ENVIRONMENTAL ASSESSMENT

UNIVERSITY OF HAWAIʻI (UH) MARINE CENTER AND HAWAIʻI UNDERSEA RESEARCH LABORATORY (HURL) VESSEL OPERATIONS

Papahānaumokuākea Marine National Monument
Northwestern Hawaiian Islands
Hawaiʻi

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

September 2011

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EXECUTIVE SUMMARY

This Environmental Assessment was prepared in accordance with the National Environmental Policy Act of 1969 (42 United States Code §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 proposes to issue an annual conservation and management permit to the University of Hawai‘i (UH) Marine Center for the operation of the UH research vessel (R/V) *Ka‘imikai-o-Kanaloa* (KOK) and an annual research permit to the Hawai‘i Undersea Research Laboratory (HURL) for the operation of HURL submersibles and a Remotely Operated Vehicle within Papahānaumokuākea Marine National Monument (hereinafter referred to as the "proposed action") each year for a duration of five years. Both permits would support a range of deep-sea marine research projects. The UH Marine Center R/V KOK 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 HURL submersibles and a Remotely Operated Vehicle (ROV) for underwater work.

The purpose of the proposed action is to satisfy the Findings of Presidential Proclamation 8031 which authorizes research in the Monument designed to enhance understanding of Monument resources and assist in the conservation and management of the Monument (Monument Management Plan, 2008). The proposed action is needed to support research operations which would garner a better understanding of deep-sea ecosystems 200-4,000 m (660-13,123 ft) through voucher specimen collection of new records and new species, bathymetric habitat mapping, and characterization of the deep-sea ecosystems. This information would allow for better management of deep water areas within PMNM, consistent with Proclamation 8031.

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, physical conditions, marine traffic, solid waste and cultural resources. The proposed action would not create environmental health and safety risks that may disproportionately affect minority or disadvantaged populations, and would not result in significant cumulative impacts to any environmental resource category.

NOAA therefore anticipates issuing a Finding of No Significant Impact for the proposed action.

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ENVIRONMENTAL ASSESSMENT
UH MARINE CENTER AND HURL VESSEL OPERATIONS
PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT, HAWAIʻI

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ACRONYMS AND ABBREVIATIONS

ATBA	Area to Be Avoided
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
dB	Decibel
DOD	U.S. Department of Defense
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
FONSI	Finding of No Significant Impact
FR	Federal Register
Ft	feet
HAR	Hawai‘i Administrative Record
HDOH	Hawai‘i Department of Health
HURL	Hawai‘i Undersea Research Laboratory
IMO	International Maritime Organization
KOK	*Ka‘imikai-o-Kanaloa*
lbs	pounds
LORAN	Long Range Navigation
m	meter(s)
m^2	square meter(s)
MHI	Main Hawaiian Islands
NAAQS	National Ambient Air Quality Standards
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
nm	nautical miles
NOAA	National Oceanic and Atmospheric Administration
NWHI	Northwestern Hawaiian Islands
PCBs	polychlorinated biphenyls
PMNM	Papahānaumokuākea Marine National Monument
PSSA	Particularly Sensitive Sea Area
R/V	research vessel
ROV	remotely operated vehicle
SOEST	School of Ocean and Earth Science and Technology
SPA	Special Preservation Area
spp.	Species (plural)
SRS	Ship Reporting System
sub	submersible
UH	University of Hawai‘i
uPa	Micropascal
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service

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1. PURPOSE AND NEED FOR ACTION

1.1 SUMMARY OF PROPOSED ACTION

NOAA's Office of National Marine Sanctuaries proposes to issue an annual conservation and management permit to the University of Hawai‘i (UH) Marine Center for the operation of the UH research vessel (R/V) *Ka‘imikai-o-Kanaloa* (KOK) and an annual research permit to the Hawai‘i Undersea Research Laboratory (HURL) for the operation of HURL's submersibles and a Remotely Operated Vehicle within Papahānaumokuākea Marine National Monument, each year for a five year period (hereinafter referred to as the "proposed action"). Both permits would support a range of deep-sea marine research projects. The UH Marine Center R/V KOK 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 HURL submersibles and a Remotely Operated Vehicle (ROV) for underwater work. This Environmental Assessment will consider the effects of the proposed action for a duration of five years.

1.2 PURPOSE AND NEED

The purpose of the proposed action is to satisfy the findings of Presidential Proclamation 8031 which authorizes research in the Monument designed to enhance understanding of Monument resources and assist in the conservation and management of the Monument (Monument Management Plan, 2008). The proposed action is needed to conduct vessel, submersible, and ROV operations in support of separately permitted research activities taking place at depths between 200m and 4,000m (660-13,123 ft). Conducting vessel, submersible and ROV operations to support permitted research projects would contribute toward a better understanding of the deep-sea benthic environment. This information would allow for better management of deep sea resources in PMNM, consistent with Presidential Proclamation 8031. It is noted that this activity was permitted in 2007 and 2009. The proposed action is a continuation of these respective research and conservation and management activities.

1.3 BACKGROUND

<u>Papahānaumokuākea Marine National Monument (PMNM) – Regulatory Environment</u>

President George W. Bush established 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 Proclamation 8031 (Proclamation; 71 FR 36443) and codified in regulations (50 CFR 404).

Papahānaumokuākea (Figure 1-1) is administered jointly by three Co-Trustees – the Department of Commerce through the National Oceanic and Atmospheric Administration (NOAA), the Department of Interior through the U.S. Fish and Wildlife Service (FWS), and the State of Hawai‘i through the Department of Land and Natural Resources (collectively, the Co-Trustees). In addition, the Co-Trustee agencies work in close collaboration and consultation with the Office of Hawaiian Affairs to ensure that both cultural and natural resources are protected in a manner appropriate and with reverence to the Native Hawaiian host culture. The mission of PMNM is to carry out seamless integrated management to ensure ecological integrity and achieve strong, long-term protection and perpetuation of NWHI ecosystems, Native Hawaiian culture, and heritage resources for current and future generations.

Papahānaumokuākea includes a number of existing federal conservation areas: the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve, managed by the U.S. Department of Commerce through NOAA; and Midway Atoll National Wildlife Refuge, Hawaiian Islands National Wildlife Refuge, and Battle of Midway National Memorial, managed by the U.S. Department of Interior through FWS. These areas remain intact within the Monument, subject to their applicable laws and regulations in addition to the provisions of the Proclamation. Papahānaumokuākea also include State of Hawai‘i lands and waters, managed by the State through the Department of Land and Natural Resources as the Northwestern Hawaiian Islands Marine Refuge and the State Seabird Sanctuary at Kure Atoll. These areas also remain in place and are subject to their applicable laws and regulations. Inscription of Papahānaumokuākea as a World Heritage Site in 2010 added to the history of the NWHI, as the only mixed natural and cultural seascape in the world.

Although the Monument contains different areas of management, all activities within PMNM are subject to permit approval by the Monument Co-Trustees according to the Monument permitting criteria regulations in 50 CFR 404.11. Permit categories include 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. Chapter 13-60.5, Hawai‘i Administrative Rules remains in effect for proposed activities in State of Hawai‘i waters and may be subject to Hawaii Revised Statutes 343 environmental review.

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 will be significant. Specific factors that ONMS believe are relevant include the potential effects of the proposed research on unique characteristics of this geographic region. However, ONMS will 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.

The environmental assessment prepared for the proposed research was available for public comment on the Monument website (http://papahanaumokuakea.gov/) for 30 days. No comments were received. Additionally, this EA incorporates by reference the previous EA completed for permits issued in 2009 for this same research project and vessel operations. That EA was also available for a 15 day public comment period and no comments were received. UH Marine Center and Hawai‘i Undersea Research Laboratory (HURL)

The UH Marine Center maintains three research vessels: the R/V *Kilo Moana*, the R/V *Klaus Wyrtki*, and the R/V KOK. The R/V *Kilo Moana* is owned by the United States Navy and is not designed for submersible deep-sea work. The R/V *Klaus Wyrtki* is a smaller vessel designed to operate in coastal areas. Only the R/V KOK is designed and equipped for deep-sea submersible research.

HURL is one of six national centers established by NOAA and UH under NOAA's Undersea Research Program (NURP) to study deep water marine processes in the Pacific Ocean. HURL builds its research program through an annual request for proposals. Projects are selected through peer review and by a scientific advisory panel. In addition, HURL accepts funded requests from private, state, or federal agencies and participates in international collaborative research projects in the Pacific. Research proposals for work in PMNM are then reviewed by the Monument Co-Trustees according to the Monument permitting criteria on a case-by-case basis before the issuance of a permit is considered.

