

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Aquatic Resources
Honolulu, Hawaii 96813

August 23, 2013

Board of Land
and Natural Resources
Honolulu, Hawaii

Request for Authorization and Approval to Issue a Papahānaumokuākea Marine National Monument Research Permit to Dr. Russell Brainard, Coral Reef Ecosystem Division, National Oceanic and Atmospheric Administration, for Access to State Waters to Conduct Reef Assessment and Monitoring Research Activities

The Division of Aquatic Resources (DAR) hereby submits a request for your authorization and approval for issuance of a Papahānaumokuākea Marine National Monument research permit to Dr. Russell Brainard (Applicant), Chief, Coral Reef Ecosystem Division (CRED), National Oceanic and Atmospheric Administration (NOAA), pursuant to § 187A-6, Hawaii Revised Statutes (HRS), chapter 13-60.5, Hawaii Administrative Rules (HAR), and all other applicable laws and regulations.

The research permit, as described below, would allow entry and activities to occur in Papahānaumokuākea Marine National Monument (Monument), including the NWHI State Marine Refuge and the waters (0-3 nautical miles) surrounding the following sites:

- French Frigate Shoals
- Lisianski Island
- Pearl and Hermes Atoll

The activities covered under this permit would occur between September 1, 2013 and August 31, 2014.

The Applicant and the proposed reef assessment and monitoring activities are largely a renewal of work previously permitted and conducted in the Monument.

INTENDED ACTIVITIES

The Applicant proposes to conduct diving, non-coral invertebrate collections, seawater sampling, and the installation/removal of equipment as related to reef assessment and monitoring activities within the Monument, as part of the Pacific Reef Assessment and Monitoring Program (RAMP) and mandated within the NOAA National Coral Reef Monitoring Program (NCRMP). Activities

would be conducted from the NOAA vessel R/V HI'IALAKAI from September 3 to 19, 2013. Within the Monument, there are over 300 permanent transects and mooring sites. The survey sites for the is permit application have been randomly selected from among these permanent sites focusing on French Frigate Shoals, Lisianski Island, and Pearl and Hermes Atoll.

A total of twenty-two (22) trained researchers and field staff would conduct the following activities in waters from the surface to 30 m:

1. Oceanographic water sampling, including:
 - a. Fifteen (15) liters of seawater collected by swimming and SCUBA diving at a total of thirty-six sites within the requested area, and
 - b. Twenty-five (25) liters of seawater collected from the HI'IALAKAI using a Conductivity-Temperature-Depth (CTD) instrument package at a total of thirty sites within the requested area;
2. Visual surveys of benthic community structure and coral disease, including in water photoquadrat and benthic transect surveys;
3. Retrieving, installing, and/or replacing seafloor instrumentation and associated seafloor anchors including:
 - a. Twelve (12) sites for Autonomous Reef Monitoring Structure (ARMS) deployment;
 - b. Fifty-five (55) sites for installing Subsurface Temperature Recorders (STR), Ecological Acoustic Recorders (EARS), Seasurface Temperature Buoys (SST-STR), Wave and Tide Recorders (WTR), and associated anchors and/or battery replacements; and
 - c. Fifteen (15) sites for fifty (50) Bioerosion Monitoring Units (BMU) and seventy-five (75) Calcification Accretion Units;
4. Removing non-coral invertebrates collected through random recruitment and colonization of sampling equipment (removal of the 36 ARMS deployed); and
5. Fortuitous collection of up to a maximum of ten (10) crown-of-thorns sea stars (*Acanthaster planci*) for a population connectivity study and up to a maximum of forty (40) 1 liter sand samples for a molluscan diversity study.

The proposed activities, with the exception of sand sampling for a molluscan diversity study, are a continuation of activities that have already been permitted in the Monument. The GPS locations of all sites are reported on the permit application.

The activities proposed by the Applicant directly benefit the Monument through 3.1.1 – Marine Conservation Science Action Plan (Strategy MCS-1: Continuing to enhance research, characterization and monitoring of marine ecosystems for the life of the plan, as appropriate, and Strategy MCS-2: Assess and prioritize research and monitoring activities over the life of the plan). Strategy MCS-1 focuses on “continuing marine research, characterization, and monitoring designed to support an ecosystem-based approach to protection and management” and for the continuation of characterizing “types and spatial distributions of shallow-water marine habitats to inform protection and management efforts”. Strategy MCS-2 calls specifically for integrating collaborative “independent monitoring initiatives...such as...water chemistry and water quality”.

Reef assessment and monitoring activities and associated long-term data sets such as those proposed fit into these two strategies of the Monument Management Plan.

The activities described above may require the following regulated activities to occur in State waters:

- Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving monument resource
- Drilling into, dredging, or otherwise altering the submerged lands other than by anchoring a vessel; or constructing, placing, or abandoning any structure, material, or other matter on the submerged lands
- Touching coral, living or dead
- Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

REVIEW PROCESS:

The permit application was sent out for review and comment to the following scientific and cultural entities: Hawaii Division of Aquatic Resources, Hawaii Division of Forestry and Wildlife, Papahānaumokuākea Marine National Monument (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO), United States Fish and Wildlife Service Hawaiian and Pacific Islands National Wildlife Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application has been posted on the Monument Web site since July 5, 2013, giving the public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument's Public Notification Policy.

Comments received from the scientific community are summarized as follows:

Scientific reviews support the acceptance of this application.

The following concerns were raised. Applicant responses are noted below.

QUESTIONS:

There were no MMB Agency Reviewer questions for this permit application.

COMMENTS:

- 1. The permittee should review boating and diving Best Management Practices (BMPs) with all authorized personnel; and**
- 2. Disinfect sampling tools after each use to avoid contamination between sites.**

All personnel aboard will review boating and diving BMPs and sampling tool disinfecting guidelines prior to the start of operations in PMNM.

Comments received from the Native Hawaiian community are summarized as follows:

Cultural reviews support the acceptance of this application.

Comments received from the public are summarized as follows:

No comments were received from the public on this application.

Additional reviews and permit history:

Are there other relevant/necessary permits or environmental reviews that have or will be issued with regard to this project? (e.g. MMPA, ESA, EA) Yes No

If so, please list or explain:

- Pursuant to the National Environmental Policy Act (NEPA) a Programmatic Environmental Assessment (EA) was completed and a Finding of No Significant Impact (FONSI) was issued on May 7, 2010. This EA will expire in 2015.
- An informal consultation pursuant to section 7 of the Endangered Species Act of 1973 (ESA) was initiated on March 17, 2011 and the National Marine Fisheries Service (NMFS) Pacific Islands Regional Office (PIRO) concurred with the NMFS Pacific Islands Fisheries Science Center, Coral Reef Ecosystem Division determination that the proposed action (research and monitoring activities as proposed in this permit) may affect, but is not likely to adversely affect ESA listed marine species, or their designated critical habitat. The NMFS determination was based on the finding that the effects of the proposed action are expected to be insignificant, discountable, or beneficial as defined in the joint USFWS-NMFS Endangered Species Consultation Handbook.
- The Department has made an exemption determination for this permit in accordance chapter 343, HRS, and Chapter 11-200, HAR. See Attachment (“DECLARATION OF EXEMPTION FROM THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT UNDER THE AUTHORITY OF CHAPTER 343, HRS AND CHAPTER 11-200 HAR, FOR PAPAĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR RUSSELL BRAINARD, CORAL REEF ECOSYSTEM DIVISION, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, FOR ACCESS TO STATE WATERS TO CONDUCT REEF ASSESSMENT AND MONITORING RESEARCH ACTIVITIES UNDER PERMIT PMNM-2013-024”)

Has Applicant been granted a permit from the State in the past? Yes No

If so, please summarize past permits:

- Similar activities have been conducted in the Northwestern Hawaiian Islands since 2000. Permits have been issued for similar activities in the Monument in 2006 (NWHIMNM-2006-011 Vroom; Northwestern Hawaiian Island Marine Refuge permit Brainard (with activities and time frame are the same as in permit number NWHIMNM-2006-011); NWHIMNM-2006-015 Brainard), 2008 (PMNM-2008-062 Brainard), 2010 (PMNM-2010-052 Brainard), 2011 (PMNM-2011-022 Godwin), and 2012 (PMNM-2012-034 Godwin).

