ENVIRONMENTAL ASSESSMENT

Papahānaumokuākea Marine National Monument
Northwestern Hawaiian Islands
Hawai‘i

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

October 2014

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EXECUTIVE SUMMARY

This Environmental Assessment 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.

NOAA' s Office of National Marine Sanctuaries (ONMS) proposes to issue two permits ("Proposed Action"); 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.

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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ENVIRONMENTAL ASSESSMENT
FLORIDA STATE UNIVERSITY AND SIKULIAQ VESSEL OPERATIONS
PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT, HAWAIʻI

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ACRONYMS AND ABBREVIATIONS

Al	Aluminum
AUV	Autonomous Underwater Vehicle
CTD	Conductivity, Temperature, Depth
CFR	Code of Federal Regulations
dB	Decibels
DOD	U.S. Department of Defense
DIC	Dissolved Inorganic Carbon
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
Fe	Iron
FONSI	Finding of No Significant Impact
FSU	Florida State University
ft	Feet
g	Grams
HAR	Hawai‘i Administrative Record
Hz	Hertz
HDOH	Hawai‘i Department of Health
kHz	Kilohertz
lbs	Pounds
m	Meter(s)
km^2	Square kilometer(s)
µP	micropascal
mm	Millimeters
MHI	Main Hawaiian Islands
NAO	National Oceanic and Atmospheric Administration, Administrative Order
NEPA	National Environmental Policy Act
nm	Nautical miles
NOAA	National Oceanic and Atmospheric Administration
NSF	National Science Foundation
NWHI	Northwestern Hawaiian Islands
NWHICRER	Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve
PMNM	Papahānaumokuākea Marine National Monument
POC	Particulate Organic Carbon
Proclamation	Proclamation 8031
PSSA	Particularly Sensitive Sea Area
R/V	Research vessel
ROV	Remotely Operated Vehicle
SPA	Special Preservation Area
spp.	Species (plural)
sub	Submersible
SL	Source levels
Texas A&M	Texas A&M University
UAF	University of Alaska – Fairbanks
SMC	Seaward Marine Center
U.S.	United States
USCG	U.S. Coast Guard
USBL	Ultra short baseline
USFWS	U.S. Fish and Wildlife Service
WHOI	Woods Hole Oceanographic Institution
XR	External Release Type

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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 two permits; one research permit issued to Florida State University (FSU) for research using an Autonomous Unmanned Vehicle (AUV) within PMNM, and one conservation and management permit to the University of Alaska – Fairbanks (UAF) for operation of the Research Vessel *Sikuliaq* to allow vessel support operations for the aforementioned research activities within PMNM. The Proposed Action constitutes the first phase of a two-year project. Year one is designed to conduct broad surveys and identify areas where corals occur at each of the target sites. In Year two, permittees would return to the identified sites with a Remotely Operated underwater Vehicle (ROV) to collect specimens and additional video data. A team of researchers from FSU and Texas A&M University co-led by Dr. Amy Baco-Taylor of FSU and Dr. Brendan Roark of Texas A&M University would focus on three specific aspects of seamount communities: (1) community structure; (2) age structure of precious corals using a verified size-age curve; and (3) genetic structure of precious corals using DNA microsatellites. Using these methods, scientists would be able to discern the amount of time that lapse between trawling and new coral colonization as well as source populations of recent colonizers. The captain and crew of the R/V *Sikuliaq* would provide the support platform as well as multi-beam mapping system to support proposed project. Both permits would be issued for a period of one year. Year one consists of bathymetric mapping, AUV operation, water sampling, and deployment of a TCM-1 current meter and data logger. Year two would continue year one activities, and collect specimen samples identified during Year one. This analysis focuses on activities proposed to occur in Year one of the project (bathymetric mapping, AUV operation, water sampling, and deployment of a TCM-1 current meter and data logger).

1.2 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 in efforts 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). In accordance with Presidential Proclamation 8031 and codifying regulations in 50 CFR Part 404, all activities in the Monument, with limited exceptions, require a permit. The PMNM permitting program is designed to manage and minimize human impact, ensuring the protection of the Monument's natural, cultural, and historic resources and a PMNM permit is required for the Proposed Action.

All PMNM permit applications must meet the ten applicable Findings of Presidential Proclamation 8031, described below, prior to issuance of a permit:

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 management direction 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 Office of Law Enforcement and complies with the requirements of Proclamation 8031.

10) There are no other factors that would make the issuance of a permit for the activity inappropriate. Proposed Action

Need

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. Despite the continued protection of the NWHI, and the area's relative isolation in the Pacific, significant global threats to the Monument's ecosystem exist. Many of these threats are a direct result of human activities occurring beyond Monument boundaries. These threats include climate change, sea level rise, ocean acidification, marine and terrestrial invasive species, vessel groundings, and marine debris. The Monument's stringent permitting process is the first line of defense against many of these threats. The permitting process allows for managing, monitoring, and reporting activities to evaluate and mitigate cumulative impacts. This process also enables scientists and managers to accomplish a number of activities focused on resource protection, habitat conservation, and management.

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. This information would allow for better management of deep sea ecosystems in the Monument.

1.3 Background

Papahānaumokuākea Marine National Monument (PMNM) – Regulatory Environment

President George W. Bush established the PMNM on June 15, 2006, to protect the resources of the Northwestern Hawaiian Islands (NWHI). 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).

The Secretary of Commerce, through NOAA, has primary responsibility regarding the management of the marine areas of the PMNM, in consultation with the Secretary of the Interior. The Secretary of the Interior, through the U.S. Fish and Wildlife Service (USFWS), has sole responsibility for the areas of PMNM that overlay the Midway Atoll National Wildlife Refuge, the Battle of Midway National Memorial, and the Hawaiian Islands National Wildlife Refuge, in consultation with the Secretary of Commerce. Nothing in the Proclamation diminishes or enlarges the jurisdiction of the State of Hawaiʻi, which has primary responsibility for managing the State waters of PMNM and primary responsibility for the Kure Atoll portion of the Kure Atoll State Seabird Sanctuary.

The mission of the PMNM is:

1) prohibit unauthorized access;
2) provide for carefully regulated education and scientific activities;
3) preserve access for Native Hawaiian cultural activities;
4) enhance visitor access at Midway;
5) Phase out commercial fishing; and
6) Ban other types of resource extraction and dumping of waste.

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 Hawaiʻi Department of Land and Natural Resources. Permit categories are research, conservation and management, education Native Hawaiian practices, recreation (Midway only), and special ocean use. 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 designated initially as the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve (NWHICRER), which is part of the Monument.

According to NAO 216-6,the purpose for an Environmental Assessment (EA) is to determine whether significant environmental impacts could result from a Proposed Action. An EA 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. However, the PMNM would also evaluate the potential effect of the proposed research on all factors, including several shown below.