The current focus of HURL's Pacific-wide research projects are on deep-sea geology and ecosystems and potential global climatic influences. Future projects may include research on the geology and biology of emerging and subsiding islands, marine product and fishery assessments, and processes of submarine mineral accumulations on seamounts, volcanoes, and islands.

Figure

Figure 1-1. Papahānaumokuākea Marine National Monument, Hawai‘i

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2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVE

2.1 INTRODUCTION

This chapter presents a discussion of the two project alternatives: 1) proposed action or preferred alternative, and 2) the no action alternative. 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.

2.2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVE

2.2.1 Proposed Action

NOAA's Office of National Marine Sanctuaries proposes to issue two PMNM permits each year, for a period of five years for vessel support operations in deep sea areas 200m-4,000m (660-13,123 ft) within PMNM. One permit (conservation and management permit) would be issued to the UH Marine Center for operation of R/V KOK. Activities permitted under the conservation and management permit include entrance into the Monument, operation of the multibeam sonar mapping system, operation of small support boats, anchoring of the authorized vessels on non-coral substrate, and limited discharge associated with vessel operations. A second permit (research permit) would be issued to HURL for submersible and ROV operations in order to support separately permitted research projects in PMNM. Activities permitted under the research permit include discharging or depositing material or matter into the Monument including ballast materials composed of steel washer punches and seawater and specimen collection. Objectives of the proposed action include vessel support operations of R/V KOK, support operation for two deep-diving submersibles (*Pisces IV* and *Pisces V*), and an ROV (RCV-150) (Table 2-1). R/V KOK would be permitted to enter and conduct operations within PMNM. The KOK, *Pisces* submersibles, and ROV would be operating in deep waters 200-4,000 m (660-13,123 ft) around all island areas within the PMNM. The home port for R/V KOK is Honolulu Harbor at Pier 45. The submersibles are housed and maintained at HURL facilities at Makai Pier in Waimanalo on the windward side of O‘ahu.

In order to meet the purpose and need of the proposed action, two Monument permits are required. The conservation and management permit allows the primary vessel to enter and operate and conduct mapping in PMNM. The research permit is needed to allow the specific activities including specimen collection. Issuing only one permit would not meet the purpose and need because deep water research requires both a primary research vessel (the R/V KOK) and the deep sea submersibles and ROVs.

R/V *Ka‘imikai-o-Kanaloa* (KOK)

The UH Marine Center operates R/V KOK, owned by the State of Hawai‘i. On average, the KOK accommodates 30 personnel on each cruise, with a maximum capacity of 32 crew members. In addition to traditional berthing and living spaces, the KOK has wet and dry laboratory space, a rock lab, a clean room, and a dark room. The vessel is ballasted with fresh potable water from the dock in Honolulu. There are no ballast water exchanges at sea. The length overall (LOA) for the KOK is 223 feet. While in the Monument, the KOK would only anchor in emergency situations, and efforts would be made to drop anchor in areas that are relatively free of coral.

The KOK is dry docked every three years and the bottom and sides are cleaned using a high pressure water system to remove dirt and growth on the hull. The hull is then repainted with an anti-fouling paint, which is approved by the U.S. Environmental Protection Agency (EPA) to retard marine growth and preserve the bottom surface. The hull is also painted with a marine paint for protection in the salt water environment. The last time KOK was dry-docked was November 2008. When the KOK is not in dry-dock, divers routinely scrub the hull and propellers to remove marine growth and reduce drag.

The KOK has a Redfox Marine Sanitation Device (MSD), which uses aerobic bacteria to break down the waste material from the ships sewage system. The Redfox MSD discharges into the grey water holding tank. The KOK 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).

The ship would carry up to 101,000 gallons of diesel fuel and up to 1,000 gallons of lubrication oil, ten 16-ounce cans of WD-40 and 20 gallons of an EPA approved solvent. These are kept in the designated holding tanks located in the engine room. Used oil is stored in a designated labeled drum until return to port. HURL typically generates about one gallon of used oil per dive day. Excess oils from maintenance and repairs are cleaned up with cloth rags and/or oil absorbent pads. Used rags are stored in designated, labeled bins until return to port. The ship also carries approximately 40 gallons of paint and paint thinners that are stored in a large box on deck. Waste and excess paint is retained on board until the ship returns to port for proper disposal.

The ship would also carry about 75 gallons of spare hydraulic fluid for the ROV. The hydraulic charge cart adjacent to the ROV A-frame/winch holds about 20 gallons, and the remainder is stored in 5-gallon containers on the half deck below the hangar. The A-frame/winch power pack is located in the hangar and has a capacity of about 40 gallons of hydraulic fluid. An additional 20 gallons of spare hydraulic fluid for the A-frame/winch is stored in 5-gallon containers on the half deck below the hangar. Maintenance crews also keep small amounts of lubricants and solvents which are necessary for the proper operation and maintenance of the ROV in the Tracking room.

Although an oil spill at sea is unlikely, the crew would address the spill in accordance with the KOK Shipboard Oil Pollution Emergency Plan as approved by the U.S. Coast Guard (USCG). A Non-Tank Vessel Response Plan has also been submitted to the USCG. In the case of a hazardous material spill, the crew would follow procedures described in the KOK Safety Management Manual.

The KOK Safety Management Manual also addresses solid waste management. Degradable waste that is ground up into small pieces would be discharged overboard at a minimum distance of 3 nm from SPA boundaries, and degradable waste that is not ground would be discharged 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.

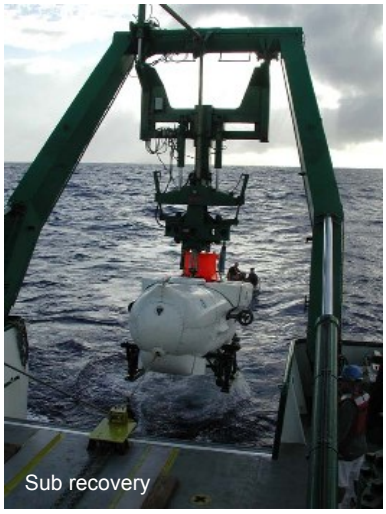
The KOK is equipped with a SeaBeam 3012 multibeam sonar bathymetric system. The system is only turned on during mapping projects. The SeaBeam system uses active sonar

to map the depth and contours of the sea floor (bathymetry). The system sends a focused pulse of sound (ping) straight down and listens for the reflected echo off 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 SeaBeam uses a frequency of 12 kilohertz and a maximum power of 30 kilowatts for deep ocean mapping pinging every 1-25 seconds. The source level on the maximum response axis is 231 decibels (dB) re. 1 micropascal (uPa) at one meter. In practice, due to slight mismatches between the amplifier and the projectors, the power levels in actual systems are usually 1-2 dB lower than the specified number which is based on an ideal match. The beam pattern is a vertically focused narrow beam system with 2x2 degree beams. The mapping system is operated during transit and service days for 24-36 hours straight. It is also operated for shorter durations during normal submarine and ROV operations, approximately 8-12 hours (J. Smith, personal communication via email, SOEST, October 26, 2009).

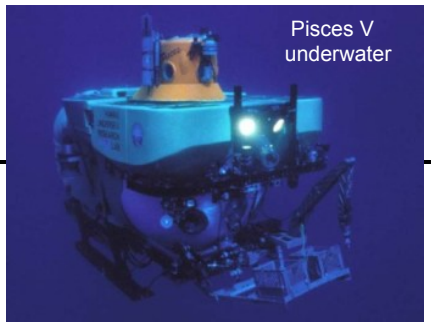
This type of sonar is different from Low-Frequency Active Sonar used by the U.S. Navy which uses a frequency range of 100-1,000 hertz (Federation of American Scientists, 2007).

Pisces IV & Pisces V

The Pisces submersibles can do a maximum of about 40 dives per year total. An average cruise within the Monument is 30-days in duration. A maximum of one cruise a year would take place within the Monument. There are typically 3 science groups on each cruise and each group conducts between 3-9 dives during the cruise duration, for a maximum total of 27 submersible dives within the Monument per year. Most of the submersible work occurs in the aphotic zone beneath the photocline where light does not penetrate.