Have there been any a) violations: Yes No
 b) Late/incomplete post-activity reports: Yes No

Are there any other relevant concerns from previous permits? Yes No

STAFF OPINION:

DAR staff is of the opinion that Applicant has properly demonstrated valid justifications for his application and should be allowed to enter the NWHI State waters and to conduct the activities therein as specified in the application with certain special instructions and conditions, which are in addition to the Papahānaumokuākea Marine National Monument Research Permit General Conditions. All suggested special conditions have been vetted through the legal counsel of the Co-Trustee agencies (see Recommendation section).

MONUMENT MANAGEMENT BOARD OPINION:

The MMB is of the opinion that the Applicant has met the findings of Presidential Proclamation 8031 and this activity may be conducted subject to completion of all compliance requirements. The MMB concurs with the special conditions recommended by DAR staff.

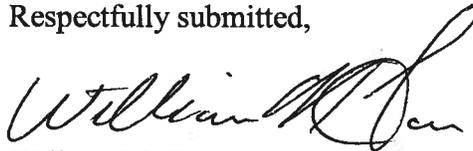
RECOMMENDATION:

Based on the attached proposed declaration of exemption prepared by the department after consultation with and advice of those having jurisdiction and expertise for the proposed permit actions:

1. That the Board declare that the actions which are anticipated to be undertaken under this permit will have little or no significant effect on the environment and is therefore exempt from the preparation of an environmental assessment.
2. Upon the finding and adoption of the department's analysis by the Board, that the Board delegate and authorize the Chairperson to sign the declaration of exemption for purposes of recordkeeping requirements of chapter 343, HRS, and chapter 11-200, HAR.
3. That the Board authorize and approve a Research Permit to Dr. Russell Brainard, Coral Reef Ecosystem Division, National Oceanic and Atmospheric Administration, with the following special conditions:
 - a. This permit is not to be used for nor does it authorize the sale of collected organisms. Under this permit, the authorized activities must be for noncommercial purposes not involving the use or sale of any organism, by-products, or materials collected within the Monument for obtaining patent or intellectual property rights.

- b. The permittee may not convey, transfer, or distribute, in any fashion (including, but not limited to, selling, trading, giving, or loaning) any coral, live rock, or organism collected under this permit without the express written permission of the Co-Trustees.
- c. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocol attached to this permit.
- d. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.
- e. Refueling of tenders and all small vessels must be done at the support ships and outside the confines of lagoons or near-shore waters in the State Marine Refuge.
- f. If there is any Hawaiian monk seal or any other protected species in the area when performing any permitted activity shall cease until the animal(s) depart the area, except as permitted for specific management of that species.

Respectfully submitted,



William M. Tam
Acting Administrator

APPROVED FOR SUBMITTAL



William J. Aila, Jr.
Chairperson

Papahānaumokuākea Marine National Monument
RESEARCH Permit Application

NOTE: *This Permit Application (and associated Instructions) are to propose activities to be conducted in the Papahānaumokuākea Marine National Monument. The Co-Trustees are required to determine that issuing the requested permit is compatible with the findings of Presidential Proclamation 8031. Within this Application, provide all information that you believe will assist the Co-Trustees in determining how your proposed activities are compatible with the conservation and management of the natural, historic, and cultural resources of the Papahānaumokuākea Marine National Monument (Monument).*

ADDITIONAL IMPORTANT INFORMATION:

- Any or all of the information within this application may be posted to the Monument website informing the public on projects proposed to occur in the Monument.
- In addition to the permit application, the Applicant must either download the Monument Compliance Information Sheet from the Monument website OR request a hard copy from the Monument Permit Coordinator (contact information below). The Monument Compliance Information Sheet must be submitted to the Monument Permit Coordinator after initial application consultation.
- Issuance of a Monument permit is dependent upon the completion and review of the application and Compliance Information Sheet.

INCOMPLETE APPLICATIONS WILL NOT BE CONSIDERED

Send Permit Applications to:

Papahānaumokuākea Marine National Monument Permit Coordinator

6600 Kalaniana'ole Hwy. # 300

Honolulu, HI 96825

nwhipermit@noaa.gov

PHONE: (808) 397-2660 FAX: (808) 397-2662

SUBMITTAL VIA ELECTRONIC MAIL IS PREFERRED BUT NOT REQUIRED. FOR ADDITIONAL SUBMITTAL INSTRUCTIONS, SEE THE LAST PAGE.

Papahānaumokuākea Marine National Monument Permit Application Cover Sheet

This Permit Application Cover Sheet is intended to provide summary information and status to the public on permit applications for activities proposed to be conducted in the Papahānaumokuākea Marine National Monument. While a permit application has been received, it has not been fully reviewed nor approved by the Monument Management Board to date. The Monument permit process also ensures that all environmental reviews are conducted prior to the issuance of a Monument permit.

Summary Information

Applicant Name: Russell E. Brainard, Ph.D.

Affiliation: National Oceanic and Atmospheric Administration (NOAA), Pacific Islands Fisheries Science Center (PIFSC), Coral Reef Ecosystem Division (CRED)

Permit Category: Research

Proposed Activity Dates: between 09/03/13 and 09/19/13

Proposed Method of Entry (Vessel/Plane): NOAA Ship Hi'ialakai

Proposed Locations: Deep and shallow water reefs of the Monument including the reefs associated with: Pearl & Hermes Atoll, French Frigate Shoals, Lisianski Island.

Estimated number of individuals (including Applicant) to be covered under this permit:
22

Estimated number of days in the Monument: 17

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...

conduct reef assessment and monitoring activities throughout the islands and atolls of the Papahānaumokuākea Marine National Monument. These efforts would contribute to continuing research providing scientific information needed to support ecosystem approaches to the management of coral reef systems of the Monument and areas across the Pacific region. The primary focus of the multi-institutional team of scientists, led by NOAA's CRED, would focus on collaborating with local agencies to implement the Pacific Reef Assessment and Monitoring Program's (RAMP) portion of climate research and monitoring as mandated within NOAA's National Coral Reef Monitoring Program (NCRMP).

b.) To accomplish this activity we would

use monitoring efforts including rapid ecological assessments of corals, macro-invertebrates, fish, and algae to species or genus level using multiple methods; multi-

platform oceanographic and water quality monitoring using shipboard surveys, moored instrument arrays, and satellite remote sensing.

c.) This activity would help the Monument by ...
establishing consistent interdisciplinary methods across this vast region allowing for an opportunity to perform biogeographic and ecological comparative analyses of diverse ecological, environmental, and oceanographic gradients. Patterns of spatial and temporal variability of seawater chemistry, thermal structure, coral reef calcification rates, biodiversity, and other reef metrics are paramount to assessing an ecological niche as valuable as Papahānaumokuākea Marine National Monument.