1) degree to which effects on the human environment are likely to be highly controversial;
2) degree to which the action establishes a precedent for future actions with significant effects or represents a decision in principle about a future consideration;

3) individually insignificant but cumulatively significant impacts; and
4) degree to which endangered or threatened species, or their critical habitat as defined under the Endangered Species Act of 1973, are adversely affected

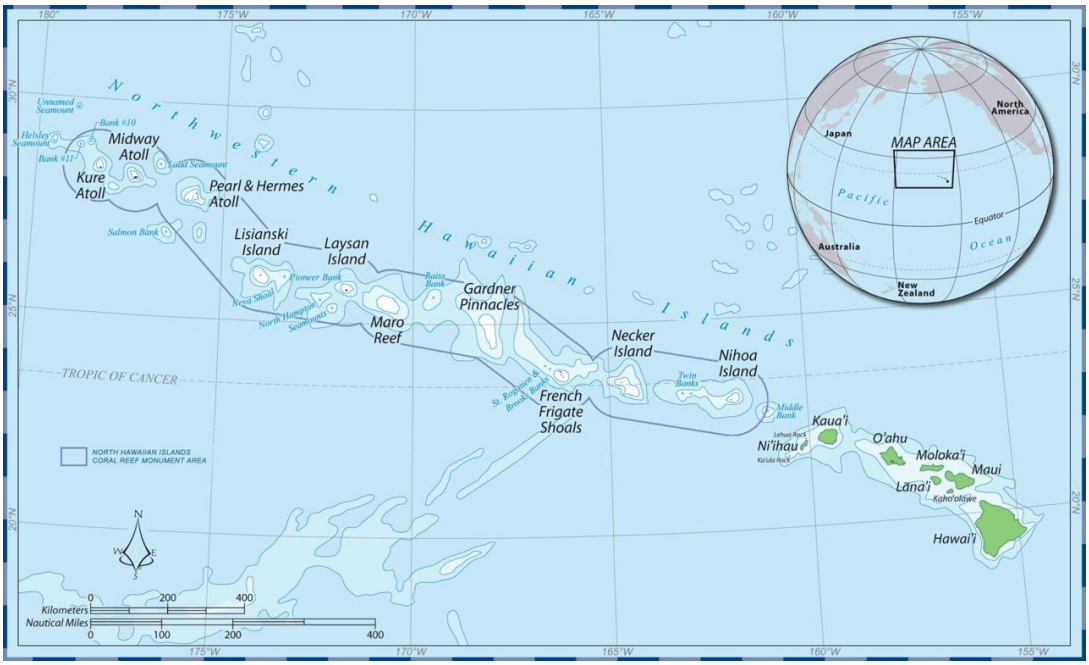
Florida State University and University of Alaska – Fairbanks, School of Fisheries and Ocean Sciences, Seward Marine Center

Dr. Baco-Taylor is an Associate Professor at the Florida State University, Department of Earth, Ocean, and Atmospheric Sciences and the permittee proposing to conduct deep-sea research in the NWHI to provide for a better understanding of the deep-sea biota through bathymetric habitat mapping and the collection of new records and species. In addition this research would provide 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 PMNM.

Dr. Baco-Taylor, in partnership with Dr. Brendan Roark of the Texas A&M University (Texas A&M) obtained a grant from the National Science Foundation (NSF) to conduct this project. The NSF supplied ship-time and funding to both Dr. Baco-Taylor and Dr. Roark to complete this project to publication. Research would be conducted on-board R/V *Sikuliaq*, owned by the NSF and operated by the UAF. The AUV *Sentry* is owned and operated by the Woods Hole Oceanographic Institution (WHOI) and would be used to obtain photographic and video footage of the sea floor to document conditions. A dedicated AUV team from WHOI comprised of five people would participate in the proposed project in the NWHI to support AUV *Sentry* operations.

This collaborative partnership seeks to address recovery potential and time scales of recovery for deep-sea coral and sponge bed communities that have been affected by trawling that occurred prior to the establishment of the U.S. Exclusive Economic Zone, which now protects the area in and around PMNM from trawling.

Figure 1-1 Papahānaumokuākea Marine National Monument, Hawai'i



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2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVE

2.1 Introduction

This environmental assessment 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: not issuing a permit to conduct proposed research activities using the AUV *Sentry* (no action alternative) or issuing a PMNM permit to conduct research activities using the AUV *Sentry* 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, multi-beam, and AUV operations.

2.2 Description of Proposed Action and Alternative

Proposed Action

NOAA's Office of National Marine Sanctuaries (ONMS) proposes to issue two permits for vessel support operations in deep water areas of the NWHI. One research permit would be issued to FSU for research using the *Sentry* AUV in order to support separately permitted research projects in the PMNM and a second conservation and management permit would be issued to the UAF for operation of R/V *Sikuliaq* (Figure 2-1). Objectives of the research activities that will be authorized by the Proposed Action include operation of the AUV *Sentry* for purposes of underwater surveys and vessel support operations onboard R/V *Sikuliaq,* including multibeam mapping and water sampling (Table 2-1). R/V *Sikuliaq* would be permitted to enter and conduct operations within the PMNM. The AUV *Sentry* would be transported to Honolulu onboard R/V *Sikuliaq*. R/V *Sikuliaq* home port is Fairbanks, Alaska.

R/V *Sikuliaq*

The UAF, School of Fisheries and Ocean Sciences, Seward Marine Center (SMC) operates the NSF-owned R/V *Sikuliaq*. The R/V *Sikuliaq* is a newly built general oceanographic research vessel that is part of the United States academic research fleet, completed and delivered to the UAF on June 6, 2014. It can accommodate up to 24 scientists, two (2) UAF SMC provided marine technicians, and 20 crewmembers. In addition to traditional berthing and living spaces, R/V *Sikuliaq* has science storage space, laboratory space, and a deck working area of 4,360 square feet. The ship is equipped with an incinerator for burning trash, but would not use the incinerator while operating within PMNM boundaries. This requirement will 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 *Sikuliaq* would only anchor in emergency situations and efforts would be made to drop anchor in areas that are relatively free of coral. While there is no intention, on the part of the permit applicants, to anchor the R/V *Sikuliaq* and its small vessels, the restrictions on anchoring within PMNM will be a condition of the proposed PMNM permits.

The R/V *Sikuliaq* is scheduled to be dry docked every two years per five-year maintenance cycle and the bottom and sides are cleaned using a high pressure water system to remove dirt and growth on the hull. The hull is painted with Inerta abrasion-resistent paint that has a proven record to stand up to ice abrasion. Inerta is not an anti-fouling paint, however, divers routinely scrub the hull and propellers to remove marine growth and reduce drag. The ship's routine maintenance would minimize the potential for introduction of invasive species.

