral reef.

Kure Atoll (Mokupāpapa)

Kure Atoll is located at the northern extent of coral reef development includes nearly 200 acres of emergent land. The only permanent land in the atoll is crescent-shaped Green Island, located near the fringing reef in the southeastern part of the lagoon. Kure contains 80,000 acres of coral reef habitat.

Banks and Seamounts

There are approximately 30 submerged banks throughout the NWHI. An unnamed bank is located just to the east of French Frigate. To the west are South East Brooks Bank, St. Rogatien Bank, and another unnamed bank. Raita Bank is just west of Gardner Pinnacles. Pioneer Bank is only 22 nm from Neva Shoals. Bank areas provide extensive habitat for bottomfish and a few are known to provide foraging habitat for endangered Hawaiian monk seals.

Coral Reefs

A total of 57 stony coral species are known in the shallow waters of the NWHI, of which 17 endemic species account for 37 to 53 percent of the relative abundance surveyed on each reef in the NWHI (Friedlander et al. 2005). Seven species of coral within the *Acropora* genus have been documented in the central NWHI, despite their near absence from the MHI. Despite their high latitudes, more species of coral have been reported for the NWHI (52 spp.) than the MHI (48 spp.) (Friedlander et al. 2005).

Shallow and deep-sea coral reef habitats harbor a diversity of macro and micro algae. Currently, a total of 355 algal species have been recorded from shallow water coral reef habitats of the NWHI. The reefs of the NWHI are largely free of invasive species unlike in the MHI.

Bottomfish

Prior to the establishment of PMNM, commercial bottomfishing had been conducted in the NWHI for over 60 years. The fishery included 13 species of snapper and carangid and one species of grouper that was commonly caught at depths between 60-350 m (NOAA, 2007). With the establishment of PMNM, commercial bottomfishing was phased out and the fishery closed as a result of Presidential Proclamation 8031.

Seabirds

Approximately 14 million birds representing 20 breeding species seasonally or permanently reside in the NWHI (Naughton and Flint 2004). Birds that live at sea and migratory birds are also part of the ecosystem. The NWHI contain over 95 percent of the world's black-footed and Laysan albatrosses.

Marine Mammals

A total of 24 different species of marine mammals have been recorded by research cruises within the U.S. Exclusive Economic Zone in waters surrounding the NWHI and are afforded protection under the Marine Mammal Protection Act (Barlow 2003). Marine mammals observed in the NWHI include whales, dolphins, and Hawaiian monk seals.

Endangered Species

Twenty-three species of plants and animals known to occur in the NWHI are listed under the Endangered Species Act. Of those listed species that occur in the marine ecosystem, the Hawaiian monk seal and the green sea turtle are discussed further as the NWHI serve as an important breeding ground for these species.

Hawaiian Green Turtle (*Chelonia mydas*)

Over 90 percent of all sub-adult and adult green turtles found throughout Hawai'i originate from the NWHI. Green turtle nesting sites occur at Pearl and Hermes Atoll, Lisianski Island, Maro Reef, and French Frigate Shoals. French Frigate Shoals is the primary nesting site for green turtles, accounting for 400 nesting sites or 90 percent of all nesting within the Hawaiian Archipelago (NOAA 2006).

Hawaiian Monk Seal (*Monachus schauinslandi*)

The Hawaiian monk seal population is estimated at 1,200 individuals (Antonelis et. al 2006), however models predict that the population would fall below 1,000 individuals within the next five years, due to a variety of threats including predation, disease, and marine debris. The great majority of the Hawaiian monk seal population lives within PMNM. Designated critical habitat for this species under the ESA encompasses all beach areas, sand spits and islets, including all beach crest vegetation to its deepest extent inland, lagoon waters, inner reefs, and ocean waters out to a depth of 20 fathoms (36.5 m) with few exceptions.