Other information or background:

CRED conducts integrated, multidisciplinary, ecosystem research, habitat mapping, and long-term monitoring of coral reef ecosystems in the U.S.-affiliated Pacific Islands. CRED's work is a key component of NOAA's Coral Reef Conservation Program (CRCP). CRED scientists describe, map, and monitor coral reef ecosystems. The program's approach is to apply a suite of standardized methods, including ecological assessments, oceanographic and water quality measurements, and benthic habitat mapping, to improve understanding of the spatial and temporal processes influencing the health of coral reef ecosystems throughout the region. The knowledge gained is shared with resource managers and various public stakeholders to improve decision-making for the long-term conservation and management of coral reef resources.

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Brainard, Russell, E. Ph.D.

Title: Chief, Coral Reef Ecosystem Division, NOAA Pacific Islands Fisheries Science Center

1a. Intended field Principal Investigator (See instructions for more information):
Charles Young

2. Mailing address (street/P.O. box, city, state, country, zip):

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

For students, major professor's name, telephone and email address:

3. Affiliation (institution/agency/organization directly related to the proposed project):
NOAA Pacific Islands Fisheries Science Center, Coral Reef Ecosystem Division

4. Additional persons to be covered by permit. List all personnel roles and names (if known at time of application) here (e.g. John Doe, Research Diver; Jane Doe, Field Technician):

Field Team 1

1. TBD
2. TBD
3. TBD
4. TBD

Field Team 2

5. TBD
6. TBD
7. TBD
8. TBD

Field Team 3

- 9. TBD
- 10. TBD
- 11. TBD
- 12. TBD

Benthic Research Team

- 13. TBD- Invertebrates (ARMS)
- 14. TBD- Invertebrates (ARMS)
- 15. TBD- Benthic Habitat
- 16. TBD- Benthic Habitat

Oceanographic and Mooring Team

- 17. TBD
- 18. TBD
- 19. TBD
- 20. TBD

Divemaster/Chamber Operator

- 21. TBD

Data Management/Outreach

- 22. TBD

Section B: Project Information

5a. Project location(s):

- | | | | |
|--|-------------------------------------|---|--|
| <input type="checkbox"/> Nihoa Island | <input type="checkbox"/> Land-based | <input type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> Necker Island (Mokumanamana) | <input type="checkbox"/> Land-based | <input type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> French Frigate Shoals | <input type="checkbox"/> Land-based | <input checked="" type="checkbox"/> Shallow water | <input checked="" type="checkbox"/> Deep water |
| <input type="checkbox"/> Gardner Pinnacles | <input type="checkbox"/> Land-based | <input type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> Maro Reef | | | |
| <input type="checkbox"/> Laysan Island | <input type="checkbox"/> Land-based | <input type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> Lisianski Island, Neva Shoal | <input type="checkbox"/> Land-based | <input checked="" type="checkbox"/> Shallow water | <input checked="" type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> Pearl and Hermes Atoll | <input type="checkbox"/> Land-based | <input checked="" type="checkbox"/> Shallow water | <input checked="" type="checkbox"/> Deep water |
| <input type="checkbox"/> Midway Atoll | <input type="checkbox"/> Land-based | <input type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> Kure Atoll | <input type="checkbox"/> Land-based | <input type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> Other | | | |

Ocean Based

Remaining ashore on any island or atoll (with the exception of Midway & Kure Atolls and Field Camp staff on other islands/atolls) between sunset and sunrise.

NOTE: There is a fee schedule for people visiting Midway Atoll National Wildlife Refuge via vessel and aircraft.

Location Description:

CRED's multidisciplinary monitoring teams collect data in shallow water environments from surface levels to 30m deep. There are over 300 permanent transect and mooring sites throughout PMNM, investigating the various coral reef environments along the forereef, backreef and lagoons. Randomly selected survey sites will be selected prior to the cruise, and the list of positions will be submitted in the compliance form.

5b. Check all applicable regulated activities proposed to be conducted in the Monument:

- Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving Monument resource
- Drilling into, dredging, or otherwise altering the submerged lands other than by anchoring a vessel; or constructing, placing, or abandoning any structure, material, or other matter on the submerged lands
- Anchoring a vessel
- Deserting a vessel aground, at anchor, or adrift
- Discharging or depositing any material or matter into the Monument
- Touching coral, living or dead
- Possessing fishing gear except when stowed and not available for immediate use during passage without interruption through the Monument
- Attracting any living Monument resource
- Sustenance fishing (Federal waters only, outside of Special Preservation Areas, Ecological Reserves and Special Management Areas)
- Subsistence fishing (State waters only)

Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

6. Purpose/Need/Scope *State purpose of proposed activities:*

The Coral Reef Conservation Act of 2000 created a national program and authorized NOAA to conduct mapping, monitoring, assessment, restoration, and scientific research that benefit the understanding, sustainable use, and long-term conservation of coral reefs and coral reef ecosystems. As part of the mandate, CRED leads coral reef ecosystem monitoring efforts in the U.S jurisdictions across the Pacific, including in PMNM. CRED proposes to continue its previous Pacific RAMP efforts in the Northwestern Hawaiian Islands by conducting coral reef ecosystem monitoring, which includes biological and oceanographic observations.

In order to properly manage the coral reefs and related waters of PMNM, Pacific RAMP cruises utilize several disciplines to monitor the various biota and environments. The primary research areas are listed below with accompanying descriptions (Oceanographic & Water Sampling 1; Algae, Corals and Coral Disease 2; and Non-coral Invertebrates 3):

1.) Oceanography:

Long-term time-series of physical oceanographic data supplemented by discrete water sampling enables scientists and resource managers to characterize the oceanographic regime under which coral reef ecosystems reside. Long-term datasets of oceanographic and environmental parameters provide important context to ecological observations (obtained by NOAA, the Monument, and other partners). Information about the carbonate chemistry systems of coral reefs helps scientists to understand the potential effects of ocean acidification. Passive acoustic information allows resource managers to economically monitor vessel activity and other variables at remote locations. In conjunction with PMNM, we are requesting permission to service existing instruments and deploy additional instrumentation in the archipelago. We are also requesting permission to collect near-shore and open ocean water samples for water quality analysis of various parameters.

Objectives:

- a) Perform conductivity, temperature and depth recorder (CTD) casts to gather continuous profiles of temperature and salinity against depth in shallow water environments.
- b) Conduct water sampling efforts in conjunction with CTD casts at Calcification Accretion Unit (CAU) sites and benthic survey sites to provide a measure of the carbonate system, microbiological diversity, and nutrient regime present within the reef ecosystems CRED visits.

CAU Site	Latitude	Longitude
PHR-R26	27.785833	-175.780283
PHR-33	27.785438	-175.823543
PHR-R39	27.940460	-175.861310
PHR-R44	27.910617	-175.904833
PHR-R42	27.753133	-175.948767

CAU Site	Latitude	Longitude
LIS-18	26.004283	-173.994028
LIS-R14	26.078415	-173.997011
LIS-R9	26.039408	-174.012545
LIS-09	25.958073	-173.882380
LIS- R10	25.944620	-173.953610
FFS-21	23.8469537	-166.3269575
FFS-H6	23.8804552	-166.2730599
FFS-R46	23.7692800	-166.2617300
FFS-12	23.6383500	-166.1800500
FFS-34	23.6279200	-166.1353800

Water samples are analyzed for:

Dissolved inorganic carbon and total alkalinity at
NOAA, PMEL

Cynthia Peacock

cynthia.peacock@noaa.gov

7600 Sand Point Way NE

Seattle, WA 98115

Salinity at

University of Hawaii

Paul Bienfang

pfang@hawaii.rr.com

Marine Science Bldg.

1000 Pope Rd.

Honolulu, HI 96722

CAU samples are analyzed at

NOAA, CRED

1125B Ala Moana Blvd.