The Marine Sanitation Device (MSD) aboard R/V *Sikuliaq* is an Act 2 Piranha water reclamation system. Solids are filtered and eliminated through a biological process within the sewage treatment tank and solids separation via the MSD. The treated and filtered effluent from the MSD is then reused as flushing water for toilet operations. Reusing the effluent reduces the need for water production and allows for vessel operation in areas where discharge of sewage is restricted or prohibited. R/V *Sikuliaq* can retain sewage and grey water on board for an average of two days before the holding tank reaches capacity and grey water must be discharged. 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 (Figure 2-1). 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 186,000 gallons at 95% and the ship would bunker at 95% for the proposed project activities, in anticipation of a 50 day cruise departing from Honolulu. The ship uses low sulfur diesel as required to meet Environmental Protection Agency Tier II emissions of the diesel generator engines. The ship has 10 fuel storage tanks and two (2) service tanks for the onboard generators, which consists of a service tank for the emergency generator and a small service tank for the incinerator. The largest storage tank is 33,557 gallons at 95% and the smallest is 9,918 gallons at 95% and the other tanks range from 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. An overflow system is onboard to ensure that excess flows to one of the two overflow tanks, of which have a capacity of 1,752 gallons and 1,589 gallons respectively. The overflow tanks are not used for fuel storage, their capacity is not part of the 186,000 gallon fuel capacity of the ship, are maintained empty and an alarm would sound if fuel entered any one of the overflow tanks. The ship's fuel storage system is designed to minimize potential for discharge.

The ship would carry up to 186,000 gallons of low sulfur diesel fuel and 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 *Sikuliaq* 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. The ship also carries approximately 8 gallons of paint for touch up work and it is stored in the Hazmat compartment. Waste and excess paint are retained on board until the ship returns to port for proper disposal.

Although an oil spill at sea is unlikely, the crew would address the spill in accordance with the UAF SMC 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 UAF SMC Safety Management System Manual.

The UAF SMC Safety Management System Manual and Garbage Management Plan (SMS-26104) also address solid waste management. Degradable waste that is ground would be discharged overboard at a minimum distance of 3 nautical miles (nm) from SPA boundaries, and degradable waste that is not ground would be discharge at a minimum distance of 12 nautical miles from SPA boundaries. Any degradable waste that may remain floating for some time, would be discharged at a minimum distance of 25 nm from SPA boundaries. All plastics are retained on board until the vessel returns to port. Laboratory waste is also retained on board until it can be properly disposed of at home port.

R/V *Sikuliaq* is equipped with a Conductivity, Temperature, Depth (CTD) rosette with twenty-four 10 L bottles to collect a suite of water samples, resulting in fewer casts per site to collect all necessary samples. Under optimal circumstances, three to five CTD casts would be conducted at each site (maximum of 15 total casts within the Monument) and each cast would be surface to bottom to surface stopping at standard depths to collect water samples. If weather conditions deteriorate and the AUV *Sentry* cannot be launched and all mapping is completed, additional CTD casts, up to an additional 25 CTD casts in total would be conducted to better characterize the environment (temperature, salinity, density, pH, oxygen concentration, and chlorophyll). The CTD instrument would be lowered into the water column via the vessel's winch system and would not touch the seafloor. Hazmat material would be used in processing some of the water samples. The mercuric chloride is used to stop biological process from continuing by adding 100 µl to the radiocarbon, alkalinity, and dissolved inorganic carbon (DIC) samples and then sealing the containers. A small amount (~50 µl) of dilute hydrochloric acid is added to the Particulate Organic Carbon (POC) filters and sealed in containers. All water samples and all the unused hazmat would be removed from the ship and returned to Texas A&M in order to conduct the analyses.

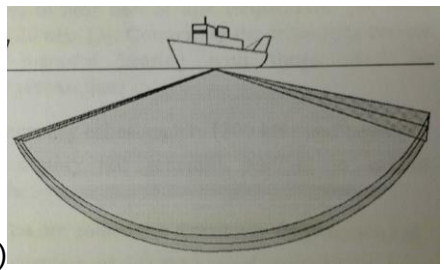
A TCM-1 current meter and data logger would be deployed at Pioneer Bank, by dropping it over the side as a free vehicle. The current meter is made from PVC and aluminum and would be attached to a single concrete block 12" x 12" x 1.75" weighing 10 – 20 pounds (lbs) in seawater, as an anchor. Since concrete is carbonate, it should be non-toxic to any marine life. The current meter would be recovered by an ROV, which would be deployed in the second year of this project and the concrete weight originally attached to the current meter would be left on the seafloor.

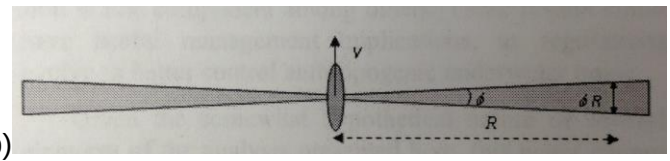
Kongsberg Multi-beam system onboard R/V *Sikuliaq*

R/V *Sikuliaq* 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 systems sends a focused pulse of sound (ping) straight down and listens for the reflected echo of the sea floor. The amount of time it takes for the noise to be sent, reflected, and received is converted into a depth measurement. Power, amplitude, pulse width, and ping rate vary

depending on the depths of the ocean in the area being mapped. The two systems are the Kongsberg EM710 (for shallower depths) and Kongsberg EM302 (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. Source level is defined as the number of decibels at a 1m distances from the transducer. The sounding patterns for both multi-beam systems are equiangular/equidistant and transmit downward with a planar ensonification volume oriented perpendicular to the vessel's keel (See Figures 1a and b below).

Figure 2-1 Multibeam Ensonification Volume: Diagrams showing a typical multibeam ensonification volume from a) the horizontal and b) the overhead prospective (From Lurton & DeRuiter 2011).

1a) 

1b) 

The system would be turned on 24 hours a day, seven days a week during both years the project activities would be conducted and on station, except during deployment of the AUV to ensure successful tracking of the AUV while deployed. A complete mapping survey plan would be created and installed on R/V *Sikuliaq's* navigation computers. This type of multibeam sonar is different from Low-Frequency Active Sonar used by the U.S. Navy which uses a frequency range of 100 - 1,000 hertz (Federation of American Scientists, 2007).

Autonomous Underwater Vehicle (AUV) *Sentry*

The Autonomous Unverwater Vehicle (AUV) *Sentry* would conduct a total of 27 dives during 2014 (nine sites, three dives per site), at a target depth range of 300 – 600m (see figure 2-1 below for project locations). The total amount of time spent at each dive site would be approximately 90 hours at each targeted seamount (30 hours per dive).