Sub recovery

The submersibles would use steel washer punches for ballast. The punches are approximately 10mm thick, with a high surface area. The punches are made of uncoated low-carbon steel, and washed before use. To land on the sea floor, the submersible pilot drops one round of weights, and when the sub is ready to return to the surface, the pilot drops a second round of weights. In total, each submersible would drop approximately 300-400 pounds (lbs) of washer punches per dive (150-200 lbs per drop). A 5-gallon bucket of washer punches weighs about 100 lbs. During a 30 day cruise consisting of 27 submersible dives, a maximum of 10,800 lbs of steel washer punches would be discharged. Over a five year period, a maximum of 54,000 lbs of steel washer punches would be discharged. Submersible operators would survey their surroundings visually and have access to detailed maps and would avoid sensitive areas, such as coral colonies, when landing and dropping weights. All ballast would be dropped in the aphotic zone. When low-carbon steel ballast corrodes in seawater the process releases iron into the surrounding environment (Lenntech, 1998). The decay rate of steel in seawater varies depending on the type of steel. It would take approximately 5 years for a 10 millimeter-thick piece of steel to corrode in seawater. Actual corrosion rate depends on the salinity, oxygen availability, and temperature of the water (National Association of Corrosion Engineers, 1984).


Pisces V underwater

Up to 100 pounds of seawater may be pumped out or flooded into the hard ballast tanks of the submersibles, depending on the ballasting needs encountered. Under certain conditions, high pressure air may be used in soft ballast tanks to increase the buoyancy of a submersible during the ascent at the end of a dive mission. The soft ballast tanks are open to the environment to avoid rupture due to rapidly expanding air near the surface. The surplus ballast air is released into the surrounding water.

The operator would perform pre-dive and post-dive maintenance checks on each submersible. During these checks, all hydraulic and pressure compensating systems are examined for leaks and potential problems. Any oil leak found on these systems must be addressed prior to the next dive mission to ensure proper operation of the vehicle and thus the safety of observers and crew. No solvents or fuels are used to operate the submersibles. Silicone-based lubricants are used to treat the seals within pressure proof systems on the submersible.

All electrical and hydraulic systems on the submersibles are sealed to the environment as intrusion of seawater into any part of these components must be avoided to ensure the safety of observers and crew. 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 submersibles would be launched in the morning in clean condition and remain immersed in seawater during the day. Every evening, each submersible is recovered and rinsed with fresh water to remove residual seawater, which causes corrosion and crystallization issues.

Remotely Operated Vehicle

The ROV system consists of the vehicle and launching garage, a winch/A-frame unit, and the associated power and control consoles. The system has been upgraded from the original design to incorporate fiber optic data transmission. The ROV is ballasted with syntactic foam and attached lead blocks. Both types of ballast are fixed to the vehicle and are not released. No liquid ballast is used. The compact hydrodynamic design and neutrally buoyant tether cable allow close up inspections with a high degree of maneuverability. The vehicle can operate to depths of 914 m (3,000 ft). Color video and a single manipulator are standard equipment on the RCV-150. The investigator can record video and vehicle data (depth, heading, etc.) and can verbally annotate the video recording in real time. Other equipment, such as an attached basket, may be adapted for use on the ROV.

In preparation for any research cruise, the maintenance crews would wash the ROV with fresh water and Simple Green™ prior to departure and again following any maintenance onboard the KOK. While at sea, operators would rinse the ROV with fresh water on board the KOK after each dive.

Collection of Voucher Specimens

In addition to bathymetric mapping conducted by the KOK, operation of the two submersibles and ROV, the final component of each research cruise is the collection of deep water voucher specimens. Scientists specially trained in the identification of sponges, deep water corals and invertebrates travel in the submersibles to depth and guide the

submersible operator to utilize the submersibles' manipulator arms to collect voucher samples of specimens that cannot be visually identified or may represent a new geographic record or new species in accordance with the Monument's Voucher Specimen Guidelines stated below and included as Appendix A:

Collection of a limited number of a visually observable marine organism morphotype, which cannot be visually identified or may represent a new geographic record or new species, from each of the Permitted Activity Location areas defined within the respective Monument permit, based upon the per island/atoll abundance criteria below:

a. One (1) specimen can be taken, removed, or possessed if an abundance assessment cannot be ascertained, or fewer than ten (10) such specimens are present, cumulative during the course of the collection event per island or atoll;
b. Up to three (3) specimens can be taken, removed, or possessed if an abundance assessment of ten (10) or more of such specimens is ascertained, cumulative during the course of the collection event per island or atoll;
c. For clonal organisms that cannot be visually identified or may represent a new geographic record or new species, take shall be limited to no more than half the clonal organism visually observed. Up to three (3) clonal specimens of similar morphology can be taken, removed, or possessed if an abundance assessment of ten (10) or more of such specimens is ascertained, cumulative during the course of the collection event per island or atoll.

The abundance criteria as specified above is intended to prohibit over-collection and adverse impacts to deep water ecosystems. The Monument's Voucher Specimen Guidelines were developed by a Monument Management Board sanctioned working group consisting of leading taxonomists and scientists with expert knowledge of Pacific marine resources. Once specimens are collected according to the Monument's Voucher Specimen Guidelines, they are stored aboard the ship and transported to Honolulu for further laboratory identification and museum curation.

Figure 2-1. Project Location

Table 2-1. UH and HURL Facility Specifications

Facility	Specifications	
Ka‘imikai O Kanaloa	Built: 1979 (Modified 1993) Ownership: State of Hawai‘i Length: 223 ft Beam: 38 ft Draft: 13 ft 6 in Gross Tonnage: 259 Displacement: 1,961 tons Speed: Cruising 10 knots; Full 11 knots; Minimum 1 knot Range: 15,000 nautical miles (nm) (60 days) Fuel Capacity: 101, 000 gallons* Endurance: 50 days (food and fresh water)	
Pisces IV	Length: 20 ft Width: 10 ft 6 in Height: 11 ft Weight: 13 tons Crew: 1 Pilot 2 Observers Life Support: 140 hours for 3 people Max. Operating Depth: 6,500 ft (1981 meters) Power: 2 lead-acid battery systems Duration: 7 - 10 hours Buoyancy Control: seawater, high-pressure air and droppable descent/ascent weights.	
Pisces V	Length: 20' Width: 10' 6" Height: 11' Weight: 13 tons Crew: 1 Pilot 2 Observers Life Support: 140 hours for 3 people Max. Operating Depth: 6,280 ft. (1914 meters) Power: 2 lead-acid battery systems Duration: 7 - 10 hours Buoyancy Control: seawater, high-pressure air and droppable descent/ascent weights.	
RCV-150	Length: 52” Width: 47” Height: 43” Buoyancy in water: 15 lb Weight in air: 1,215 lb Max. Operating Depth: 3,000 ft. (914 meters) Power: 880 VAC via umbilical Operators: 2 Duration: limited by operator endurance. Propulsion: four 10” diameter thrusters, two horizontal, two vertical Speed: 1.5 knots forward, 0.5 knot vertical (approximate)	

Source: HURL, 2007
*Note: The fuel capacity differs from the source specifications sheet because some of the fuel tanks have been converted to water tanks since the specifications were initially posted. S. Winslow, personal communication via email, School of Ocean and Earth Science and Technology (SOEST), 30 August 2009.

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2.2.2 Alternative Two / No Action Alternative

Alternative two would be no issuance of any permits to support deep sea submersible research activities in the PMNM. Under this alternative, NOAA's Office of National Marine Sanctuaries would not take any action to meet the purpose and need of the project. Although the no action alternative does not meet the purpose and need as stated in Chapter 1.2, it has been carried forward for analysis in order to adhere to the Council on Environmental Quality (CEQ) regulations requiring consideration of the no action alternative.

3 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, water quality and solid waste. These resource categories are described here and carried through the impact analysis presented in Chapter 4.0. Preliminary project screening indicated that neither the no action alternative nor the proposed action would 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 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, nor would it affect the availability of utility services.

The descriptions of the target islands and resources potentially affected are incorporated by reference and summarized from the Papahānaumokuākea Marine National Monument Final Management Plan and Environmental Assessment (2008).