Honolulu, HI 96714

c) Complete removal, maintenance, replacement and/or installation of various oceanographic instruments, biological platforms, and acoustic monitoring devices at study sites selected to provide valuable longterm oceanographic and ecological data sets. Note: Only Subsurface Temperature Recorders (STR) will be recovered and replaced after completion of this cruise. Long term near reef seawater temperature records, collected during STR deployments, are mandated by the climate monitoring policy within NOAA's NCRMP. Ecological Acoustic Recorders (EARS), Seasurface Temperature Buoys (SST-STR), Wave and Tide Recorders (WTR), and associated anchors will be removed from the Monument. Below is a list of dive locations where instruments will either be exchanged or removed.

Latitude	Longitude	Name
27.94060316	-175.8617209	EAR, Pearl and Hermes Reef
27.7544833	-175.8940833	EAR, Pearl and Hermes Reef
27.8539269	-175.8158758	STR, Pearl and Hermes Reef
27.8539269	-175.8158758	SST-STR, Pearl and Hermes Reef
27.77473921	-175.9787157	STR, Pearl and Hermes Reef

27.91184284 -175.8943118 STR, Pearl and Hermes Reef
27.95767928 -175.780838 STR, Pearl and Hermes Reef
27.80261943 -175.779335 STR, Pearl and Hermes Reef
27.89800524 -175.8313905 STR, Pearl and Hermes Reef
27.8539269 -175.8158758 ANCHOR, Pearl and Hermes Reef
27.8539269 -175.8158758 STR, Pearl and Hermes Reef
27.78206181 -175.8809973 STR, Pearl and Hermes Reef
27.781683 -175.88088 ANCHOR, Pearl and Hermes Reef
27.7816469 -175.8809328 STR, Pearl and Hermes Reef
27.78250186 -175.882137 STR, Pearl and Hermes Reef
27.790972 -175.862992 ANCHOR, Pearl and Hermes Reef
27.94235422 -175.8634055 STR, Pearl and Hermes Reef
27.94431634 -175.8649835 STR, Pearl and Hermes Reef
27.78193952 -175.7834911 STR, Pearl and Hermes Reef
27.86619642 -175.7311846 STR, Pearl and Hermes Reef
27.94056687 -175.8617143 ANCHOR, Pearl and Hermes Reef
27.94060316 -175.8617209 EAR, Pearl and Hermes Reef
27.78211948 -175.881429 BATTERY, Pearl and Hermes Reef
27.78211948 -175.881429 ANCHOR, Pearl and Hermes Reef
27.78211948 -175.881429 SBE37, Pearl and Hermes Reef
27.78211948 -175.881429 ADP, Pearl and Hermes Reef
27.78571439 -175.7804599 STR, Pearl and Hermes Reef
27.75312882 -175.9489414 STR, Pearl and Hermes Reef
25.901833 -173.776166 EAR, Lisianski Island
25.96761991 -173.9158715 STR, Lisianski Island
25.96761161 -173.9158361 SST-STR, Lisianski Island
26.10010042 -173.9979861 ANCHOR, Lisianski Island
26.10017301 -173.9979678 ANCHOR, Lisianski Island
25.96761991 -173.9158715 STR, Lisianski Island
25.96761991 -173.9158715 ANCHOR, Lisianski Island
25.98699016 -173.9943768 STR, Lisianski Island
25.94301567 -173.8841434 ANCHOR, Lisianski Island
25.94301567 -173.8841434 STR, Lisianski Island
25.94301567 -173.8841434 WTR, Lisianski Island
25.94461746 -173.9536197 STR, Lisianski Island
26.07838458 -173.9970317 STR, Lisianski Island
23.6373 -166.2632166 EAR, French Frigate Shoals
23.76904126 -166.2612977 STR, French Frigate Shoals
23.86605324 -166.2196974 STR, French Frigate Shoals
23.64515824 -166.173743 STR, French Frigate Shoals
23.73812906 -166.1674967 STR, French Frigate Shoals
23.85626083 -166.275186 STR, French Frigate Shoals
23.85626083 -166.275186 SST-STR, French Frigate Shoals
23.63880593 -166.1797021 STR, French Frigate Shoals
23.634983 -166.185593 ANCHOR, French Frigate Shoals

23.63507 -166.18554 EAR, French Frigate Shoals
23.85626167 -166.2751585 ANCHOR, French Frigate Shoals
23.85626167 -166.2751585 STR, French Frigate Shoals
23.76887103 -166.2619694 ANCHOR, French Frigate Shoals
23.88048529 -166.2730727 STR, French Frigate Shoals

2.) Algae, Corals, and Coral Disease:

Quantitative assessment and monitoring of the coral reef benthic communities is central to NOAA-PIFSC-CRED's programmatic mission to provide sound science to enable informed and effective implementation of ecosystem-based management and conservation strategies in the U.S.-Affiliated Pacific Islands Region. In this context, surveys are conducted at a range of shallow (0-30 m depth), hard-bottom habitats within each sub-jurisdictional unit (island) to document community status and change over time. Largely, these activities involve two main themes: 1) Coral reef benthic composition, community structure, and demography parameters, including percent cover, taxonomic richness, density, size-class distribution, and health condition, are assessed at geo-referenced, fixed and stratified random sites selected to provide spatial-temporal appraisals of coral reef dynamics in the region; and 2) calcification studies on scleractinian corals and other calcifying reef builders, by means of sample collection and deployment of instrumentation, to better understand reef calcification dynamics and processes in a changing climate. Continued monitoring of these parameters is pivotal to the understanding of coral reef structural integrity and health status over time. More importantly, it enables resource managers to make informed decisions pertaining to the protection and preservation of critical habitats across the U.S.-affiliated Pacific.

Objectives:

- a) Continue to collect information to assess the status and trends of the coral reef benthic communities of Hawaii and the U.S.-Affiliated Pacific Islands Region, building upon quantitative studies initiated in 2002.
- b) Continue to assess and monitor the abundance and geographical distribution of shallow-water (< 20 m) diseases and diseased corals, building upon studies that were initiated in 2006, and methodically describe the gross morphology of disease and lesions in diseased corals.
- c) Assess and monitor the calcification rates of scleractinian corals and other calcifying benthic organisms by deployment and retrieval of CAUs.
- d) Provide the basis for inter and intra-jurisdictional status and trend analyses.
- e) Provide the basis to evaluate the effects of potential local and global environmental impacts, including land-based sources of pollution, siltation and sedimentation stress, physical damage (storms, groundings), habitat degradation, climate change, and ocean acidification.

3.) Invertebrates:

The need for conservation of coral reef ecosystems throughout the world requires knowledge concerning species richness within and among habitats and an

understanding of the factors that influence species survivorship. The collection of systematic information concerning what taxa are present is essential to understand the changes in coral reef communities and ecosystem processes. Historically, coral reef biodiversity assessments and monitoring programs have focused strictly on the charismatic fauna such as corals and fish even though much of the biomass and the majority of reef biodiversity lies within the complex three-dimensional architecture of the reef matrix. This diverse and understudied cryptofauna community of sponges, mollusks, tunicates, polychaetes, crustaceans, and other small motile and sessile fauna, play an integral role in reef ecosystem function. This study is aimed at monitoring the diversity, abundance and distribution of the cryptofauna at sites to be established for long-term monitoring in PMNM. The goal is encompassed within the CRED's programmatic mission to further efforts to monitor, assess, and preserve coral reefs in the US Pacific Territories, the National Coral Reef Monitoring Plan's to establish national-level status and trends monitoring across both basins with the U.S. coral reef ecosystems, and the US National Ocean Policy established in July 2010 to protect, maintain, understand, and restore the biological diversity of ocean ecosystems. This project will build upon previous baseline and monitoring efforts to enhance the state of knowledge of coral reef invertebrate populations in the Hawaii Archipelago and in relationship to the other Pacific island areas.