AUV Sentry preparing for a dive (Photo Credit: Christopher Reddy/Woods Hole Oceanographic Institution)

The AUV would be used to conduct down-looking camera surveys and to acquire CTD and oxygen data. The primary purpose of the camera surveys would be to document the benthic fauna of each of the targeted seamounts. The angle of the AUV camera combined with the height it would be hovering over new terrain, provide for little ability to identify species or families of corals (C. Fisher pers comm., February 2013) or colony size. Therefore, the AUV would be used to assess coral presence, abundance, and density and habitat parameters, providing a first-order assessment of recovery. In addition, the survey data would be used to discern evidence of trawling (e.g. Waller et al. 2007) as well as be used to select areas to re-visit using the ROV during the second year of this project. The images would also be used to measure substrate parameters to tie to benthic community data.

Operation of the AUV *Sentry* requires the use of steel plate dive weights to control bouyancy during each dive's descent and ascent. Each individual steel plate weighs aproximately 16 lbs and a single dive weight is comprised of approximately 3 - 4 individual steel plates bolted together. All dive weights are made primarily of Alvin plates, which are approximately 12" x 9" x 5/8" and are made of flame cut mild steel and are not painted or surface treated. Two different configurations of weights would be left on the seafloor; *Sentry* descent dive weights and *Sentry* ascent dive weights.

A *Sentry* descent dive 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

Sentry descent weight

A *Sentry* ascent dive weight is composed of:

- 3x or 4x Alvin plates depending on vehicle configuration
- 1x galvanized steel carriage bolt. 3.5 in. or 4 in. long depending on vehicle configuration. ½ x 13 thread
- 1x galvanized steel washer, ½ in.
- 1x or 2x galvanized steel hex nut. ½ - 13 thread

Sentry ascent weight

To control bouyancy, the AUV *Sentry* utilizes one descent weight per dive, weighing approximately 64 lbs, and two *Sentry* ascent weights per dive, weighing between 48 – 64 lbs each. Each AUV dive is estimated to take approximately 30 hours. A total of 27 dives would occur in the first year, leaving an estimated 81 dive weights on the seafloor throughout the project area. However, a maximum of 310 plates (4,960 lbs) bolted together to form 93 complete sets of dive weights would be configured and carried onboard the R/V *Sikuliaq* in anticipation of the 27 scheduled AUV dives, which would leave 81 dive weights on the seafloor as well as 12 additional dive weights in the event they are necessary as a result of weather contingencies. The proposed PMNM permits will allow for a maximum of three dives at each of the nine identified sites, of which three sites are located within PMNM. Therefore, a total of nine dives would be conducted within PMNM and 27 weights would remain on the seafloor within PMNM (<1,800 lbs of steel)

The decay rate of steel in seawater varies depending on the type of steel. 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). Since PMNM waters typically have lower oxygen content and temperatures, corrosion rates of the soft steel plates are expected to be slower than the above estimates. Actual corrosion rate depends on the salinity, oxygen availability, and temperature of the water (National Association of Corrosion Engineers, 1984). 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.

The AUV *Sentry* navigates using both internal (dead reckoning) and external navigation (Doppler Velocity Logs). The systems Doppler Velocity Logs (300 and 1200 kHz) operate at higher frequencies than the range generally considered relevant to marine mammals and cetaceans. These systems are also pointed directly down and therefore are unlikely to intersect with the path of marine mammals, cetaceans and sea turtles. The internal navigation system receives periodic updates from R/V *Sikuliaq* using an ultra short baseline (USBL) acoustic based system. As a required condition of the proposed PMNM permits, the USBL system would be calibrated for use on this research cruise prior to entry into Monument waters. The frequencies emitted from the USBL system are relatively high. However, while such frequencies are not entirely out of the relevant hearing range of marine mammals, cetaceans, and sea turtles, the USBL navigation system is commonly used by researchers and has no known adverse impact on marine life.

The Sidescan system enables the AUV to continuously record raw data of the seafloor. As part of normal operations as well as a condition of the proposed PMNM permits, the system would be turned off during ascent and descent, resulting in sound energy that would remain near the seafloor. The sub bottom sonar would operate at a limited frequency range from 4kHz - 24kHz, a conditional requirement of the proposed PMNM permits, reducing the distance the sound energy would travel. This system is pointed straight down and therefore is unlikely to directly intersect marine mammals and cetaceans when the AUV is near the bottom.

External Release Type (XR) emergency release transponders would be utilized frequently, however, they operate on a precision ten second cycle and therefore do not produce as much overall noise as most sonar systems. These systems have been used for over 40 years worldwide and have no known negative impacts to marine mammals or cetaceans. Finally, an imaging multibeam (900 kHz) would be used in steep terrain, however, it operates at a higher frequency than the range generally considered relevant to marine mammals and cetaceans. (Baco-Taylor pers. comm; July 28, 2014)

As a condition of the proposed PMNM permits, the operator would perform pre-dive and post-dive maintenance checks on the AUVs. During these checks, all hydraulic and pressure compensating systems are examined for leaks, water intrusion, and other potential problems. Any oil leak found on these systems would be addressed prior to the next dive mission to ensure proper operation of the AUV. No solvents or fuels are used to operate the AUV. Silicone-based lubricants are used to treat the seals within pressure proof systems on the AUV.

All electrical and hydraulic systems on the AUV are sealed to the environment as intrusion of seawater into any part of these components must be avoided to ensure proper functionality and successful operation. All power generation is electrical. The battery systems emit a small amount of hydrogen gas which is released through check valves to avoid pressure build up inside the battery pods.

The AUV typically operates 24 hours per day, however, for this project, AUV *Sentry* is the primary diver, therefore, to the extent possible without impacting data coverage, launch and recovery would not occur between the hours of 00:00 (midnight) and 06:00 (6am). The R/V *Sikuliaq*'s crane along with two handheld taglines and an air winch controlled tagline would be used for stabilization while the AUV is lowered overboard.

Remotely Operated Vehicle

The Remotely Operated Vehicle (ROV) system that would be utilized to conduct additional research and collections during the second year of this project has not yet been identified. A supplemental Environmental Assessment would be completed prior to use of the ROV.