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
Terrestrial Biological Resources, Soils and Topography, Land Use, Traffic, and Ambient Noise, Visual Resources, Natural Hazards, Utilities and Other Infrastructure.	No significant anticipated impact.	No impact.
Marine Biological Resources	No significant impact to marine biological resources with implementation of Best Management Practices (BMPs). If any endangered monk seal or sea turtle is observed or enters the project area at any time, in-water work would cease until such animals leave the area. No significant impact anticipated through the limited collection of voucher specimens in accordance with the Monument's Voucher Specimen Guidelines.	No impact.
Cultural Resources	No significant impact to cultural resources. If any indication of a culturally or historically significant site is found during the proposed work, activities would be halted until the proper authorities can be notified and a determination can be made that it is safe to proceed.	No impact.
Physical Conditions/Water Quality	No significant impact to water quality as small quantities of steel washer punches (each puncher = 10mm thick) are dropped over an extremely large area, maximum 10,8000 lbs per year and 54,000lbs over five years, over 362,075 square kilometers.	No impact.
Solid Waste	No significant impact to solid waste is anticipated with the implementation of mitigations and operating practices as needed.	No impact.
Marine Traffic	No significant impact to marine traffic is anticipated by adding one additional research cruise per year.	No impact.

Resource Category	Proposed Action	No Action Alternative
Air Quality	No significant impact to air quality is anticipated by adding one additional research cruise per year. The submersibles are battery-powered and therefore do not produce emissions.	No impact
Hazardous and Regulated Materials	No significant impact. 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 Manual. With these mitigation measures in place, no significant impact to resources are likely to occur as a result of the proposed action.	No impact

3.2 MARINE BIOLOGICAL RESOURCES

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

The KOK, *Pisces* submersibles, and ROV would be operating in deep waters 200-4,000 m (660-13,123 ft) around all island areas within the PMNM. The descriptions of the target islands and marine biological resources are incorporated by reference and summarized from the Papahānaumokuākea Marine National Monument Final Management Plan and Environmental Assessment (2008).

3.2.1 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 each atoll in the NWHI. The descriptions of these target islands below are summarized from the Papahānaumokuākea Marine National Monument Final Management Plan (2008).

<u>Nihoa Island</u>

Nihoa Island is located about 155 miles northwest of Kaua‘i and the Main Hawaiian Islands (MHI). Nihoa is approximately 150 land acres and is the largest emergent volcanic island in the NWHI. Nihoa’s surrounding submerged coral reef habitat totals approximately 142,000 acres. Nihoa’s seabird colony boasts one of the largest populations of Tristam’s storm-petrel (*Oceanodroma tristrami*), Bulwer’s petrel (*Bulweria bulwerii*) and blue-grey noddies (*Procelsterna cerulean*) in the Hawaiian Islands and possibly in the world.

<u>Necker Island (Mokumanamana)</u>

Necker Island is a dry volcanic island shaped like a fishhook and includes about 45 acres of land. Necker is also known by the Hawaiian name Mokumanamana, and is spiritually significant in the Native Hawaiian culture. Geologists believe it was once as large as O‘ahu. Wave erosion has reduced the remaining land to a submerged shelf about 40 miles long and 15 miles wide. While this shelf holds more than 380,000 acres of coral reef habitat, severe waves and currents in the exposed areas inhibit coral growth.

French Frigate Shoals (Kānemiloha‘i)

French Frigate Shoals, the largest atoll in the chain, forms an 18 mile long crescent-shaped cove and consists of 67 acres of total emergent land and approximately 23,000 acres of coral reef habitat. The lagoon contains two exposed volcanic pinnacles and 12 low, sandy islets. French Frigate Shoals is home to the largest breeding colony of the endangered Hawaiian monk seal (*Monachus schauinslandi)* and supports nesting sites for 90 percent of Hawai‘i’s green sea turtle (*Chelonia mydas)* population. The shoals also have the largest diversity of breeding seabirds (18 spp.) in the NWHI.

Gardner Pinnacles (Pūhāhonu)

Gardner Pinnacles consists of two volcanic peaks. Bird guano has given the peaks a frosted appearance, indicating their importance as a roosting site and breeding habitat for 12 species of sub-tropical seabirds. In scale, these pinnacles are small, the larger reaching only 180 feet and about 590 feet in diameter. Surrounding the pinnacles is approximately 600,000 acres of coral reef habitat, most of which is in waters 60 feet in depth.

Maro Reef (Ko‘anako‘a)

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. 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. 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 (see also Figure 2-1). 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 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.

3.2.2 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 water coral reef habitat harbors a diversity of macro algae. Currently, a total of 355 algal species have been recorded from 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 alien species and invasive algae have overgrown many coral reefs, the reefs of the NWHI are largely free of alien algae.

Deepwater corals in the Monument are even more diverse than those in shallow water. To date, 137 gorgonian octocorals and 63 species of azooxanthellate scleractinians have been documented to occur in the Monument (Parrish and Baco 2007). In November 2007 two new genera of deep water bamboo corals were collected by submersibles at a single site off Twin Banks (Watling, pers comm.).

3.2.3 Bottomfish

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 commercial bottomfish industry targets onaga (*Etelis coruscans*), ehu (*E. carbunculus*), opakapaka (*Pristipomoides filamentosus*), kalekale (*P. sieboldii*), lehi (*Aphareus rutilans*), gindai (*P. zonatus*), and hapuupuu (*Epinephelus quernus*). 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). In January 2010, the NWHI federal bottomfish fishery closed via a buyout process facilitated by the NOAA National Marine Fisheries Service. The closure was a result of a congressional appropriation that compensated the owners of seven bottomfish licenses. Since that time there have been no commercial fishing allowed in PMNM.

3.2.4 Seabirds

As the proposed action will predominately take place in the deep sea areas around the target islands, it is unlikely that seabirds will be affected. 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). Both seabirds 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 short-tailed albatross is the only ESA-listed seabird in the NWHI. The current worldwide population is approximately 1,700 individuals, and due to habitat management and stringent protection, the population has increased by approximately six percent per year (U.S. Fish and Wildlife Service 2000). The primary range of this species is along the coasts, traveling between its breeding colonies in Japan, along Russia, the Aleutian Islands, and down the coast of North America. Land-based sighting records indicate that at least 15 short-tailed albatrosses have visited the NWHI over the past 60 years. Most of these sightings have been at Midway Atoll (U.S. Fish and Wildlife Service 2000), where two individuals are present every breeding season. The greatest threats to seabirds in the NWHI are marine debris, invasive species, contaminants, and climate change.

3.2.5 Special Status Species

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.

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 from PMNM Management Plan and Environmental Assessment (2008)). Of those listed species that occur in the marine ecosystem, eight are plants and birds that would not be affected. Sea turtles and marine mammals are discussed further below.

Special Status Species in the NWHI

Common Name	Taxonomic Name	Protection	Occurrence
Land plants			
Loulu/fan palm	*Pritchardia remota*	ESA	Resident
Kamanomano	*Cenchrus agrimoniodes*	ESA	Resident
ʻOhai	*Sesbania tomentosa*	ESA	Resident
	Amaranthus brownii	ESA	Resident
	Mariscus pennatiformis	ESA	Resident
	Schiedea verticillata	ESA	Resident
Land Birds			
Laysan duck	*Anas laysanensis*	ESA	Resident
Laysan finch	*Telespyza cantans*	ESA	Resident
Nihoa finch	*T. ultima*	ESA	Resident
Nihoa millerbird	*Acrocephalus familiaris kingi*	ESA	Resident
Seabirds			
Short-tailed albatross	*Phoebastria albatrus*	ESA/MBTA	Rare
Sea Turtles			
Olive Ridley	*Lepidochelys olivacea*	ESA	Occasional
Leatherback	*Dermochelys coriacea*	ESA	Occasional
Loggerhead	*Caretta caretta*	ESA	Occasional
Hawksbill	*Eretmochelys imbricata*	ESA	Rare
Green	*Chelonia mydas*	ESA	Resident
Marine mammals			
Hawaiian monk seal	*Monachus schauinslandi*	ESA/MMPA	Resident
Humpback whale	*Megaptera novaeangliae*	ESA/MMPA	Seasonal
Sperm whale	*Physeter macrocephalus*	ESA/MMPA	Occasional
Blue whale	*Balaenoptera musculus*	ESA/MMPA	Rare
Fin whale	*B. physalus*	ESA/MMPA	Rare
Sei whale	*B. borealis*	ESA/MMPA	Rare
North Pacific right whale	*Eubalaena japonica*	ESA/MMPA	Rare
Spinner dolphin	*Stenella longirostris*	MMPA	Resident
Bottlenose dolphin	*Tursiops truncatus*	MMPA	Resident

Source: NOAA 2004b

Sea Turtles

There are five ESA-listed sea turtles that could occur in the waters of the Monument. The Hawaiian population of the green turtle, loggerhead, and olive ridley are listed as threatened under the ESA. The leatherback and hawksbill turtles are listed as endangered under the ESA. The green turtle is common in the NWHI; the other turtles are rarely sighted in the Monument and are not considered further in this analysis.