Objectives:

- a) Continue to deploy, recover, and process Autonomous Reef Monitoring Structures (ARMS) in PMNM.
- b) Establish new permanent sites based on a random sampling design for long-term monitoring of non-coral marine invertebrates.
- c) Habitat characterization of the new permanent sites.
- d) Collection of targeted species for phylogeography work.
- e) Collection of sediment to examine which environmental variables influence reef-associated bivalve biodiversity across the Pacific.

ARMS Site	Latitude	Longitude
PHR-R26	27.785833	-175.780283
PHR-33	27.785438	-175.823543
PHR-R42	27.753133	-175.948767
PHR-R44	27.910617	-175.904833
LIS-18	26.004283	-173.994028
LIS-R14	26.078415	-173.997011
LIS- R10	25.944620	-173.953610
LIS-R9	26.039408	-174.012545
FFS-H6	23.8804552	-166.2730599
FFS-12	23.6383500	-166.1800500
FFS-34	23.6279200	-166.1353800
FFS-R46	23.7692800	-166.2617300

ARMS samples are primarily processed and stored at

NOAA, CRED

1125B Ala Moana Blvd.

Honolulu, HI 96714

further sample exchange with various institutions are listed in 9b.

Sand samples are processed, stored, and analyzed at
Florida Museum of Natural History
278 Dickinson Hall
Museum Road & Newell Drive
Gainesville, FL 32611

*Considering the purpose of the proposed activities, do you intend to film / photograph federally protected species? Yes No

For a list of terrestrial species protected under the Endangered Species Act visit:

<http://www.fws.gov/endangered/>

For a list of marine species protected under the Endangered Species Act visit:

<http://www.nmfs.noaa.gov/pr/species/esa/>

For information about species protected under the Marine Mammal Protection Act visit:

<http://www.nmfs.noaa.gov/pr/laws/mmpa/>

7. Answer the Findings below by providing information that you believe will assist the Co-Trustees in determining how your proposed activities are compatible with the conservation and management of the natural, historic, and cultural resources of the Monument:

The Findings are as follows:

a. How can the activity be conducted with adequate safeguards for the cultural, natural and historic resources and ecological integrity of the Monument?

The Coral Reef Ecosystem team members conduct monitoring reef surveys with little to no adverse impacts to the natural resources of the Monument. The scientific objectives are to observe the natural habitat with minimal disturbance and to only come in contact with resources in limited occurrences to further comprehensive understanding and research in the Monument. In addition, team members attend a Hawaiian Cultural Briefing each year before entering the Monument waters. This education instills the awareness of the natural, cultural and historical values the Monument holds. Also, the NOAA research ship HI'IALAKAI has informative cultural literature provided by the Office of Hawaiian Affairs (OHA) and the Monument for personnel seeking further knowledge or who may not be able to attend the briefings.

b. How will the activity be conducted in a manner compatible with the management direction of this proclamation, considering the extent to which the conduct of the activity may diminish or enhance Monument cultural, natural and historic resources, qualities, and ecological integrity, any indirect, secondary, or cumulative effects of the activity, and the duration of such effects? All management regulations pertaining to the Monument are strictly adhered to when conducting operations within the Monument and in Special Preservation Areas. The PIFSC and CRED supplies trained, knowledgeable and experienced researchers who are aware and educated of the Monument's cultural, natural and historic resources and act accordingly to enhance the management of the Monument. To the knowledge of PIFSC and CRED, there are to be no indirect, secondary, or cumulative effects on the Monument's cultural, natural and historic resources, qualities and ecological integrity from the proposed activities. All activities proposed provide critical data that will greatly enhance the Monument managers' ability to characterize and understand the ecosystems within the Monument. As stated, all scientific methods to be used on this cruise are designed to have minimal, if any, negative effects on the environment or cultural resources. There are no anticipated indirect, secondary or cumulative effects of the proposed methods. The uniformed goals of conservation and management are of utmost importance to the intended research and no work outside of permitted activities shall be considered.

c. Is there a practicable alternative to conducting the activity within the Monument? If not, explain why your activities must be conducted in the Monument.
There is no practicable alternative to conducting the research within the Monument because monitoring data gathered from this research pertains to the area being managed and is to be utilized by the Monument.

d. How does the end value of the activity outweigh its adverse impacts on Monument cultural, natural and historic resources, qualities, and ecological integrity?
There will be little to no adverse impacts on the Monument cultural, natural and historic resources, qualities and ecological integrity from the proposed activities. All intended activities contribute significantly to an understanding of the ecosystems within the Monument. CRED intends to provide the scientific data needed to support management of the Monument through cruise reports and coral reef ecosystem monitoring reports.

e. Explain how the duration of the activity is no longer than necessary to achieve its stated purpose.

The NWHI RAMP cruise will use the minimum amount of time needed within Monument waters to complete the required work. Due to the considerable size of the Monument and the transit time between locations, the provided schedule will maximize the amount of operational days available.

f. Provide information demonstrating that you are qualified to conduct and complete the activity and mitigate any potential impacts resulting from its conduct.

Personnel from NOAA Pacific Islands Fisheries Science Center's Coral Reef Ecosystem Division have collected monitoring data with little to no adverse impacts to the natural

resources of the Monument and in other U.S. related Pacific Islands. RAMP cruises have been successfully conducted on an annual basis in the NWHI since 2000 in conjunction with the co-trustees of the Monument. Team members are experienced divers and highly trained personnel who will be under the guidance of the Chief Scientist (CV attached).

g. Provide information demonstrating that you have adequate financial resources available to conduct and complete the activity and mitigate any potential impacts resulting from its conduct. RAMP operations are funded by yearly grants from the NOAA Coral Reef Conservation Program to the Coral Reef Ecosystem Division, which is a part of the NOAA Pacific Islands Fisheries Science Center. NOAA's Pacific Islands Fisheries Science Center contributes in kind to the foundation and activities conducted by the CRED. Collaborators and partners also supply personnel and effort through their own funding.

h. Explain how your methods and procedures are appropriate to achieve the proposed activity's goals in relation to their impacts to Monument cultural, natural and historic resources, qualities, and ecological integrity.

CRED has been conducting research in the Northwestern Hawaiian Islands for over a decade, using their established protocols and methods, which have shown to have little impact on the coral reef habitat being observed (see Hoeke, et al. 2009). For each discipline there are procedure manuals, including safety instructions, for both ship and diving operations, which are followed and enforced. These methods, and the RAMP cruise itself, are conducted with the intention of monitoring and assessing the coral reef ecosystem with as little impact as possible to the Monument resources, as directed and outlined in the Monument's "Best Management Practices" documentation.

(<http://www.papahanaumokuakea.gov/permit/bestmanagement.html>)

i. Has your vessel been outfitted with a mobile transceiver unit approved by OLE and complies with the requirements of Presidential Proclamation 8031?

Under a separate permit, the Hi'ialakai is outfitted with a mobile transceiver unit.

j. Demonstrate that there are no other factors that would make the issuance of a permit for the activity inappropriate.

We are not aware of any other factors that would make the issuance of a permit for the activity inappropriate. CRED plans to conduct the vigilant operations and concise protocols exhibited on previous RAMP cruises unless requested by the Monument to modify.

8. Procedures/Methods:

All diving and boating activities are conducted in accordance with NOAA policies and safety regulations.