Project Locations

Figure 2-2 Project Locations Map

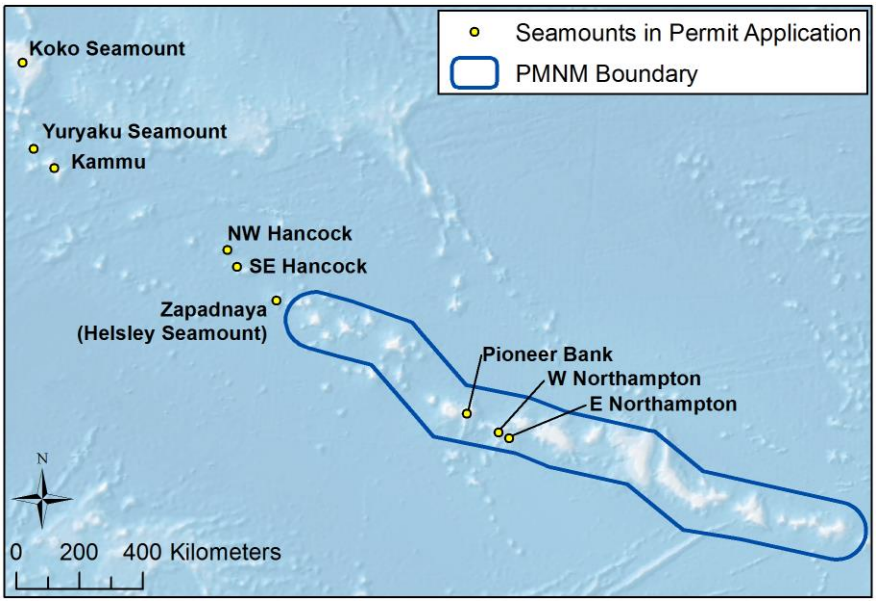
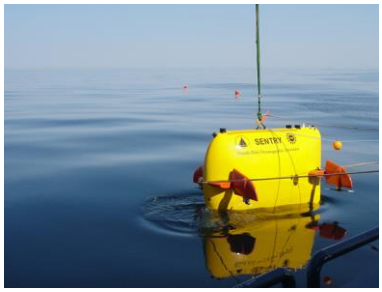


Figure 2-3 Project Location Coordinates

Feature Name	Lat N	Long E/W	*Last Year Trawled	Coral Observations	Total Catch **mt	SA (km^2)	Catch per km^2	C (km)
Koko Smt	35 15.0	171 35.0	Ong	ns	92500	3874	24	397.7
Yuryaku Smt	32 40.2	172 16.2	Ong	ns	98000	72.7	1348	41.2
Kammu	32 10.0	173 00.0	Ong	ns	28000	610.3	46	166.7
NW Hancock	30 16.2	178 43.2	1986 - ong	ns	98300	5.6	17558	9.2
SE Hancock	29 47.4	179 04.2	1986	ns	92500	10.9	8525	16.3
Zapadnaya	28 54.0	-179 36.0	1977	Yes	11500	42.3	272	33.2
Pioneer Bank	26 00.0	-173 26.0	Never	Yes		143.0		103.1
W Northampton	25 30.6	-172 24.6	Never	ns		81.48		85.8
E Northampton	25 22.2	-172 04.2	Never	ns		37.96		53.7

All positions from SBN earthref.org. *NOAA Report (2008), ong = ongoing. ns = not surveyed on previous explorations for precious corals in the NWHI. SA = Surface area given as area within 300-600m depth range, C = circumference for the 600m depth contour.

Table 2-1 Vessel Specifications

Facility	Specifications	
R/V *Sikuliaq*	Built: 2014 Ownership: National Science Foundation Length (overall): 261 ft Beam (max across reamer): 52 ft Draft: 18 ft 9 in Gross Tonnage: 3,242 tons Displacement: 3,665 tons Speed: Cruising 11 knots; Full 14.2 knots; Minimum 1 knot Range: 60 days Fuel Capacity: 170, 000 gallons (at 95% capacity) Endurance: 60 days (food and fresh water)	
AUV *Sentry*	Dimensions: Length: 9 ft 7 in; Width: 7 ft 2 in; Height: 5 ft 8 in Weight: 2,750 lbs Operating Range: 38 – 54 miles Max. Operating Depth: 19,685 ft (6,000 meters) Operating Speed: 0 – 2.3 knots Energy: Lithium Ion batteries, 13 kWh; 10 hrs Endurance Navigation: USBL Navigation with real-time Acoustic Communications and/or Long Baseline (LBL) using acoustic transponders, Doppler Velocity Log (DVL), and Inertial Navigation System (INS) Buoyancy Control: 3 Sentry dive weights; 1 during descent, 2 during ascent (left on seafloor)	

No Action Alternative

The No Action alternative would be to deny issuance of requested PMNM permits, based on the Findings defined in PMNM regulations 50 CFR Part 404.11, for the Proposed Action. 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.

Table 3-1 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 3-1 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 are dropped over an extremely large area <1,800 lbs per year over 362,075 square km.	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 *Sikuliaq,* 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.
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 *Sikuliaq* and properly disposed of on land.	No impact

3.2 Marine Biological Resources

PMNM encompasses a vast and remote chain of islands that is a part of the Hawaiian archipelago, including emergent and submerged lands and waters within a radius of approximately 50 nautical miles from the islands. 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. PMNM includes State of Hawaiʻi waters and submerged lands, including the NWHI State Marine Refuge and Kure Atoll Wildlife Sanctuary. PMNM also includes Midway Atoll National Wildlife Refuge/Battle of Midway National Memorial, Hawaiian Islands National Wildlife Refuge, and the NWHI Coral Reef Ecosystem Reserve. 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 *Sikuliaq* 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 300 – 600m (984 – 1,969 ft). The descriptions of these target islands below are summarized from the Papahānaumokuākea Marine National Monument Final Management Plan (2008).

The Northwestern Hawaiian Islands (NWHI)

The NWHI can be characterized as a large marine ecosystem exposed to a wide range of oceanographic conditions and environmental and anthropogenic stressors. Submerged geomorphologic features, including reef, slope, bank, and seamount habitats, support a diverse range of shallow and deepwater marine life. Small islands and islets provide critical breeding grounds and nesting sites for endangered, threatened, and rare species that forage throughout the coral reef, deepwater, and pelagic marine ecosystems encompassing the NWHI.

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. The descriptions of these target islands below are summarized from the Papahānaumokuākea Marine National Monument Final Management Plan (2008), which is incorporated by reference.

Maro Reef (Koʻanakoʻa)

Maro Reef is a submerged open atoll with less than one acre of emergent land. At very low tide, only a small coral rubble outcrop of a former island is believed to break above the surface. 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. Maro has intricate “reticulated” reef crests, patch reefs and surrounding lagoons. Deepwater channels with irregular bottoms cut between shallow reef structures. Maro’s outermost reefs absorb the energy of swells that travel toward the inner lagoon. The innermost area lies within reticulated reefs and aggregated patch reefs and has the characteristics of a true lagoon, with little influence from

large ocean swells. 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. Most of the reef area at Laysan is in deeper waters, with a small shallow-water reef area in a bay off the southwest side of the island. The land cover of Laysan consists of vegetation and sandy dunes including a 100-acre hypersaline lake (one of only five natural lakes in Hawai'i). 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 (Papa'āpoho)

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. Lisianski is part of a larger open atoll, and lies at the northern end of a reef bank called Neva Shoal, which is estimated to be close to 290,000 acres. 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. Pearl and Hermes reef is a true atoll, fringed with shoals, including permanent and ephemeral sandy islets. The islets provide important dry land respites for seals, turtles, and birds in need of rest, protection from predators, or nesting grounds. The islets are periodically washed over when winter storms pass through the area.