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 protected 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).

Marine Mammals

There are nine species of marine mammals that are listed under the ESA or MMPA that occur in the PMNM. Five are considered to only occur rarely or occasionally and are not considered further in this analysis. The Hawaiian monk seal is a resident of the PMNM as are the spinner and bottlenose dolphins, whereas the humpback whale is a seasonal resident.

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 will 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).

Humpback Whale (Megaptera novaeangliae)

Humpback whales occur consistently in the winter but are found mainly in waters surrounding the seven main Hawaiian Islands. Recent research by Johnston et al. (2007) reveals that the Monument hosts many more humpback whales than originally thought.

Spinner and Bottlenose Dolphins (Stennela longirostris and Tursiops truncates)

Spinner and bottlenose dolphins are year-round residents of the Hawaiian Islands. They are not considered threatened or endangered under the ESA or depleted under the MMPA though they are protected under the MMPA. While both species are widely distributed throughout the world in tropical and warm temperate waters, they are considered separate stocks from other populations due to their isolation in the Hawaiian archipelago (NOAA 2000). Both species occur from the island of Hawai‘i to Kure Atoll. There are an estimated 743 bottlenose dolphins and 3,184 spinner dolphins within 28.7 miles (25 nautical miles, 46.3 kilometers) of the main Hawaiian Islands. Because waters beyond 28.7 miles (25 nautical miles, 46.3 kilometers) of the coast or the waters of the NWHI were not surveyed,

this number is considered an underestimate of the population size (NOAA 2000). The largest pod of spinner dolphins within the Monument occurs at FFS, with approximately 500 individuals (Andrews et al. 2006). Smaller pods occur at Pearl and Hermes Atoll, Midway Atoll, and Kure Atoll. While spinner dolphins have a capacity for high mobility, it appears that movements between islands are relatively infrequent, with each pod having a high affinity to a specific atoll (Karczmarski et al.2005).

3.3 CULTURAL RESOURCES

3.3.1 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.

3.3.2 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. Incorporated by reference is the information from the 2008 PMNM Management Plan and EA. 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 to 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.

3.4 PHYSICAL CONDITIONS

3.4.1 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.

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

3.4.3 Marine Traffic

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 areas of the NWHI causing potential localized adverse impacts.

The Monument was designated a Particularly Sensitive Sea Area (PSSA) by the International Maritime Organization (IMO) on 3 April 2008. This designation effectively set three shipping lanes within the deep-water areas of the NWHI; established Areas to Be Avoided (ATBAs) including all shallow-water coral reef and nearshore island areas); required vessel entry and exit notification reporting for all U.S. flagged vessels; and strongly recommended vessel entry and exit notification reporting for all foreign flagged vessels passing through the NWHI without interruption (without stopping). In conjunction with the PSSA designation, a Monument Ship Reporting System (SRS) was developed to track entry and exit notifications for the entire NWHI. There are an average of 133 vessel entry and exit notifications for vessels passing through the Monument without stopping per year. In addition an average of seven vessels obtain permits to conduct work within the Monument annually, those seven vessels make an average of 18 total round trip visits per year.

3.4.4 Air Quality

Aside from the small garbage incinerator on Midway Atoll, aircraft and permitted sea vessel operations are the only other air emissions-producing activities occurring within the Monument. Two runways exist in the NWHI: Henderson Airfield on Midway Atoll and Tern Island within French Frigate Shoals. An average of 57 round trip flights are conducted

between the two airfields per year, consisting of the following: (1) FWS-chartered Gulfstream-2 jet (Midway Atoll – approximately 45 flights per year); (2) US Coast Guard C-130 aircraft (Midway Atoll – approximately 4 flights per year); or (3) Small Cessna six-seat plane (Tern island – approximately 8 flights per year). An average of 7 permitted vessels serving as research, education, Native Hawaiian and conservation and management support platforms for activities authorized within the Monument conduct 18 round trips per year. Due to their remote location and low level of human activities, the air quality within the NWHI is relatively pristine.

3.4.5 Hazardous and Regulated Materials

All hazardous material and hazardous waste management activities within the marine areas of the Monument are on marine vessels. With the prohibition of commercial bottomfishing in the Monument, research vessels and vessels used in restoration activities, such as the removal of marine debris, make up the predominant vessel activity. In addition, no more than three cruise ships per year are permitted entry to the Midway Atoll Special Management Area. The controlled environment onboard these vessels allows for proper containment of chemical substances. In a shipboard environment there are numerous engineering and management controls that prevent hazardous chemicals or materials from contaminating crew, passengers, and the environment. Any hazardous waste generated aboard a marine vessel, such as mercury-containing light bulbs, waste paint, dry cleaning and photo-processing operations, batteries, or solvents, is required to be offloaded at land-based treatment or disposal facilities (NOAA 2004a). Monument regulations and permit conditions provide additional safeguards on hazardous material and waste management including requirement for VMS and reporting all incidents.

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4 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

4.2.1 Marine Biological Resources

Under the proposed action, submersible operators would implement operational practices to minimize any potential to adversely impact the environment or marine biological resources. Such mitigation measures would include avoiding deepwater corals when dropping ballast weights while performing underwater work. Submersible operators would select ballast drop sites where corals are not present. Operators would record Global Positioning System (GPS) coordinates at each drop site and ballast would not be dropped in the same location twice.

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 KOK would not drop anchor within PMNM, except in emergency situations. If an emergency occurs, efforts would be made to drop anchor in areas relatively free of coral.

Referencing the 2009 EA for the HURL permits, use of the KOK sonar system and frequency would not have any potential for adversely impacting marine mammals (K. Graham, personal communication via email, NMFS, Pacific Islands Regional Office, Protected Resources Division, October 30, 2009). On previous research cruises, spinner dolphins have been seen riding bow waves both while the sonar was in operation and while it was not in operation (J. Smith, personal communication via phone, SOEST, 30 August 2009). Additionally, there is no research that indicates the type of sonar that the KOK operates is harmful to marine mammals.

Endangered species including monk seals and sea turtles may be seen during vessel operation activities within PMNM. The presence of any vessel in an area where marine mammals and sea turtles are co-located poses a potential for ships strikes. The KOK's speed averages at 10 knots which would also minimize the potential of ship strikes on cetaceans and pinnipeds. Additionally, before any in-water work is to commence, personnel aboard the KOK would perform a visual scan of the adjacent areas to locate any endangered species or marine mammals. Crew members aboard the KOK are trained to perform these visual scans. The KOK has three to four crew members stationed at all times to visually scan the surrounding area for the safety of the vessel, crew, and PMNM resources. 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.

Alien and introduced 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 order to adhere to these policies and eliminate the introduction of any species via ballast water, the KOK would use fresh potable water for ballast. In addition, a careful washing and disinfecting regimen for the KOK, submersibles, and ROV 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 alien species.

Collection of voucher specimens would consist of a limited number of any visually observable marine organism morphotype, which cannot be visually identified or may represent a new geographic record or new species, from each of the Permitted Activity Location areas defined within the respective annual Monument collection permit, based upon the per island/atoll abundance criteria below:

a. One (1) specimen can be taken, removed, or possessed if an abundance assessment cannot be ascertained, or fewer than ten (10) such specimens are present, cumulative during the course of the collection event per island or atoll;
b. Up to three (3) specimens can be taken, removed, or possessed if an abundance assessment of ten (10) or more of such specimens is ascertained, cumulative during the course of the collection event per island or atoll;
c. For clonal organisms that cannot be visually identified or may represent a new geographic record or new species, take shall be limited to no more than half the clonal organism visually observed. Up to three (3) clonal specimens of similar morphology can be taken, removed, or possessed if an abundance assessment of ten (10) or more of such specimens is ascertained, cumulative during the course of the collection event per island or atoll.