3.3 Cultural Resources

Native Hawaiian Significance

The ocean serves as a central source of physical and spiritual sustenance for Native Hawaiians on a daily basis. Today, Native Hawaiians continue to maintain their strong cultural ties to the land and sea. This concept of interconnectedness transcends geography. Native Hawaiians understand the importance of managing the islands and waters as one, as they are inextricably connected to one another (Beckwith 1951; Lili'uokalani 1978).

Maritime Heritage Significance

Maritime activities following Western contact with the Hawaiian Islands have left behind the historical and archaeological traces of a unique past. Currently, there are over 60 known ship losses and/or confirmed sites among the NWHI, the earliest loss dating back to 1818. This, combined with 67 known aircraft crashes, gives a total of over 120 potential maritime heritage resource sites. Many of these resources reflect the distinct phases of historical activities in the remote atolls (Van Tilburg 2002).

3.4 Physical Conditions

Water Quality

Due to their remote location and low level of human activities, the waters of the NWHI are relatively pristine.

Air Quality

Due to their remote location and low level of human activities, the air of the NWHI is relatively pristine.

3.5 Solid Waste

Marine pollution can be defined as the direct or indirect introduction by humans, of substances or energy to the marine environment resulting in deleterious effects such as hazards to the health of marine life and humans, hindrance of marine activities, and impaired water quality.

3.6 Marine Traffic

Federal regulations (50 CFR Part 404) define specific vessel traffic reporting rules for areas within PMNM, a designated Particularly Sensitive Sea Area (PSSA) (http://www.papahanaumokuakea.gov/resource/ship_reporting.html). Vessels that are not required by federal law to participate in vessel reporting within PMNM are encouraged to report. In general, due to the area's remote location, vessel traffic is minimal throughout the year.

3.7 Hazardous and Regulated Materials

Hazardous materials transported via vessel within PMNM must be reported via the PMNM Vessel Reporting System (50 CFR Part 404) and such materials may not be left in the Monument. In addition, per PMNM policies and permit condition #12, all hazardous materials must be pre-approved via a valid PMNM permit and stored, used, and disposed of according to applicable laws and Monument approved protocols (www.papahanaumokuakea.gov/permit).

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4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Overview

This chapter evaluates the potential environmental consequences to environmental resources with implementation of the Proposed Action and the No Action Alternative. Table 4-1 summarizes the environmental effects of the Proposed Action and the No Action Alternative. This information is a summary of Chapter 4.0, Environmental Consequences.

Table 4-1 Summary of Anticipated Environmental Effects of the Proposed Action and No Action Alternative

Resource Category	Proposed Action	No Action Alternative
Marine Biological Resources	No significant adverse impact to marine biological resources with implementation of Best Management Practices (BMPs). If any endangered monk seals or sea turtles are observed, or enters the project area at any time, in-water work would be stopped until they leave the area.	No impact.
Cultural Resources	No significant adverse impact to cultural resources. If any indication of a culturally or historically significant site is found during project, work would be halted until the proper authorities are notified.	No impact.
Physical Conditions (Water Quality)	No significant adverse impact to water quality as steel weights, less than 1,800 lbs per year, are dropped at target locations, of which, only four of the ten target sites are located within PMNM. Target sites span in location from the southwestern most boundary of PMNM to beyond Kure Atoll (see Figure 2-1 for map of target sites).	No impact.
Physical Conditions (Air Quality)	No significant impact to air quality by adding one additional research cruise per year. Other than incidental admissions from the R/V *Kilo Moana,* no other emission would occur.	No impact.
Solid Waste	No significant adverse impact to solid waste is anticipated with the implementation of mitigations and operating practices as needed.	No impact.
Marine Traffic	No significant impact is anticipated by adding one additional research cruise per year.	No impact.