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. Numerous patch reefs dot the lagoon. Midway originated as a volcano approximately 27 million years ago. In 1965, the U.S. Geological Survey took core samples and hit the solid basaltic rock 180 feet beneath Sand Island atoll and 1,240 feet beneath the northern reef. Despite being heavily used by humans, Midway boasts the largest nesting colonies of both Laysan and black-footed albatrosses in the world.

Kure Atoll (Mokupāpapa)

Kure Atoll is located at the northern extent of coral reef development. The atoll is nearly circular with a six-mile diameter enclosing nearly 200 acres of emergent land. The outer reef forms almost a circle around the lagoon except for passages to the southwest. 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. Surrounding French Frigate Shoals is a series of submerged banks. 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. The crest or top of Raita Bank is nearly 60 feet from the ocean surface. Pioneer Bank is only 22 nm from Neva Shoals, and the features combine to form a major coral reef ecosystem rich in biodiversity with a variety of marine habitats. Bank areas provide extensive habitat for bottomfish and a few are known to provide foraging habitat for endangered Hawaiian monk seals. Large precious corals, such as gold, pink and black corals, are also found in the deep waters of these banks. Unlike shallow reef corals that harness sunlight as an energy source through photosynthesizing symbiotic dinoflagellates in their tissues, deep-water corals live in near-total darkness and thus for a food source, deep-water corals rely on their tentacles to capture plankton from the water column.

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. Coral cover varies significantly across the NWHI. Most regions have low coral cover with the exception of Maro Reef and Lisianski Island having comparatively high coral cover. 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. In addition, deep-sea corals support habitat for a diverse array of species, serve as a hotspot of biological diversity, as well as serve as indicators of past climates. Currently, a total of 355 algal species have been recorded from shallow water coral reef habitats of the NWHI. The NWHI contain a large number of Indo-Pacific algal species not found in the MHI, such as the green calcareous alga (*Halimeda velasquezii*). Unlike the MHI where invasive species (e.g. invasive algae, *Kappaphycus alvarezii*) have overgrown many coral reefs, the reefs of the NWHI are largely free of invasive species. Approximately 98% of PMNM's area is deeper than 100 m, therefore deep-sea research is important to understand what is being protected within PMNM.

Bottomfish

Prior to the establishment of PMNM, commercial bottomfishing had been conducted in the NWHI for over 60 years. Bottomfish are found concentrated on the steep slopes of deepwater banks of the NWHI. Descriptions of bottomfish habitats in the NWHI indicate that the distribution and abundance of bottomfish are patchy, and appear to be associated with cavities or oceanic current patterns that serve as prey attractants (Kelly et al. 2004). 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). Common bottomfish species include onaga (*Etelis coruscans*), ehu (*E. carbunculus*), opakapaka (*Pristipomoides filamentosus*), kalekale (*P. sieboldii*), lehi (*Aphareus rutilans*), gindai (*P. zonatus*), and hapuupuu (*Epinephelus quernus*). In addition, species of Hawaii bottomfish that are federally regulated include uku (*Aprion virescens*), white ulua (*Caranx ignobilis*), black ulua (*C. lugubris*), butaguchi (*Pseudocaranx dentex*), taape (*Lutjanus kasmira*), yellow tail kalekale (*Pristipomoides auricilla*) and kahala (*Seriola dumerili*). These species together are

collectively known as the Bottomfish Management Unit Species (Hawaii Bottomfish Fishery 2007). With the establishment of PMNM, commercial bottomfishing was phased out and the fishery closed on June 15, 2011 (Monument Proclamation 8031).

Seabirds

Seabird colonies in the NWHI constitute one of the largest and most important assemblages of seabirds in the world, with approximately 14 million birds representing 20 breeding species (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. The greatest threats to seabirds in the NWHI are introduced mammals and other invasive species, fishery interactions, contaminants, oil pollution, and climate change.

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. Use of acoustics (i.e. sound waves) is an important tool for marine mammals in communication, locating prey, and navigation.

Endangered Species

According to the Endangered Species Act of 1973, endangered species are those currently facing extinction. Threatened species are those likely to become endangered within the foreseeable future. Twenty-three species of plants and animals known to occur in the NWHI are listed under the Endangered Species Act (see Table 3-1). 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*)

Green sea turtles have been protected under the ESA since 1978. Over 90 percent of all sub-adult and adult green turtles found throughout Hawai'i originate from the NWHI. After more than 25 years of protecting nesting and foraging habitats in the Hawaiian Archipelago, the Hawaiian green sea turtle population is showing some signs of recovery. 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 was listed as an endangered species under the ESA in 1976 and is protected by the State of Hawai'i under HRS 195D. The 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. While 80 to 100 Hawaiian monk seals coexist with humans in the main Hawaiian Islands, the great majority of the population lives among

remote islands and atolls within PMNM. Their range generally consists of the islands, banks, and corridors within the PMNM, although individuals have been found farther than 50 nm from shore. 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) around the following: Pearl and Hermes Atoll; Kure Atoll; Midway Atoll, except Sand Island and its harbor; Lisianski Island; Laysan Island; Maro Reef; Gardner Pinnacles; French Frigate Shoals; Mokumanamana; and Nihoa (50 CFR 226.201).

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. Poetically referred to as Ke kai pōpolohua mea a Kāne (the deep dark ocean of Kāne), the ocean was divided into numerous smaller divisions and categories, from the nearshore to the deeper pelagic waters (Malo 1951). Likewise, channels between islands were also given names and served as connections between islands, as well as a reminder of their larger oceanic history and identity.

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). Despite the fact that the NWHI were not used and experienced on a daily basis by most Hawaiians, they have always been seen as an integral part of the Hawaiian Archipelago and have been honored as a deeply spiritual location, as evidenced by the many wahi kūpuna, or sacred sites, on Nihoa and Mokumanamana.

Maritime Heritage Significance

In addition to the rich Native Hawaiian cultural setting, 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).

As American and British whalers first made passage from Hawai‘i to the seas near Japan in 1820, they encountered the low and uncharted atolls of the NWHI. At times the treacherous nature of navigation in the region gave rise the Western names of the islands and atolls as we know them today. Pearl and Hermes Atoll is named for the twin wrecks of the British whalers *Pearl* and *Hermes* lost in 1822. Laysan was reportedly discovered by the American whale ship Lyra prior to 1828. The history of American whaling is a significant part of our national maritime heritage and is a topic that encompasses historic voyages and seafaring traditions set on a global stage as these voyages had political, economic and cultural impacts. As a nation we were intimately involved in the whaling industry in important and complex ways. There are 10 known whaling shipwrecks in the NWHI. Three of these have been located (American whaler Parker and British whalers Pearl and Hermes) and their archaeological assessment is underway. Whaling vessel wreck sites from the early 19th

century are quite rare, and the study and preservation of heritage resources is an important concern. The NWHI provide a unique glimpse into our maritime past.