By following the Voucher Specimen Guidelines as stated above, the proposed action would not significantly affect marine biological resources as collections of new records and / or new potential species would be dictated by the aforementioned guidelines and would be included as part of each annual Monument collection permit. The Monument's Voucher Specimen Guidelines were developed by a Monument Management Board sanctioned working group consisting of leading taxonomists and scientists with expert knowledge of Pacific marine resources.

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

4.3 CULTURAL RESOURCES

Under the proposed action, the actual locations of underwater work would be determined by individual research projects at depths ranging from 200-4,000m (660-13,123 ft). These underwater areas are unlikely to contain historically significant sites. Additionally, there are no known cultural sites within the PMNM at this depth range (200-4,000m). However, if any indication of a culturally or historically significant site is found during project activities, work would be halted until the proper authorities can be notified and a determination can be made that it is safe to proceed. The proposed action is temporary in nature and would not significantly impact historic or cultural resources. Traditional Native Hawaiian practices do not occur within the proposed action area.

4.4 PHYSICAL CONDITIONS

4.4.1 Water Quality

Under the proposed action, the submersibles would drop 300-400 lbs of steel as ballast per dive. With an average of 27 dives per year within the Monument, the total amount of steel washer punches dropped as ballast per year would be 10,800 lbs (5.4 tons). The steel punches would not be recovered and would slowly dissolve, adding iron to the water. Seawater contains approximately 1-3 parts per billion (ppb) of iron. For example, one drop of ink in a large tanker truck used to haul gasoline would be an ink concentration of 1 ppb. The amount of iron in seawater varies strongly, and is different in the Atlantic and the Pacific oceans (Lenntech, 1998). According to the HURL Director, the environment where the ballast is likely to be dropped is iron-limited (J.C. Wiltshire, personal communication via email, SOEST, 10 September 2007). The submersibles would drop 150-200 lbs on the initial dive and another 150-200 lbs on the return ascent. Because the submersibles are submerged 7-10 hours, the drop sites for ballast weights would occur in different areas. Most of the submersible work would occur 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 (approximately 1 mi^2). 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. All sewage aboard the KOK would be treated and the grey water retained until reaching a minimum of three nm from SPA boundaries, where it would then be discharged.

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 (50 CFR 404.7(f)).

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.

4.4.2 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 laboratory waste and plastics would be retained on board and properly disposed of at home port. Adhering to these operational restrictions, the KOK would not discharge significant amounts of solid waste within PMNM.

Under the proposed action, the submersibles would drop 300-400 lbs of steel as ballast per dive. With a maximum of 27 dives per year within the NWHI, the maximum amount of steel

washer punches dropped as ballast per year would be 10,800 lbs (5.4 tons) or 54,000 lbs over a five year period. The steel punches 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 shot ballast because it dissolves faster and does not release lead into the environment. The steel washer punches are relatively thin (10 mm) with a high surface area which minimizes the time it takes to corrode. During previous visits, anecdotal evidence is that the punches dissolve within 2 years (J.C. Wiltshire, personal communication via email, SOEST, 10 September 2007). The rapid corrosive rate of the ballast material, the small punch size and resultant increased surface area exposed to salt water, and anecdotal observations of researchers visiting areas of prior ballast releases suggest that the punches would not persist in the environment more than 2 years. Therefore, no significant impacts to solid waste would occur as a result of the proposed action.

4.4.3 Marine Traffic

Under the proposed action, the KOK would undertake a maximum of one research cruise per year over a five-year period. The existing marine traffic is minimal and one additional research cruise would not significantly increase traffic within PMNM; the KOK's speed averages at 10 knots which would also minimize the potential of ship strikes on cetaceans and pinnipeds; 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.

4.4.4 Air Quality

Under the proposed action, the emissions from the KOK diesel engine would have no significant effect on existing air quality within the PMNM because the vessel would only be there temporarily and it is expected that emissions would dissipate quickly. The submersibles are battery-powered and there are almost no emissions under normal operating conditions. Therefore, no significant adverse impacts to air quality would occur as a result of the proposed action.

4.4.5 Hazardous and Regulated Materials

Hazardous and regulated materials include gasoline, oils, lubricants, and batteries used to operate the KOK, the submersibles and the ROV. The ship would carry up to 101,000 gallons of diesel fuel and up to 1,000 gallons of lubrication oil, ten 16-ounce cans of WD-40 and 20 gallons of an EPA approved solvent. These are kept in the designated holding tanks located in the engine room. Used oil is stored in a designated labeled drum until return to port. HURL typically generates about one gallon of used oil per dive day. The ship also carries approximately 40 gallons of paint and paint thinners that are stored in a large box on deck. Waste and excess paint is retained on board until the ship returns to port for proper disposal.

The ship would also carry about 75 gallons spare hydraulic fluid for the ROV. The hydraulic charge cart adjacent to the ROV A-frame/winch holds about 20 gallons, and the remainder is stored in 5-gallon containers on the half deck below the hangar. The A-frame/winch power pack is located in the hangar and has a capacity of about 40 gallons of hydraulic fluid. An additional 20 gallons of spare hydraulic fluid for the A-frame/winch is stored in 5-gallon containers on the half deck below the hangar.

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 Manual. With these mitigation measures in place, no significant impact to resources are likely to occur as a result of the proposed action.

The vessel operations have been permitted in 2007 and 2009 for similar operations and research activities and have not had any incident with spills or the release of hazardous or regulated materials.

4.5 NO ACTION ALTERNATIVE

4.5.1 Marine Biological Resources

Under the no action alternative, the proposed action would not take place. No ballast would be dropped, no mapping would take place, no voucher specimens would be collected and there would be no anchoring by the KOK. Under the no action alternative there would be no potential damage to coral and no chance for fuel spills, vessel grounding or other vessel hazards from the submersibles, ROV or KOK. Under the no action alternative, no deep sea research projects would occur, as the KOK and submersibles would not enter the Monument. Under the no action alternative, Monument managers would not have the opportunity to gain new information about deep water areas in the Monument that may improve the health of biological resources in the future. No additional scientific information would be collected and no new knowledge on Papahānaumokuākea's deep sea marine resources would be gained.

4.5.2 Cultural Resources

Under the no action alternative, existing cultural resources and the Native Hawaiian uses of PMNM would not change; therefore, no significant impacts would occur as a result of the no action alternative.

4.5.3 Physical Conditions

Under the no action alternative, the proposed action would not take place. The existing conditions at PMNM would not change; therefore, no significant impacts would occur as a result of the no action alternative.

4.5.3.1 Water Quality

Under the no action alternative, the submersibles would not operate, therefore no ballasting or de-ballasting would occur, thereby eliminating the need to discharge the steel washer punches and water. The water quality conditions at PMNM would not change; therefore, no significant impacts would occur as a result of the no action alternative.

4.5.3.2 Solid Waste

Under the no action alternative, ballast drop-weights or effluent would not be discharged. The existing conditions at PMNM would not change; therefore, no significant increases of solid waste would occur as a result of the no action alternative.

4.5.3.3 Marine Traffic

Under the no action alternative, the KOK would not enter PMNM. The existing conditions at PMNM would not change; therefore, no significant impacts would occur as a result of the no action alternative.

4.5.3.4 Air Quality

Under the no action alternative, no vessels would operate within the PMNM, therefore nothing would be added to the air quality. The existing conditions within PMNM would not change; therefore no significant impacts would occur as a result of the no action alternative.

4.5.3.5 Hazardous and Regulated Materials

Under the no action alternative, no hazardous and / or regulated materials would be brought into PMNM. The existing conditions within PMNM would not change; therefore no significant impacts would occur as a result of the no action alternative.

5 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.

5.1 MARINE BIOLOGICAL RESOURCES

The proposed action may take place within marine environments 200 meters to 4,000 meters in depth (Figure 2-1) within PMNM. The remote nature of PMNM requires that access to these areas must be supported by a well-equipped seafaring vessel. From 2007-2010, there were 77 vessel access trips to Monument waters to conduct separately permitted and unrelated activities. On average, 18 vessels have accessed the Monument annually to conduct permitted activities. All vessels permitted to access the Monument must comply with strict sanitation requirements limiting vessel grey-water discharge and must have a working NOAA Office of Law Enforcement type-approved Vessel Monitoring System installed, capable of tracking and displaying vessel movement within PMNM. In addition, before a Monument permit is issued, the vessel must successfully complete the following inspections to prevent alien or invasive species transfer to the Monument: rodent inspection, hull and tender inspection and cleaning (if necessary) and ballast water inspection. By following Monument regulations and aforementioned best management practices, there have been no adverse impacts from the combined total number of past vessel accesses to the Monument.