The proposed research would be conducted between September 3rd, 2013 and September 19th, 2013 using the NOAA research vessel Hi'ialakai as a platform. In order to properly manage the coral reefs and related waters of PMNM, Pacific RAMP cruises utilize several disciplines to monitor the various biota and environments. The

primary research areas are listed below with accompanying descriptions (Oceanographic & Water Sampling 1; Algae, Corals and Coral Disease 2; and Invertebrates 3:
Benthic Field survey Techniques:

1) Oceanography:

The seafloor instruments are 'temporary' in that they can be deployed and completely removed, if necessary. Sites with instruments are conceived to be a long-term data collection sites. We plan to swap out moored instruments every three years and maintain them when needed. Future retrieval and replacement of installed equipment is intended to be conducted on subsequent cruises. Anchors (aka moorings) are replaced on a similar 3 year schedule. 'Servicing' (replacement or retrieval) of an instrument and/or anchor takes place by CRED primarily but with occasional assistance from partners on other research cruises.

- Acoustic Doppler Current Profilers (ADCP) collect information on water velocity, water level, and waves. These are typically a cylindrical body approximately 6 cm in diameter and 45 cm in length. The instrument is typically deployed in conjunction with a ~140 lb anchor weight. ADCP Deployments involve lowering an instrument(s) to the seafloor using a lift bag and SCUBA divers.
- Ecological Acoustic Recorder (EAR) units: The EAR is a digital, low power system that records ambient sounds at frequencies up to 30 kHz on a programmable schedule. They collect information on ocean sounds (natural and anthropogenic). EAR units are attached to weights and deployed on the seafloor. There are two types of EARs presently deployed in the Monument, shallow EARs and deep EARs. Shallow EARs consist of a cylindrical body approximately 10 cm in diameter and 80 cm in length. They are typically deployed in conjunction with a ~250 lb anchor weight. A lift bag is used in this procedure. Deep EARs are composed of the same cylindrical body described above, as well as a syntactic foam float measuring approximately 40 cm in diameter and 50 cm in length, a cylindrical acoustic release measuring approximately 10 cm in diameter and 60 cm in length, and approximately 150 lbs of anchoring weight in the form of a concrete block and natural fiber sand-filled bags.
- Sub-surface Temperature Recorders (STR) are used to construct a time series of water temperature data at various locations on a reef for the duration of their deployment. These small instruments are placed on the seafloor and in coral reefs and provide high resolution data sets of ocean temperature. STRs are cylindrical bodies measuring 2.5 cm in diameter and 30 cm in length, are mounted onto ~4 lbs of weight and attached to the reef cement matrix using zipties.
- Calcification Accretion Units (CAUs) and Bioerosion Monitoring Units (BMUs) are used to monitor calcification and bioerosion rates across reefs and islands experiencing different physical oceanography and local human impacts. CAUs study the in situ ecological impacts of ocean acidification by measuring variations in the calcification rates of stony corals and crustose coralline algae. A CAU is a small device and is typically deployed in a set of five at a survey site. The device consists of a pair of 10 cm x 10 cm poly vinyl chloride plates that are attached to the reef with permanent stainless steel transect markers and underwater epoxy. The BMU is a tool used to quantify

biological erosion rates on coral reefs. The BMU is made of a 1 cm x 2 cm x 5 cm block of calcium carbonate rock mounted on a similarly sized piece of polyvinylchloride plate. It is attached to the same permanent stainless steel transect marker upon which the CAU is mounted. The BMU rests flush with the seafloor and upon retrieval will be measured for changes in weight and density using a CT Scan. Only a subset of CAUs will have BMUs collocated, as CRED plans to only deploy 50 BMUs and 100 CAUs throughout the Papahānaumokuākea Marine National Monument.

- Conductivity-Temperature-Depth (CTD) casts are used to collect information about the vertical salinity and temperature structure of the water column. An instrument array is lowered and retrieved above the seafloor by hand and line from a small boat or carried by a diver.
- Oceanographic Water Sampling: Niskin bottles are used by SCUBA divers to collect water samples. Three water samples will be associated with each survey site that has CAUs deployed. Two samples of surface water will be collected near the CAU site and one water sample will be collected at the reef, alongside the deployed CAUs. An additional water sample will be collected at the reef by the Benthic Research Team on each dive the team conducts. The standard sampling depths will be 1m depth (or surface sample) and ~15m depth (or reef sample). For the DIC/TA water sample, 200µL of saturated Mercuric Chloride (HgCl₂) solution will be used to halt biological activity in the water sample, as per directed by the Guide to Best Practices for Ocean CO₂ Measurements. Water samples may also be collected with a remote auto-sampler or Programmable Underwater Collector (PUC) where near reef samples can be collected over a variety of times. Collecting water samples autonomously allows for the investigation of diel variability in the carbonate system. The PUC units will be deployed for 24 hrs and removed before CRED departs an island or region. The remote auto-samplers are diver portable and do not require lift bags or working dives.

Additional oceanographic research regarding microbiological research while onboard the Hi'ialakai:

- 1) One ml of water from each sample will be fixed with paraformaldehyde and filtered onto nucleopore filters (0.02 and 0.2µm). Filters will be stained with SYBR-Gold (for counting microbes and viruses) and DAPI (for obtaining cell size measurements)
- 2) Slides will be stored in a slide box at -20 degrees C until they can be transported to CRED's collaborative partner at San Diego State University (SDSU) for processing.
- 3) Water samples will be filtered through GF/F glass filters and the filtrate will be collected in glass bottles. Hydrochloric acid (30ul) will be added to each bottle (to remove dissolved inorganic carbon) and the bottles will be stored at 4 degrees C. These samples will be analyzed for dissolved organic carbon at SDSU. The GF/F filters will be stored at -20 degrees C and analyzed for particulate organic carbon (concentration and stable isotopes of C & N) at SDSU.
- 4) Archive microbial DNA samples will be filtered through a 20µm profiler followed by a 0.2 micron Sterivex filter. The filter will be stored at -20 degrees C until the DNA can be isolated for 454 sequencing at SDSU.
- 5) Flow cytometry research will be conducted on 5ml of water, filtered through a 20µm filter. The filtrate will be dispensed into 3 x 5 ml cryovials, and glutaraldehyde added to each [final = .125%]. Vials will be inverted to mix, and incubated in the dark for 15 min. The

glutaraldehyde preserved samples will be flash frozen in liquid nitrogen (contained in a dry shipper) until they can be transported to SDSU for flow cytometry analysis.

2) Algae, Corals and Coral Disease:

Several complementary, underwater-surveys are used to enumerate, parameterize, and characterize the shallow-water coral reef benthic assemblages. Each method is repeated at all sites visited within the various habitat types present around each island or bank. Resulting data provides information relative abundance, size-structure, and health condition, providing the basis for estimation of benthic cover, colony densities, and disease prevalence.

At each REA site, two 25-m transect lines are the focal point for the benthic surveys.

1) Photoquadrat procedure: This is the main method used by CRED to derive benthic cover information at higher taxonomic resolution than functional group level. At each site, still photographs were taken to record the benthos at intervals of 2 m and 5 m along each transect line with a high-resolution digital camera mounted on a pole. This work generates 32 photographs per site that are later analyzed by staff at CRED, using the computer program Coral Point Count with Excel extensions (CPCe), to determine the benthic composition.

2) Coral community structure and coral disease: Within each of the two transects above, five, 2.5-meter segments are surveyed (beginning at points: 0, 5, 10, 15, and 20 meters), whereby in each segment, all coral colonies whose center falls within 0.5 meters of either side of the transect line are identified to the species level and two planar size metrics collected (i.e., maximum diameter and maximum diameter perpendicular to the maximum diameter). The extent of colony mortality, both recent and old, is also estimated for each colony; special attention is paid to identifying as best as possible the extent of formerly live colonies. In addition, cases of disease or impaired health are recorded and additional information collected, including type of affliction (bleaching, skeletal growth anomaly, white syndrome, subacute tissue loss, band diseases, necroses, pigmentation responses, algal and fungal infections, as well as other diseases of unknown etiology, and predation), extent (% of colony) and severity of the affliction (mild, moderate, marked, severe, acute), as well as photographic documentation and sometimes tissue samples.