Resource Category	Proposed Action	No Action Alternative
Hazardous and Regulated Materials	No significant impact to the environment as all hazardous and regulated materials would be sealed and contained onboard the R/V *Kilo Moana* and properly disposed of on land.	No impact

4.2 Proposed Action

Marine Biological Resources

The October 2014 EA describes the environmental consequences likely to occur as a result of the activities described therein and therefore is not further discussed in this SEA. Under this Proposed Action, during the deployment of the lander with additional instrumentation attached, operators would implement operational practices to minimize any potential to adversely impact the environment or marine biological resources. Implementation of these operational practices would be an explicit condition of the permit and permit amendment considered in this Proposed Action.

Deepwater Corals

The lander would descend and be weighted to the seafloor and stay in place for a period of one year prior to recovery. During recovery, the lander would drop one set of steel plates, identical to those used by the AUV *Sentry* (all AUV *Sentry* weights have been previously described and analyzed for impacts in the Environmental Assessment dated October 2014). To avoid deepwater corals during deployment and recovery of the lander, to the extent possible, operators would select a drop site where corals are not present. R/V *Kilo Moana* would not drop anchor within PMNM, except in emergency situations. If an emergency occurs, efforts would be made to drop anchor in areas of sandy substrate.

Acoustic Impacts on Biological Resources

The following devices would transmit sound underwater however are not likely to affect fish, cetaceans, and marine mammals underwater because the sound frequency at which they transmit underwater noise (i.e., the sound frequency levels are typically above what most fish and whales can hear) and the small number of sound emissions that would occur as a result of the proposed action.

The Type 7835 Deep Mark Transponder operates at a frequency band ranging from 35 – 55kHz with source levels of 183 – 186dB. The acoustic release Teledyne 866 A operates at a frequency rand of 7 – 15kHz and its source level is 192dB. While there is a potential for fish, cetaceans (not including porpoises) and marine mammals to hear frequencies below 10 kHz, a range in which the acoustic release may operate, the frequency at which the pings are emitted are beyond the range of these marine species and therefore are not likely to have adverse effects on marine biological resources.

The Seaguard II Platform operates at 600 kHz with a range up to 100 m. As further explained below, this profiling device operates outside of the typical hearing range of fish,

cetaceans and marine mammals and therefore will not have a significant impact on marine biological resources.

The ROV *Jason II* operates within a range of 200 – 400 KhZ with maximum ping rates of up to 50 Hz and beam widths measuring at -3 dB. While there is a potential for fish, cetaceans (not including porpoises) and marine mammals to hear frequencies below 10 kHz, a range and number of occurrences in which the acoustic release may operate and the decibel levels at which the pings are emitted are beyond the range of these marine species and therefore are not likely to have adverse effects on marine biological resources.

Most fish as well as whales cannot hear over 10kHz (Slabberkoorn et al. 2010). Porpoises can hear up into the 100kHz range, but only if the sound is above 120dB (Thomson et al. 2006 section 6.2). Also, sounds at 10kHz or higher have a very fast attenuation radius (Thomson 2006) and are therefore more localized. Low range frequencies are the most damaging, which is anything at or below 500Hz, and often ambient sea noises between 500Hz-25kHz are due to surface wind and wave action (Hildebrand 2009), thus at those frequencies marine life would be frequently exposed to those types of sounds. Studies of possible acoustic sources of known beaked whale strandings concur with this finding that all possible culprits are low or mid frequency (Cox et al 2006). No equipment, instrumentation and other devices proposed for use under the proposed action operate at a low range frequency (<500Hz). All of the studies to date show mid- and high-range frequencies at the levels emitted by the ship and other deployed instruments of the type used in this research typically have little effect on marine life.

In addition, there is no research that indicates the type of multibeam system that R/V *Kilo Moana* operates is harmful to marine mammals. Similar, if not identical multibeam systems are utilized onboard many research vessels (e.g., *Falkor, Sikuliaq, Okeanos Explorer, Hiʻialakai, and Oscar Elton Sette)*, all of which have recently transited to the Monument in support of various research projects and activities. During each cruise on which multibeam systems are powered on and operational, observers were placed onboard each vessel prior to embarking for the NWHI to notify the ship captain and crew of the presence of marine mammals and cetaceans and document behavior during each siting.