Voucher collections have occurred in deep water areas (200m – 4,000m) within the Monument in 2007 and 2009. Three research permits have been issued for voucher specimen collection in deep water, two in 2007 and one in 2009 with no observable negative impacts to the environment. On average, 33 coral biopsy samples (each 1 cm^2) and 25 whole invertebrate organisms (i.e., crabs, sponges, or crinoids) representing a new scientific or geographic record, have been collected annually from deep water areas in 2007 and 2009. For example, in 2009 voucher collections in deep water areas led to the scientific discoveries of one new species of shrimp, one new genus of coral, and 11 new geographic records of corals never thought to have existed in such deep water areas of the Pacific. Voucher collections are an integral part of scientific research in the Monument with inherent beneficial impacts, aligned with the Monument Management Plan (MMP), Marine Conservation Science Action Plan 1-3: Map and characterize deep water habitat (MMP 2008, Vol. 1, p.123). It is reasonable to expect that voucher collections would be proposed on each deep water cruise aboard the KOK each year, for a five year duration. By following the Monument's Voucher Specimen Guidelines (Appendix A) (which would be included each year as part of the permit), the proposed action would not result in measurable cumulative effects to marine biological resources.

Submersible research and deep sea work have been permitted and conducted in the past within PMNM. The proposed action was permitted and conducted by HURL and UH Marine Center in 2007 and in 2009 in separate locations 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. The table includes short descriptions of

these projects. One research project was analyzed in a separate EA entitled, "Deep Sea Camera Research Permit EA." A Finding of No Significant Impact was signed on May 2009. When combined with the proposed action, one project does occur at the same depth, but within different habitat types. Therefore, the proposed action would not result in measurable cumulative effects to marine biological resources.

5.2 CULTURAL RESOURCES

It is anticipated that cultural and historical sites would not be located at the depth of operations proposed. Therefore, no cultural impacts are anticipated as a result of the proposed action. Additionally, the proposed action would not result in measurable cumulative effects to cultural resources.

5.3 PHYSICAL CONDITIONS

No significant adverse impacts to existing physical conditions are anticipated as a result of the proposed action. Additionally, the proposed action would not result in cumulative impacts.

5.3.1 Water Quality and Solid Waste

Since 2007, there have been 20 submersible dives within PMNM (16 in 2007 and 4 in 2009). Each submersible dive requires ballast to be dropped twice; once during the descent and once during the ascent. Each ballast drop is approximately 150-200 lbs with exact amounts determined by personnel and gear weight and oceanographic conditions. The estimated ballast dropped since 2007 is approximately 7,000 lbs, or an average of approximately 3,500 lbs a year. Given the corrosion rate of approximately 2 years, the ballast discharged in 2007 and 2009 would be dissolved by now. The submersible operators do not drop ballast in the same locations. When research activities (e.g. gold coral monitoring, or monitoring geological features or seamounts) require subs to visit the same locations, operators conduct dives on different tracklines and drop ballast in different locations away from research areas. Figure 4-1 is a map of all permitted submersible ballast drop sites within PMNM. Given that submersible dives would take place at different sites covering a vast area or approximately 120,000 square miles (311,000 square kilometers), the amount of ballast discharged is negligible.

Table 4-1 Relevant Projects within PMNM

Project Name	Time Frame	Purpose and Scope
NOAA Ship HI'IALAKAI as a Support Platform for Permitted Activities	June – October 2007-present	The project allows NOAA Ship HI'IALAKAI to enter PMNM under a PMNM conservation and management permit. Personnel aboard the vessel are permitted under separate Monument permits. This activity is re-evaluated and permitted annually.
Submersible dives to collect and study deep sea corals	October 2007 – November 2007	This project (PMNM research permit PMNM-2007-052) allowed collection of 5 coral colonies (each 2cm in diameter); and 4 coral biopsies (each 1cm^2) which were collected, identified and curated at pre-approved museums including Bishop Museum and the

Project Name	Time Frame	Purpose and Scope
		Smithsonian Institution.
Support for Permitted Research activities using the *Pisces* submersibles and ROV and the UH R/V KOK	October 2007 – November 2007	The project allowed the UH research vessel (R/V) *Ka'imikai-o-Kanaloa* (KOK) to serve as a support platform (PMNM conservation and management permit PMNM-2007-049) for separately permitted research personnel and the HURL submersibles and ROV to serve as a support platform (PMNM research permit PMNM-2007-051) for separately permitted deep sea research.
Multibeam mapping and deep water surveys	October 2007 – November 2007	This project (PMNM research permit PMNM-2007-052) allowed collection of 34 coral biopsies (each 1cm^2); 17 whole organisms including sponges, ophiuroids, crinoids, and crabs which were collected, identified, and curated at pre-approved museums including Bishop Museum and the Smithsonian Institution.
Support for Permitted Research activities using the *Pisces* submersibles and ROV and the UH R/V KOK	November 2009 – December 2009	The project allowed the UH research vessel (R/V) *Ka'imikai-o-Kanaloa* (KOK) to serve as a support platform (PMNM conservation and management permit PMNM-2009-057) for separately permitted research personnel and the HURL submersibles and ROV to serve as a support platform (PMNM research permit PMNM-2009-053) for separately permitted deep sea research.
Characterization of Large Deep-sea Scavenging Fauna, General Habitat Associations and their Relationship to Depth	June 2009 – December 2009	The project (PMNM research permit PMNM-2009-018) allowed deployment of 15-20 cameras and baited traps (collected 17 whole fishes), anchored with chain links near Nihoa, Lisianski, Laysan, and Pearl and Hermes Atoll at depths between 1,000m to 4,000m. The iron anchors were abandoned at each site.
Multibeam mapping surveys and voucher specimen collections	November 2009 – December 2009	This project (PMNM research permit PMNM-2009-052) allowed collection of 32 coral biopsies (each 1cm^2); and 33 whole organisms including sponges, ophiuroids, crinoids, and crabs.

It is reasonable to expect that one deep water submersible cruise would occur per year for the next five years which would discharge 10,800 lbs of steel washer punchers per year for a five year duration. Based on past deep water activities within the Monument, submersible operators would be conducting activities at different sites during each dive and the same site would not be visited twice, therefore no significant measurable cumulative effects would occur.

5.3.2 Marine Traffic

There are an average of 133 vessel entry and exit notifications for vessels passing through the Monument without stopping per year. In addition an average of seven vessels obtain permits to conduct work within the Monument annually, those seven vessels make an average of 18 total round trip visits per year. No significant cumulative impacts to marine traffic are anticipated as a result of the proposed action, as the proposed action involves entry and exit of one additional vessel into the Monument from the 140 that operate in the area a year and operation of two submersibles and one ROV, especially given the large area of the Monument.

5.3.3 Air Quality

No significant adverse cumulative impacts to marine traffic are anticipated as a result of the proposed action, as the proposed action involves the addition of one additional research vessel into the Monument to the average 140 vessels that operate in the area annually. The submersibles and ROV are battery operated and therefore do not emit anything.

5.3.4 Hazardous and Regulated Materials

No significant adverse cumulative impacts to the environment are anticipated as a result of the KOK bringing small amounts of properly contained hazardous and regulated materials. Again, the addition of one additional research vessel per year, for a five-year period would not cause cumulative impacts. All hazardous and regulated materials would be contained properly and appropriate spill mitigation plans would be kept current and on file with the Monument office and the U.S. Coast Guard.

Figure 4-1. Submersible Ballast Drop Sites within PMNM

6 ENVIRONMENTAL PERMITS, APPROVALS, AND COMPLIANCE

6.1 PERMITS

The University of Hawaii Marine Center and the University of Hawaii Undersea Research Laboratory have submitted two permit applications (one conservation and management application and one research application) to conduct vessel operations (KOK, *Pisces* IV and V submersibles, and ROV) in the PMNM. Permit applications would be submitted each year for a five-year duration for the proposed action.

6.2 OTHER PERMITS

No other permits are necessary for these activities, as the activities contained herein would not result in incidental disturbance or take of Hawaiian monk seals or cetaceans. UH Research Vessel KOK and HURL would obtain separate, respective permits.