3.) Non-coral Invertebrates, Autonomous Reef Monitoring Structures (ARMS) field survey and processing techniques:

The deployment, retrieval and processing of existing and future ARMS is the primary focus for RAMP non-coral marine invertebrate assessment. ARMS are small, long-term collecting devices designed to mimic the structural complexity of a coral reef and attract colonizing invertebrates. They are a standard and systematic device used to measure and understand cryptofauna biodiversity. ARMS are composed of nine 23 cm x 23 cm gray, type 1 PVC plates staked in an alternating series of open and obstructed formats attached to a 35 cm x 45 cm base plate. The entire structure is affixed to the sea floor using either four stainless steel stakes or bolts and remains on the benthos for 3 years during which time they become colonized with marine organisms. ARMS are retrieved

from the bottom by placing them within a mesh-lined container to prevent escape of motile organisms and then transported back to the Hiʻialakai for processing. Onboard the ship, each ARMS unit is disassembled plate by plate, with both sides photo-documented for spatial analyses of species coverage. The motile fraction is sieved using 2 mm, 500 µm, and 100 µm geologic sieves to create three size fractions that are preserved in 95% ethanol. After photography, plates are soaked in 95% ethanol and then scraped with a spatula and preserved in ethanol. The largest fraction (> 2mm) is processed via standard voucher-based molecular barcoding techniques. The two smaller motile fractions are crushed via mortar and pestle for DNA extraction and metagenomic analysis and the scraped encrusting fraction is homogenized with a Breville blender for future metagenomic analysis to be conducted by our partners at the Smithsonian, San Diego State University, Moss Landing Marine Laboratories and the Hawaii Institute of Marine Biology. The non-denatured biodegradable ethanol used to soak the plates will be diluted to a 10% solution (100 ml/l) and released into a mixing zone created by the prop wash at the stern of the ship. Once leaving the mixing zone, the final released concentration is estimated to be 1 to 2 orders of magnitude lower than the initial diluted solution.

ARMS permanent site establishment and characterization:

Sites will be randomly selected within hardbottom areas and specific positions will be generated prior to this cruise using a randomization tool and CRED's GIS habitat and bathymetric layers. At each randomly selected site, ARMS will be affixed to the reef as described above in replicate sets of three ARMS. The three replicates, which are installed within 1 to 2 m of each other, will act as the center point for a 50 m² quadrat. Its boundary will be fixed using marker pins and photoquad transects and rugosity measurements will be conducted within the 50 m² area. The intention of providing fixed, geo-referenced marker pins is to enable researchers to return to the exact location to conduct the exact same methods on subsequent visits thereby reducing the spatial imprecision in the site characterization overtime.

Collections:

Collections of the crown-of-thorns sea star, *Acanthaster planci*, will occur for population connectivity studies. Understanding population size and migration (dispersal and recruitment) of this corallivore in PMNM will aid in the management of these pristine reefs. *A. planci* will be removed underwater during the dive using a knife or shears and placed within a mesh bag or whirlpak. Back on board the ship, tube feet tissue will be removed using tweezers and placed into 95% ethanol for future molecular processing at the Hawaii Institute of Marine Biology. Collections are not the emphasis on this cruise and will therefore be occurring fortuitously by divers during their surveys.

Sand sample collection will occur to understand bivalve biodiversity across the Hawaiian chain. These collections are not the emphasis on this cruise and will thus be collected fortuitously by divers during surveys at fore reef sites within a depth range of 15 to 20 meters. If sampling does occur, up to three replicate samples at each site will be collected from sand patches that are at least a meter in diameter. Each sample will contain approximately one liter of sand. Collected

sand samples will either be frozen or preserved with ethanol on the ship and eventually be shipped to the Florida Museum of Natural History for examination.

NOTE: If land or marine archeological activities are involved, contact the Monument Permit Coordinator at the address on the general application form before proceeding, as a customized application will be needed. For more information, contact the Monument office on the first page of this application.

9a. Collection of specimens - collecting activities (would apply to any activity): organisms or objects (List of species, if applicable, attach additional sheets if necessary):

Common name:

1.) Water samples: samples are collected throughout the cruise in conjunction with CTD casts. Approximately 750 ml of seawater per sample is collected for samples associated with CRED climate monitoring and approximately 4 l of seawater for microbiological research. The total number of samples is variable and dependant upon work conditions, specifically conducting additional sampling in regards to tidal changes, weather and unpredicted oceanographic occurrences. Although, the maximum amount of forereef water sample collections to be conducted are as follows:

FFS = 35

LIS = 35

PHR = 35

From Shipboard CTD water sampling, approximately 30 samples are intended from various permanent locations as described in the Conservation and Management permit. Collection location: All seawater sample collections will occur at or near the CAU site locations. These exact positions will be provided in our compliance letter.

2.) EAR recovery: No new EAR deployments, only retrievals during this cruise. These exact positions will be provided in our compliance letter.

3.) Corals. No coral specimens or coral cores are to be collected during this cruise. The retrieval of CAUs may extract coral recruits which have settled onto the plates. The number and size of organisms collected off the CAU units is dependent upon random recruitment and colonization. Therefore, it is not possible to know or predict this information.

4.) Non-coral invertebrates:

With the exception of the crown-of-thorns sea star, *Acanthaster planci*, specimen collection will be based on the random recruitment and colonization of organisms to the ARMS units or the random placement of micromolluscs within collected sand samples. Sand samples will contain a variety of micromolluscs which includes both gastropods and bivalves. Previous ARMS have collected the following groups:

- Sponges
- Anemones and Hydrozoa
- Marine worms
- Snails
- Sea slugs

- Mussels and clams (exception: black-lipped pearl oysters)
- Octopus
- Barnacles, decapods, peracarids
- Bryozoans
- Starfish
- Sea cucumbers
- Brittle stars
- Feather stars
- Sea squirts

Scientific name:

Specimens from the following Phyla have been found on ARMS units:

Phylum Porifera

Phylum Cnidaria

Phylum Annelida

Phylum Mollusca

Phylum Arthropoda

Phylum Echinodermata

Phylum Bryozoa

Phylum Chordata

& size of specimens:

The number and size of organisms collected off the ARMS units and within the sand sample is dependent upon random recruitment, colonization, and displacement. Therefore, it is not possible to know or predict this information. All encountered *A. planici* will be sampled for population connectivity work. The number and size is not predictable for it is based upon a random chance of occurrence.

Collection location:

Generally, all specimens collected will occur at or near the CAU site locations. These exact positions will be provided in our compliance letter. If an opportunistic collection were to occur outside of these areas, the position will be noted and submitted within the cruise report.

Scientific name:

please see above

& size of specimens:

please see above

Collection location:

please see above

Whole Organism Partial Organism

9b. What will be done with the specimens after the project has ended?

- 1.) Water samples are brought back aboard the ship for initial processing and stored for transport. Upon arrival to Honolulu all samples are sent to analytical facilities for further analysis.
- 2.) CAUs and BMUs are brought back aboard the ship, individually stored in plastic bags, and frozen. Upon arrival to Honolulu all samples are sent to analytical facilities for further analysis.
- 3.) Collections for biodiversity assessments from the ARMS may be sent to the Smithsonian, Florida Museum of Natural History, University of Hawaii at Hilo, San Diego State, Moss Landing Marine Laboratories, and/or Hawaii Institute of Marine Biology (HIMB). The number and types of specimens sent to each of these institutions will vary pending on what recruits to the ARMS platforms and which specimens need identification. Identification will involve the use of molecular and taxonomic practices. NOAA CRED does not have a molecular facility to barcode and to conduct metagenetic analyses which is why this project is collaborative and involves many institutions.