Despite being slowly integrated into navigational charts, the NWHI remained an area of low and inconspicuous reefs and atolls for many years, frequented by shipwrecks and castaways. Russian and French ships of discovery transited the NWHI, and sometimes found themselves upon the sharp coral reefs. Nineteenth century Japanese junks of the Tokugawa Shogunate period, drifting away from their home islands and into the Pacific, were reportedly washed onto the sands of the atolls. Hawaiian schooners and local fishing sampans voyaged into the archipelago, many not to return. Marine salvage expeditions based out of the main Hawaiian Islands profited from the area, although existing records of their cruising activities are scarce. These types of sites have the potential to yield information about early historic period voyages in the Pacific and about the seafaring traditions of many cultures.

3.4 Physical Conditions

Water Quality

Hawai‘i’s water quality standards (Chapter 11-54 HAR) are broadly based to protect both terrestrial (groundwater and surface waters) and marine waters. They consist of basic standards applicable to all waters, specific numerical standards for many toxic substances, and specific numerical standards for a number of classes of state waters. Due to their remote location and low level of human activities, the waters of the NWHI are relatively pristine.

Air Quality

Hawai‘i’s air quality standards (HRS, Chapter 342B, Air Pollution Control and HAR Chapters 11-59 and 11-60.1) are broadly based and adhere to all federal emission standards for hazardous air pollutants. Due to their remote location and low level of human activities, the air of the NWHI are 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. Marine pollution may originate from land-based or sea-based human activities in the form of point-source discharges or non-point source runoff.

Marine debris is a form of marine pollution that may originate from sea-based activities, such as shipping and fishing or from land-based activities that discharge pollutants in surface water runoff. Marine debris, including derelict fishing gear, cargo nets, bottles, military flares, and barrels of hazardous materials, continue to wash ashore on all the NWHI causing potential localized adverse impacts. Seabirds often ingest smaller debris while foraging, impacting survival rates.

3.6 Marine Traffic

Federal regulations (50 CFR Part 404) define specific vessel traffic reporting rules for areas within PMNM, a designated a Particularly Sensitive Sea Area (PSSA). All domestic vessels, foreign vessels greater than 300 gross tons that are either going to or coming from a U.S. port or place, and foreign vessels of any size that are heading to or coming from a U.S. port or place that are experiencing an emergency while transiting PMNM are required to provide notification to PMNM via telephone, fax or email (http://www.papahanaumokuakea.gov/resource/ship_reporting.html). All other vessels are encouraged to participate, but are not required. Passage without interruption is highest during the winter months (October – February) due to bad weather north of PMNM. 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.

4.2 Proposed Action

Marine Biological Resources

Under the Proposed Action, vessel and AUV *Sentry* operators would implement operational practices to minimize any potential to adversely impact the environment or marine biological resources. Implementation of these operational practices will be an explicit condition of the permits considered in this Proposed Action.

To avoid deepwater corals when dropping ballast dive weights while performing underwater work. To the extent possible, AUV operators would select ballast drop sites where corals are not present. R/V *Sikuliaq* 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.

To ensure minimal sound impact to cetaceans and marine mammals, standard mitigation techniques including using a "soft start" or "ramp up" to the maximum noise output of the ship's multibeam would be followed (Barlow and Gisner 2006). Observers onboard would also scan the area for marine mammals before starting the ship's multibeam system and/or launching the AUV *Sentry* and wait until any marine mammals that might be present have left the area before starting.

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 below 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). The AUV *Sentry* and multibeam onboard the R/V *Sikuliaq* use no low range frequency (<500Hz) equipment. All of the studies to date show mid- and high-range frequencies, like those used by the AUV (most are >8kHz) and the ship, typically have little effect on marine life.

There is no research that indicates the type of multibeam system that R/V *Sikuliaq* operates is harmful to marine mammals. An identical multibeam system is utilized onboard R/V *Falkor*, which recently spent a total of 72 days within the Monument via two 36 day cruises that occurred in May and June 2014 respectively (Permit numbers PMNM-2014-002; Chris Kelley and PMNM-2014-04; Eric King). During both cruises, National Marine Fisheries Service (NMFS) Pacific Islands Regional Office (PIRO) Observer Program staff members were onboard R/V *Falkor* during both cruises within PMNM and no negative impacts to marine mammals, including whales, dolphins and sea turtles were observed.

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 *Sikuliaq* 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 *Sikuliaq*'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 302 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 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 *Sikuliaq* and AUV *Sentry* 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 300 – 600 m (984 – 1,969 ft). 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 AUV would drop approximately 170 lbs of steel dive weights as ballast per dive. With total of 27 dives, the total amount of steel dive weights dropped as ballast would be 4,960 lbs. The steel dive weights would not be recovered and would slowly dissolve, adding iron to the water. The environment where the ballast is likely to be dropped is iron-limited (J. Wiltshire, personal communication via email, SOEST, September 10, 2007). The AUV would drop one (1) dive weight (~64 lbs) on the initial dive and no more

than 128 lbs on the return ascent (the weight of each *Sentry* ascent weight ranges from 48-64 lbs. AUV *Sentry* can dive for upwards of 22 hours at a time, therefore, descent and ascent weight ballast would likely be dropped in different areas. Most of the AUV work occurs in deeper water below the photocline, and all ballast would be dropped in the aphotic zone. The steel ballast 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 SPA boundaries. As such, all sewage aboard R/V *Sikuliaq* 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 *Sikuliaq* diesel engine would have no adverse effect on existing air quality within the PMNM. The AUV *Sentry* is 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 *Sikuliaq* would not discharge significant amounts of solid waste within PMNM.

Under the Proposed Action, the AUV would drop approximately 170 lbs of steel dive weights as ballast per dive. With total of 27 dives, the total amount of steel dive weights dropped as ballast would be 4,960 lbs. The steel dive weights would not be recovered. The steel that would be used as ballast under the Proposed Action 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 (Ferro 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 *Sikuliaq* would undertake one research cruise totaling 50 days in 2014 and potentially another research cruise, up to 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 4.2.2 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 *Sikuliaq* would not enter PMNM eliminating the necessity for potential for dropping ballast

and anchor. 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 *Sikuliaq* 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 ballast drop-weights 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 *Sikuliaq* 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 *Sikuliaq* 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.

Activities that have been considered under cumulative impacts that could potentially intensify impacts of the Proposed Action are summarized in Table 4-1.