Endangered species including monk seals and sea turtles may be seen during vessel operation activities within PMNM. However, before any in-water work is to commence, personnel aboard R/V *Kilo Moana* would perform a visual scan of the adjacent areas to locate any endangered species. If an endangered species is observed, or if any such species enters the project area at any time, all in-water activities would be stopped until all endangered species leave the area. Activities that would take place as a result of the Proposed Action would not occur within, near, or adjacent to any known breeding or nesting areas of endangered species.

Throughout the project and while R/V *Kilo Moana*'s multibeam system is turned on, active observers would be on watch for marine mammals, whales, dolphins and sea turtle encounters. If species are present within 200 meters of the ship, the vessel would stop until the animals depart the area but the mapping sonar would continue transmitting. The observers would document cetacean encounters using observer program data sheets and protocols. If the systems are shut down for any reason, such as turning off the EM 3122 during an extensive area of shallow water mapping, the multibeam soft start mode – a delay function, starting sonar transmissions at a low output level and gradually increasing - would be used to minimize any impact on cetaceans.

Invasive Species

Invasive species are often spread through ballast water that has been discharged from ships as vessels transit ocean areas. In response to national concerns regarding invasive species, the National Invasive Species Act of 1996 was enacted which reauthorized and amended the Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990. In addition, a careful washing and disinfecting regimen for the R/V *Kilo Moana* would be followed to avoid the spread of invasive species. With proper attention to these guidelines, the Proposed Action would not introduce or contribute to the spread of invasive species.

By following all established guidelines, mitigations and operating practices described here, the Proposed Action would not significantly affect marine biological resources.

Cultural Resources

Under the Proposed Action, the actual locations of underwater work would be determined by the individual research projects and occur at depths ranging from 200 – 700 m. These underwater areas are not known to contain culturally or historically significant sites. However, if any indication of a culturally or historically significant site is found during project activities, work would stop until the proper authorities can be notified. In addition, the Proposed Action is temporary in nature and would not significantly impact historic or cultural resources, nor interfere with traditional Hawaiian practices.

Physical Conditions

Water Quality

Under the Proposed Action, the lander would be deployed near Pioneer Bank within PMNM for a period of approximately one year. The footprint of the lander would be 1 meter on each of the four sides (forming a square shape). The lander would contain CTD, oxygen, chlorophyll, turbidity, current velocity and direction, a sediment trap, as well as settling plates to enable larval recruitment to occur during the one year deployment. A deep marker beacon would be attached to the lander to allow researchers to locate the lander for retrieval purposes. Weights and floatation devices would also be attached to the lander to ensure it stays in place for the duration of its deployment and support successful recovery. Upon retrieval, to enable successful ascent of the lander, one dive weight (~48-64 lbs) would be released and remain on the seafloor. The steel dive weight would not be recovered and would slowly dissolve, adding iron to the water. The environment where the weight is likely to be dropped is iron-limited (J. Wiltshire, personal communication via email, SOEST, September 10, 2007). The steel weights and added nutrients would be spread over a large area. Due to the low-light environment the ballast release would not cause localized phytoplankton blooms.

Marine vessels and their related activities can affect the water quality by discharging sewage or grey water effluent. Sewage discharge can contain bacteria, viruses, or medical wastes that can adversely impact the direct health of humans and wildlife or affect the ecosystem by increasing nutrient concentrations. Grey water is wastewater from sinks, showers, laundry and galleys. It can contain a number of pollutants such as suspended solids, ammonia, nitrogen, phosphates, heavy metals and detergents. The Proposed Action would operate in deep water areas only away from all Special Preservation Area (SPA) boundaries. As such, all sewage aboard R/V *Kilo Moana* would be treated and the grey

water recycled and if discharge is necessary, discharge would be well outside of any SPA boundary.