6.3 OTHER LAWS AND AUTHORITIES CONSIDERED

6.3.1 Magnuson-Stevens Fishery Conservation and Management Act

The site for the proposed action comprises soft bottom substrate. Large precious corals, such as gold, pink and black corals, are found in the depth range considered in this proposed action, however, all are primarily found on rocky substrate such as submerged banks. Soft bottoms such as the areas targeted for ballast discharge by the submersibles 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 3.2.2) 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.

6.3.2 Endangered Species Act

The National Marine Fisheries Service (NMFS) has determined that the proposed action would not adversely affect the Hawaiian monk seal or green sea turtle occurring within the PMNM. The short-tailed albatross, an endangered species under USFWS' purview, has been observed on land at French Frigate Shoals and Midway Atoll in the past. The proposed action would take place greater than 3nm from shore at a depth range of 200m – 4,000m. Therefore, NMFS has determined that the proposed action would not affect the short-tailed albatross since it is highly unlikely that this seabird would occur in the vicinity of the submersible deployment areas. All precautions would be taken not to disturb Hawaiian monk seals or green sea turtles.

In 2009, PMNM conducted an informal consultation with NMFS Pacific Islands Regional Office (PIRO) on the proposed action – procedures which included operation of UH Research Vessel KOK and deployment of submersibles and ROV. In the analysis, NMFS PIRO concluded that: 1) disturbance from humans and equipment to protected species is temporary and insignificant and does not exceed those actions previously consulted on; 2) the likelihood of an entanglement or hooking with a protected species is discountable; 3) the likelihood of a vessel colliding with a monk seal or green turtle is discountable.

6.3.3 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, buildings, or potentially historically significant sites given the mitigation measures proposed, on shore, or on any submerged sites, such as shipwrecks.

6.3.4 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.

6.3.5 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.

6.3.6 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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9 APPENDIX A

VOUCHER SPECIMEN GUIDELINES

Papahānaumokuākea Marine National Monument

Preamble

These guidelines have been prepared by members of the Monument Management Board's Voucher Specimen Working Group to assist Monument Permit Coordinators in considering issues related to voucher specimens. The guidelines are not meant to be inclusive of all collection activities that may occur in Papahānaumokuākea Marine National Monument (Monument).

1.0 Definition

A 'voucher specimen' is any specimen that serves as a basis of study and is retained as a reference. Whenever possible a voucher should be in an accessible university or museum collection.

'Specimen' means the whole animal or a part thereof.

'Type' specimen is a particular voucher specimen which serves as a basis for taxonomic description of that species or subspecies.

2.0 Purpose

Collection of voucher specimens is a legitimate and important part of scientific research. However, the taking of any resource within the Monument is strictly regulated.

The aims of these guidelines are:

- 2.1 to provide permit language guidelines for voucher collections that satisfy the policies and regulations of the Monument Co-Trustee agencies and Monument Management Board;
- 2.2 to standardize permit language that authorizes voucher collections from the Monument; and
- 2.3 to scrutinize and limit voucher collection activities in the Monument.

3.0 Disclaimer

These guidelines do not replace the Monument's joint-permitting system. These guidelines may be applied to permit applications that are requesting voucher collections *subsequent to* the application's review and approval by the Monument Management Board and State of Hawai'i Board of Land and Natural Resources as required.

All permittees are subject to existing federal, state, and local laws and regulations regarding species collections. These guidelines do not exempt applicants proposing to collect specimens that are determined to be an endangered, threatened, or regulated species formally designated on an agency approved list (see appendices), from conforming to Federal and State regulations and mandates, such as the Endangered Species Act of 1973; Migratory Bird Treaty Act; or Marine Mammal Protection Act. As such, other permit conditions and language may apply.

4.0 Baseline Taxonomic Collection Clause

4.1 Criteria when this clause may be used:

- Applicant requests to collect specimens that cannot be visually identified or that may represent a new geographic record, new species, or would clarify the taxonomic status of a described species;
- Applicant has the taxonomic expertise that would warrant such an activity – (evident in CV, published peer-reviewed manuscripts, and prior permitted research in the NWHI);
- Field PI/Applicant is aware of the required abundance assessment, performed visually in the field; and
- Applicant is working on poorly documented taxonomic groups, or conducting work in previously un-surveyed or under-surveyed areas.
- This clause is not appropriate for birds or marine mammals without additional permits.

4.2 Permit language for use in the Permitted Activity Descriptions section:

- Removing, moving, taking, harvesting, possessing, or attempting to move, take, harvest, or possess a set number of any visually observable marine or terrestrial organism morphotype, which cannot be visually identified or may represent a new geographic record or new species, from each of the Permitted Activity Location areas defined, based upon the per island/atoll abundance criteria below:
    a. One (1) specimen can be taken, removed, or possessed if an abundance assessment cannot be ascertained, or fewer than ten (10) such specimens are present, cumulative during the course of the collection event per island or atoll;
    b. Up to three (3) specimens can be taken, removed, or possessed if an abundance assessment of ten (10) or more of such specimens is ascertained, cumulative during the course of the collection event per island or atoll;
    c. For clonal organisms that cannot be visually identified or may represent a new geographic record or new species, take shall be limited to no more than half the clonal organism visually observed. Up to three (3) clonal specimens of similar morphology can be taken, removed, or possessed if an abundance assessment of ten (10) or more of such specimens is ascertained, cumulative during the course of the collection event per island or atoll.

5.0 Molecular / Genetic Sampling Clause

5.1 Criteria when this clause may be used:

- Applicant requests to collect samples for the purpose of genetic or molecular analysis;
- Applicant has the taxonomic expertise that would warrant such an activity – (evident in CV, published peer-reviewed manuscripts, and prior permitted research in the NWHI);
- Applicant has a plan in place that includes laboratory facilities/funding necessary to process samples; and
- Collections table is based on research objectives and reviewed during permit review process.

5.2 Other notes to consider when reviewing Molecular / Genetic Sampling Clause:

- Desired number of samples for effective analysis is 50 samples per targeted species per island/area.
- For sessile clonal species (i.e., coral, plants, algae) – Desired standard is 1 cm in length, to fit in a 2 ml sampling tube.

5.3 Permit language for use in the Permitted Activity Descriptions section:

[Non-lethal]:

- Removing, moving, taking, harvesting, possessing, or attempting to move, take, harvest, or possess non-lethal genetic samples, where one (1) sample is defined as up to 5

centimeters in length per individual organism. Total samples permitted shall be in accordance with the following collections table:

Species	No. of Samples	Location of take (i.e., Lat/Long; SPA; or depth zone)
Total samples shall not exceed ####.		

- Collecting, as defined in Permitted Activity #X, shall be performed manually by hand using pliers, forceps, knife blade, scalpel, scissors, or hammer and chisel. (*Or method of collecting derived from permit application*)

  [Lethal] – Genetic and molecular sampling for some organisms may require the take of the whole-organism (i.e., lethal methods):
- Removing, moving, taking, harvesting, possessing, or attempting to move, take, harvest, or possess specimens for the purpose of genetic or molecular analysis, where one (1) sample specimen is defined as the whole-organism. Total specimens permitted shall be in accordance with the following collections table:

Species	No. of Specimens	Location of take (i.e., Lat/Long; SPA; or depth zone)
Total specimens shall not exceed ####.		

- Collecting, as defined in Permitted Activity #X, shall be performed mechanically by trapping/grabbing devices deployed from remotely operated vehicle. (*Or method of collecting derived from permit application*)

6.0 Morphologically Targeted Sampling Clause

6.1 Criteria when this clause may be used:

- Applicant requests to collect samples for the purpose of referencing into a publicly available museum collection, i.e. accessioning;
- Applicant has the taxonomic expertise that would warrant such an activity – (evident in CV, published peer-reviewed manuscripts, and prior permitted research in the NWHI);
- Applicant has a plan in place that includes curation expertise/funding/museum space necessary to accession specimens; and
- Collections table is based on research objectives and reviewed during permit review process.

6.2 Permit language for use in the Permitted Activity Descriptions section:

- Removing, moving, taking, harvesting, possessing, or attempting to move, take, harvest, or possess up to three (3) specimens per species type morphologically identifiable in the field for the purpose of accessioning into a museum collection in accordance with _____ (*applicant's accessioning plan attachment*), from each of the Permitted Activity Location areas defined. Total specimens permitted shall be in accordance with the following collections table:

Species	Location of take (i.e., Lat/Long; SPA; or depth zone)
Total specimens shall not exceed ####.	

- Collecting, as defined in Permitted Activity #X, shall be *(insert method defined in application)*.

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