Marine Biological Resources

In 2007 and 2009 respectively, activities similar to the Proposed Action were conducted with no observable negative impacts to the environment. Projects that could potentially contribute to cumulative impacts with the Proposed Action are summarized in Table 4-1 below. The table includes short descriptions of these projects. One research project was analyzed in a separate Environmental Assessment entitled “University of Hawaii (UH) Marine Center and Hawaii Undersea Research Laboratory (HURL) Vessel Operations”. A Finding of No Significant Impact was signed in October, 2009. When combined with the Proposed Action, one project does occur at similar depths, however, the depth range of the prior action was much larger (200m – 4,000m) and occurred in different locations within PMNM, and the Proposed Action would occur approximately five years after activities conducted by the University of Hawaii, Marine Center and Hawaii Undersea Research Laboratory that occurred in 2009. Therefore, the Proposed Action will not significantly impact marine biological resources.

In the past, roughly 17 expeditions for conservation and management and research purposes were 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 – 2013, 23 research expeditions targeted depths within the range of 300-600 m (984-1,969 ft) 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 300 – 600 m (984 – 1,969 ft). 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

Water Quality

On average, permitted vessels enter and exit the Monument 17 times per year. All vessel effluent discharge and anchoring is highly regulated and, in many areas, prohibited. Regulations for the PMNM, prohibit discharging or depositing any material into PMNM that could injure any resource. Blackwater discharge is prohibited within PMNM. Exceptions are made to discharges incidental to vessel operations, such as deck wash, approved marine sanitation device effluent, cooling water, and engine exhaust.

The Proposed Action would operate in deep water areas only away from all SPA boundaries. As such, all sewage aboard R/V *Sikuliaq* would be treated and the grey water recycled and if discharge is necessary, discharge would be well outside of any SPA boundary, preferably outside of the Monument boundaries. As a result, the Proposed Action would not significantly degrade the water quality within PMNM; therefore, no cumulative impacts to water quality are expected to occur as a result of the Proposed Action.

Air Quality

No significant adverse impacts to air quality are anticipated as a result of the Proposed Action. The location of PMNM is remote and vast and access is regulated resulting in minimal accesses per year. On average 17 vessel entries and exits occur each year and 50 flights per year. Two runways were operational within PMNM (Midway Atoll and Tern Island, French Frigate Shoals) until 2011. In 2011 the runway on Tern Island was closed, leaving only one operational runway within PMNM (located on Midway Atoll). As a result, the number of flights drastically decreased starting in 2012 and are expected to either remain the same or decrease in future years. In addition, emissions resulting from vessel operations and use of lithium batteries are minimal and result in no known cumulative impacts to the environment, especially given the remote location and relatively pristine environment. Therefore, the Proposed Action would not result in cumulative impacts.

Solid Waste

There have been no AUV operations within the NWHI since PMNM was designated. However, there are records of submersible divers within PMNM. Submersible (subs) dives have totaled five in 2009, eight in 2010 and zero from 2011-2013. The estimated ballast dropped since 2000 is approximately 32,200 lbs, or an average of approximately 3,578 lbs a year. The subs never drop ballast in the same locations; when research activities (e.g. gold coral monitoring, or diving on same geological feature (seamount)) require subs to visit the same locations, sub operators conduct dives on different track lines and drop ballast in different locations away from research areas. 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.

Other activities that could potentially contribute to cumulative impacts with the Proposed Action are summarized in Table 4-1.

Table 4-1 Relevant Projects within PMNM

Project Name	Time Frame	Purpose and Scope
Support for permitted activities using submersibles within PMNM	November 2009 – November 2010 (PMNM-2009-053; PMNM-2009-057)	The project provided facility support aboard R/V *Ka'imikai-O-Kanaloa* for researchers to map and study the seafloor within PMNM using submersibles.
Identification of Deep-sea Corals and Sponge Beds	October 2011 – November 2011 (PMNM-2011-037)	The project allowed for the opportunistic sampling of deep-sea corals and sponges to study genetic connectivity, using submersibles
Bathymetric (seafloor) mapping in PMNM	March 2014 – February 2015 (PMNM-2014-002)	The project conducted seafloor mapping within PMNM using multibeam sonar and simultaneously collect both gravity and magnetic field data
Support for permitted activities aboard R/V FALKOR	March 2014 – February 2015 (PMNM-2014-004)	The project provided vessel operations in support of Christopher Kelley's proposed research activities to map the seafloor of the Monument using multibeam sonar
NOAA Ship HI'IALAKAI as a support platform for permitted activities	January 2014 – December 2014 (PMNM-2014-005)	The project allows NOAA Ship HI'IALAKAI entry into PMNM. Personnel aboard the vessel would be permitted under separate permits. This activity has been permitted in 2009 - present

Marine Traffic

No significant adverse impacts to marine traffic are anticipated as a result of the Proposed Action as only permitted vessels may conduct activities above and beyond passage without interruption and a limited number of vessels are permitted to access the Monument each

year. On average permitted vessels enter and exit the Monument a total of 17 times per year; therefore, the Proposed Action would not result in cumulative impacts.

Hazardous and Regulated Materials

No significant impacts to the Monument as a result of use or hazardous or regulated materials are anticipated as materials would be contained and stored onboard the R/V *Sikuliaq* and properly disposed of once outside of the Monument. The Proposed Action requests a minimal amount of hazardous and regulated materials, all of which are necessary for vessel and small boat or AUV operations and maintenance and would be properly stored and cared for while at sea. Therefore, the Proposed Action would not result in cumulative impacts.

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5.0 ENVIRONMENTAL PERMITS, APPROVALS, AND COMPLIANCE

5.1 Permits

The University of Alaska-Fairbanks, Seaward Marine Center and the Florida State University have submitted two permit applications (one conservation and management application and one research application) to conduct vessel operations (R/V *Sikuliaq* and AUV *Sentry*) and seafloor surveys 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 *Sikuliaq* for vessel support and researchers utilizing and operating 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 in the depth range considered in this research project, however, are primarily found on rocky substrate such as submerged banks. Soft bottoms such as the areas targeted for deployment of the current meter and data logger and ballast discharge by the AUV *Sentry* 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 and no adverse impacts to the habitat or the species present (see section 3.2.11) are expected. No adverse impacts to Essential Fish Habitat 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 300 - 600m. All precautions would be taken not to disturb Hawaiian monk seals, green sea turtles, and all cetaceans previously listed.

On August 19, 2014, PMNM initiated an informal consultation with NMFS Pacific Islands Regional Office (PIRO) on the Proposed Action – procedures which included operation of R/V *Sikuliaq*, deployment of the AUV *Sentry*, water sampling and deployment of a current meter data logger. 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

September 12, 2014 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 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 species 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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