Bilge water collects in the bottom of the ship's hull, and as a result contains fuel, oil, and wastewater from engine and machine operations, including spills and leaks. Regulations for the PMNM, prohibit discharging or depositing any material into PMNM that could injure any resource. Exceptions were made to discharges incidental to vessel operations, such as deck wash, approved marine sanitation device effluent, cooling water, and engine exhaust.

With these operational practices in place and regulations followed, the Proposed Action would not significantly degrade the water quality within PMNM; therefore, no significant impacts to water quality would occur as a result of the Proposed Action.

Air Quality

Under the Proposed Action, the emissions from R/V *Kilo Moana* diesel engine would have no adverse effect on existing air quality within the PMNM. The instruments attached to the lander are either alkaline or lithium battery-powered and there may be a small amount of sulfur gas emitted, however, the amounts are minimal and spread throughout the expedition making impacts negligible. Therefore, no significant adverse impacts to air quality would occur as a result of the Proposed Action.

Solid Waste

Under the Proposed Action, degradable waste would be discharged at a minimum distance of 12 nm from shore. Degradable waste that might float would be discharged at least 25 nm from shore. All plastics would be retained on board and properly disposed of at home port. Adhering to these operational restrictions, R/V *Kilo Moana* would not discharge significant amounts of solid waste within PMNM.

Under the Proposed Action, the lander would drop between 48 – 64 lbs of one steel weight upon ascent of the lander during retrieval in 2016. The steel weight would not be recovered. The use of steel ballast would have less adverse impact than the traditional lead ballast because it does not release lead into the environment. Individually, the steel plates are relatively thin (5/8") with a high surface area which minimizes the time it takes to corrode.

One effort to model the corrosion of mild steel experimentally manipulated five variables (salinity, sulfate, bicarbonates, pH, temperature and dissolved oxygen) whose effects are interrelated (Paul, 2011). The model predicted a corrosion rate of 0.435mm/year which compared very well to field measured corrosion rates of 0.471 mm/year for soft steel in seawater with an average composition of 29.8-34.9 g salinity, 2.4 g/L SO_4^{2-}, and pH 8 (Paul, 2011). A separate study on the corrosion of materials commonly used in constructing artificial reefs found a corrosion rate of 0.3625 mm/year for soft steel in seawater (Chen et al., 2011) while the corrosion rate in Peruvian surface waters was 0.231 mm/year (Farro et al., 2009). Thus a reasonable assumption given the lower oxygen content and temperatures in the PMNM waters is that corrosion rates of the soft steel plates would be even slower. Due to estimated slow corrosion rates and the size of the steel plates, all plates are expected to remain on the seafloor. The weights are comprised of ordinary carbon steel, which is less toxic than lead and the same type of steel used in vessels often used in shallow waters as artificial reef substrate. Given the vast area the project would survey and

the comparatively small footprint of the dive weights, the value of the data obtained from such surveys would outweigh the potential impacts.

A study looking at the environmental impacts of three decommissioned naval vessels used as artificial reefs in Australian waters found some metal (Alluminum (Al) and Iron (Fe)) enrichment of the sediments in the immediate vicinity of the ships but also concluded that the scuttling of the ships had no adverse environmental impacts on the sediments and that the small enrichments levels are unlikely to significantly impact marine life in the foreseeable future (MacLeod et al., 2004). Given these results are for large ships and that this same type of ship steel is use to create numerous successful artificial reefs, a reasonable assumption is that the slow corrosion of the soft steel plates would not have any adverse impact on the environment within PMNM. Therefore, no significant impacts to solid waste would occur as a result of the Proposed Action.

Marine Traffic

Under the Proposed Action, R/V *Kilo Moana* would undertake one research cruise totaling 50 days in 2015. The existing marine traffic is minimal and one additional research cruise per year would not significantly increase traffic within PMNM; therefore, no significant impacts to marine traffic would occur as a result of the Proposed Action. Other possible impacts associated with marine vessels such as vessel discharge and oil spills have been evaluated in Section 4.2 Physical Conditions.

Hazardous and Regulated Materials

In the event of an oil or toxic chemical spill, vessel crew would follow all established procedures detailed in the USCG approved Shipboard Oil Pollution Emergency Plan and Safety Management System Manual. With these mitigation measures in place, no significant impact to resources are likely to occur as a result of the Proposed Action.

4.3 No Action Alternative

Marine Biological Resources

Under the No Action Alternative, the Proposed Action would not take place. The R/V *Kilo Moana* would not enter PMNM eliminating the necessity for research to be conducted, including deployment of the proposed lander. As a result, there would be no damage to coral and no chance for fuel spills, vessel grounding or other vessel hazards.

While the No Action Alternative would eliminate negative impacts to Monument resources it would also impede the ability to gather information that would lend to potential beneficial impacts to the Monument as well as information that would help to improve conservation and management capacity and decision making. The Proposed Action aims to address recovery potential and time scales of recovery for deep-sea coral and sponge beds that have been affected by trawling. Deep waters in the Monument on many of the island and seamounts were affected by trawling prior to the establishment of the U.S. Exclusive Economic Zone and the proposed project would provide high-resolution multibeam imagery as well as photographic survey imagery. The Proposed Action would both substantially increase knowledge of the deep-water communities within the Monument as well as provide a better understanding of trawling impacts and recovery potential for deep-sea coral and sponge communities. Ultimately, the No Action Alternative would not allow researchers and

Monument managers the opportunity to gain new information about deep water areas within PMNM.

Cultural Resources

Under the No Action Alternative, the Proposed Action would not take place. The existing cultural resources and Native Hawaiian uses at PMNM would not change as there would be no human or vessel presence in the area; therefore, no impacts would occur as a result of the No Action Alternative.

Physical Conditions

Water Quality

Under the No Action Alternative, the Proposed Action would not take place. The existing conditions to water quality at PMNM would not change as no activities would be conducted and no vessels would be present in the area; therefore, no impacts would occur as a result of the No Action Alternative.

Air Quality

Under the No Action Alternative, the Proposed Action would not take place. R/V *Kilo Moana* would not enter PMNM. The existing air quality conditions at PMNM would not change as no activities would be conducted and no vessels would be present in the area; therefore, no impacts would occur as a result of the No Action Alternative.

Solid Waste

Under the No Action Alternative, the Proposed Action would not take place. No lander, ballast drop-weight or effluent would be discharged. The existing conditions at PMNM would not change as no activity would be conducted in the area therefore, no impacts would occur as a result of the No Action Alternative.

Marine Traffic

Under the No Action Alternative, the Proposed Action would not take place. R/V *Kilo Moana* would not enter PMNM. The existing conditions at PMNM would not change as no activity would be conducted in the area therefore, no impacts would occur as a result of the No Action Alternative.

Hazardous and Regulated Materials

Under the No Action Alternative, the Proposed Action would not take place. R/V *Kilo Moana* would not enter PMNM. As a result, no hazardous or regulated materials would enter PMNM; therefore, no impacts would occur as a result of the No Action Alternative.

4.4 Cumulative Impacts

Cumulative impacts to environmental resources result from incremental effects of the Proposed Action evaluated in conjunction with the effects of other government and private

past, present and reasonably foreseeable actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

Cumulative impacts were previously analyzed in the Environmental Assessment for PMNM dated October 2014 and therefore are not discussed in this document. The following analysis is based on the newly proposed actions (deployment of a lander with instrumentation attached and expansion of the depth range from 200 – 700 m).

Marine Biological Resources

Originally proposed research activities have been previously discussed in the original Environmental Assessment dated October 2014. Additionally proposed actions, including the expansion of the target depth range to 200 – 700 m and the proposed deployment of a lander with specific instrumentation to collect data over the course of one year has not been previously permitted in PMNM. Ballast discharge of steel dive weights of the AUV *Sentry* was permitted to be permanently dropped on the seafloor in 2014 and analyzed under this original EA. Similarly, in 2007 and 2009 respectively, steel ring ballast was permitted to be dropped on the seafloor to balance the ascent and descent of previously permitted ROV and AUV operations in 2007 and 2009 respectively. The steel weight proposed to be left on the seafloor as a result of the proposed action would be one steel plate ranging in weight from 48 – 64 lbs. Therefore, due to the weight and size of the steel weight under the proposed action and the vast scale of the Monument, the Proposed Action would not significantly impact marine biological resources.

In the past, roughly 17 expeditions for conservation and management and research purposes are conducted in the Northwestern Hawaiian Islands each year. No significant adverse marine biological impacts are anticipated as a result of the Proposed Action. In addition, the proposed research locations under the Proposed Action are at a much greater depth than areas targeted by other research projects occurring within the PMNM. From 2009 – 2015, 24 research expeditions targeted depths within the range of 200 - 700 m have occurred in PMNM. Majority of marine research activities occur at depths of <30 m. Therefore, the Proposed Action would not result in cumulative impacts.

Cultural Resources

Locations of underwater work would occur at depths ranging from 200 – 700 m. These underwater areas are not known to contain culturally or historically significant sites. In addition, the Proposed Action is temporary in nature and would not significantly impact historic or cultural resources, nor interfere with traditional Hawaiian practices. Therefore, no cumulative impacts to cultural resources are anticipated as a result of the Proposed Action.

Physical Conditions

<u>Water Quality</u>

No significant impact to water quality is expected as a result of the proposed action. A complete analysis can be found in the original EA dated October 2014. Capacity and operation onboard the R/V *Kilo Moana* is similar to the R/V *Sikuliaq* and therefore is not further analyzed here. All permit conditions and restrictions applicable to the R/V *Sikuliaq* would also be applied to a permit, if issued, to the R/V *Kilo Moana.*

Air Quality

No significant impact to air quality is expected as a result of the proposed action. A complete analysis can be found in the original EA dated October 2014. Capacity and operation onboard the R/V *Kilo Moana* is similar to the R/V *Sikuliaq* and therefore is not further analyzed here. All permit conditions and restrictions applicable to the R/V *Sikuliaq* would also be applied to a permit, if issued, to the R/V *Kilo Moana.*

Solid Waste

There has been only one AUV operation and five submersible dives permitted within the NWHI since PMNM was designated. Analysis of the AUV and submersible dive operations are further analyzed in the EA dated October 2014. Given that the dives would take place at different sites covering a vast area (see figure 2-1), the amount of ballast discharged is negligible.

Marine Traffic

No significant impact to air quality is expected as a result of the proposed action. A complete analysis can be found in the original EA dated October 2014. Capacity and operation onboard the R/V *Kilo Moana* is similar to the R/V *Sikuliaq* and therefore is not further analyzed here. All permit conditions and restrictions applicable to the R/V *Sikuliaq* would also be applied to a permit, if issued, to the R/V *Kilo Moana.*

Hazardous and Regulated Materials

No significant impact to air quality is expected as a result of the proposed action. A complete analysis can be found in the original EA dated October 2014. Capacity and operation onboard the R/V *Kilo Moana* is similar to the R/V *Sikuliaq* and therefore is not further analyzed here. All permit conditions and restrictions applicable to the R/V *Sikuliaq* would also be applied to a permit, if issued, to the R/V *Kilo Moana.*

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5.0 ENVIRONMENTAL PERMITS, APPROVALS, AND COMPLIANCE

5.1 Permits

The University of Hawaii Marine Center submitted a conservation and management permit application to conduct vessel operations (R/V *Kilo Moana*) and the Florida State University submitted a permit amendment to previously permitted research activities within PMNM expand the depth range in which to survey the seafloor and deploy a lander near Pioneer Bank with specific instrumentation to collect samples gather data for a one year period within PMNM.

No other permits are required for these activities, as the activities contained herein would not result in incidental disturbance or take of Hawaiian monk seals or cetaceans. Separate PMNM permits would be issued to R/V *Kilo Moana* for vessel support and researchers to deploy a lander and operate the AUV *Sentry* for surveying the seafloor at identified target sites.

5.2 Other Laws and Authorities Considered

Magnuson-Stevens Fishery Conservation and Management Act

The site for the Proposed Action are comprised of soft bottom substrate. Large precious corals, such as gold, pink and black corals, are found within the target depth range of this research activity, however, are primarily found on rocky substrate such as submerged banks. Soft bottoms such as the areas targeted for deployment of the lander and its associated ballast discharge upon ascent do not have a suitable surface for the coral to attach to (NOAA, 2006; Drazen, personal communication, May 31, 2007). The bottom habitat surrounding the project drop areas are inhabited by invertebrate fauna, burrowing fish, and bottom-dwelling fish. The AUV *Sentry* would be the only vehicle to transit the deep sea ecosystem, collections would not occur and the lander would be stationary for one year and primarily consists of passive data recording instruments. On August 25, 2015 ONMS initiated informal consultation under the Magnuson-Stevens Fishery Conservation and Management Act on impacts to Essential Fish Habitat (EFH) and NMFS concurred with its conclusion that due to the limited scope of the proposed action,no adverse impacts to EFH are anticipated. Also, cumulative or synergistic impacts are not expected as a result of the Proposed Action because a vast amount of similar habitat lies within the PMNM.

Endangered Species Act

The National Marine Fisheries Service (NMFS) has determined that the Proposed Action would not adversely affect Hawaiian Monk Seals (*Monachus schauinslandi*), 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*), and north pacific right whales (*Eubalaena japonica*). The Proposed Action would take place greater than 3nm from shore at a depth range of 200 - 700m. All precautions would be taken not to disturb Hawaiian monk seals, green sea turtles, and all cetaceans previously listed.

On August 18, 2015, PMNM initiated an informal consultation with NMFS Pacific Islands Regional Office (PIRO) on the Proposed Action – procedures which included operation of R/V *Kilo Moana*, expansion of target depth ranges to 200 – 700 m, and deployment of a lander for a period of one year. In the analysis, NMFS PIRO concurred with the determination by ONMS PMNM that the Proposed Action may affect, but is not likely to adversely affect ESA-listed marine species or designated critical habitat. NMFS' concurrence was received on August 27, 2015 and was based on the finding 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 (USFWS & NMFS 1998).

National Historic Preservation Act (NHPA)

Under the provisions of Section 106 of the National Historic Preservation Act of 1966, the Secretary of the Interior has compiled a national register of sites and buildings of significant importance to America's history. Sites in the NWHI include cultural sites on Nihoa Island and Mokumanamana Island, and historic sites on Midway Atoll. The Proposed Action would not cause any negative impacts to historic properties, including registered sites or buildings on shore or any such submerged site, such as shipwrecks.

Marine Mammal Protection Act

The Marine Mammal Protection Act authorizes NMFS to take measures to protect marine mammals that may involve setting aside habitat required by various life stages, although the chief provision is the prohibition of "taking" marine mammals directly or indirectly. None of the activities proposed herein should directly or indirectly interact with monk seals or other protected marine mammals such as dolphins or whales.

Executive Order 12898 on Environmental Justice

Consistent with the President's Executive Order on Environmental Justice (February 11, 1994) and the Department of Commerce's Environmental Justice Strategy, the proposed research activities would not have any disproportionately high and adverse human health or environmental effects on minority or low income populations.

Executive Order 12866

Implementation of the activities herein described does not constitute a "significant regulatory action" as defined by Executive Order 12866 because (1) it would not have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities; (2) it would not create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) it would not materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; and (4) it would not raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

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