All specimens will be either frozen or preserved in ethanol. Those collected for the connectivity study will be processed at HIMB for molecular sequencing.

Contact information for collaborating institutions:

1) Smithsonian Institution

PO Box 37012, MRC 163
Washington, DC 20013-7012

Matthieu Leray	LerayM@si.edu
Nancy Knowlton	Knowlton@si.edu
Christopher Meyer	meyerc@si.edu

2) Florida Museum of Natural History

278 Dickinson Hall
Museum Road & Newell Drive
Gainesville, FL 32611

Gustav Pauley paulay@flmnh.ufl.edu

3) San Diego State

Rohwer Lab
Biology Department LS 301
San Diego State University
5500 Campanile Drive
San Diego, CA 92182

Forest Rohwer frohwer@gmail.com
Eric Hester ericokh@gmail.com

4) UH Hilo
200 W. Kawili St
Hilo, HI 96720

Marta deMaintenon demainte@hawaii.edu

5) Moss Landing
8272 Moss Landing Road
Moss Landing, CA 95039

Jon Geller geller@mlml.calstate.edu

6) Hawaii Institute of Marine Biology
P.O. Box 1346
Kane'ohe, HI 96744

Rob Toonen toonen@hawaii.edu

Collections for biodiversity assessment of the sand samples will be sent to the Florida Museum of Natural History (FMNL). The number and types of specimens sent to FMNL will vary pending how many fortuitous samples are collected at the CAU sites and what have recruited to that sand habitat. Identification by FMNL will involve the use of molecular and taxonomic practices.

2) Florida Museum of Natural History
278 Dickinson Hall
Museum Road & Newell Drive
Gainesville, FL 32611

Gustav Pauley paulay@flmnh.ufl.edu
Sahale Casebolt scasebolt@flmnh.ufl.edu

9c. Will the organisms be kept alive after collection? Yes No

• General site/location for collections:
Generally all specimens collected will occur at or near the CAU site locations. These exact positions will be provided in our compliance letter. If an opportunistic collection were to occur outside of these areas, the position will be noted and submitted within cruise reporting.

- Is it an open or closed system? Open Closed

Collected CAUs and ARMS units will be placed in a closed system on the ship for same day processing. CAUs are processed same day. If scientists are unable to process all the ARMS units in the same day, the encapsulated unit will be placed in a small make-shift magnum bin that acts as an open system. This bin accepts seawater from the shipboard system and releases seawater off the stern. Only seawater is released from the magnum bin because all the ARMS units are encapsulated within a secured crate, lined with a 100 µm mesh layer. Having this circulation will ensure that the organisms trapped within the ARMS unit are alive until processing which will occur in a closed system the following day. Once an ARMS unit is processed, all organisms within the unit are preserved in 95% ethanol.

- Is there an outfall? Yes No

Collected ARMS units will be placed in a closed system on the ship for same day processing. If scientists are unable to process all the units in the same day, the encapsulated unit will be placed in a small make-shift magnum bin that acts as an open system. This bin accepts seawater from the shipboard system and releases seawater off the stern. Only seawater is released from the magnum bin because all the ARMS units are encapsulated within a secured crate, lined with a 100 µm mesh layer. Having this circulation will ensure that the organisms trapped within the ARMS unit are alive until processing which will occur in a closed system the following day. Once an ARMS unit is processed, all organisms within the unit are preserved in 95% ethanol.

- Will these organisms be housed with other organisms? If so, what are the other organisms?
No

- Will organisms be released?
No

10. If applicable, how will the collected samples or specimens be transported out of the Monument?

1.) Oceanographic Water Samples:

All water samples are either frozen or made stable using a fixing agent upon returning to the ship, stored in dedicated containers, and offloaded upon arrival to Honolulu.

2.) Algae, Corals and Coral Disease:

In the ship's wet lab, CAUs are individually stored in plastic bags and frozen.

3.) Non-coral invertebrate specimens/samples:

Samples will be frozen or preserved in 95% ethanol, salt saturated dimethyl sulfide or 'RNA-later' while on-board the ship, and subsequently transported back to Honolulu.

11. Describe collaborative activities to share samples, reduce duplicative sampling, or duplicative research:

CRED collaborates with multiple agencies to minimize duplication and provides data to researchers and institutions interested in mutually beneficial collaboration. All attempts are made to incorporate these agencies and institutions in the research cruises and analysis of data.

1.) Oceanography.

The shallow water EARs (<30m) being removed by CRED are part of a partnership with Marc Lammers and Whitlow Au from the Hawaii Institute of Marine Biology. Microbial research is a collaborative effort with SDSU. The CAU project is a collaboration with Scripps Institution of Oceanography.

2.) Algae, Corals and Coral Disease:

N/A

3.) Non-coral invertebrates:

Non-coral invertebrates samples from the ARMS units may be deposited at Bishop Museum, Smithsonian, Florida Natural History Museum, CRED, University of Hawaii at Hilo, San Diego State, Moss Landing Marine Laboratories, and/or HIMB for molecular processing and/or taxonomic identification.

12a. List all specialized gear and materials to be used in this activity:

Certified divers use NITROX to maximise bottom times for observations while following all strict NOAA Dive Center (NDC) dive regulations and adhering to Monument protocols. Standardized NDC dive gear is worn by divers who are familiar with their dive teams equipment (Mask, snorkel fins, wetsuit, booties, dive knife, buoyancy compensator devices, regulator, safety inflation indicator, dive whistle and personal dive safety equipment).

1.) Oceanography:

Lift bags, air tanks with nozzles, lines and clips, zip ties, cameras with underwater housings, wrenches, screw drivers, the various oceanographic arrays, CTD units and water sampling gear mentioned in the Methods section.

Transect lines, underwater clipboard, underwater paper, pencils, PVC photoquadrat, camera with underwater housing, Ziploc bags, cooler.

2.) Algae, Corals and Coral Disease:

Transect lines, underwater clipboard, underwater paper, pencils, shears, sledgehammer, zipties, stainless steel stakes, and cameras with underwater housings.

3.) Non-coral Invertebrates:

Transect lines, underwater clipboard, underwater paper, pencils, shears, ARMS units, ARMS recovery crates, sledgehammer, pneumatic drill, SCUBA tank, zip ties, stainless steel stakes, eye bolts, epoxy, 5 gal buckets, Buoy lines, lift bags, dive bag, 50 ml test tubes, whirlpaks, cameras with underwater housings, and 1 liter containers.

12b. List all Hazardous Materials you propose to take to and use within the Monument:

The CRED uses very limited chemicals in the field while in the Monument. The majority of chemicals listed remain in the designated Hazmat lockers aboard the support vessel. The CRED Hazmat list contains all compounds from minor solutions like vinegar to the more caustic ones listed below. A complete version of the MSDS is attached as Appendix 1:

- Clorox Bleach (Used for the cleaning of gear and instruments.)
- Ethanol (Used for the preservation of various samples.)
- Formalin (10%) (Used for the preservation of various samples.)
- Z-Fix Concentrate (Used for the fixation of various coral samples.)
- DMSO (For sample preservation) RNA later (For sample preservation)
- Dynamic Descaler (clean ARMS plates)
- Mercuric Chloride Solution (A small amount, 200 ul per sample, is used to halt biological activity in water samples. This is necessary for accurate analysis of dissolved inorganic carbon.)
- 10,000X SYBR Gold nucleic acid gel stain (Used by the microbiologist to stain water sampling filters to allow counting of microbes and viruses.)
- DAPI (4',6-diamidino-2-phenylindole) (Used by the microbiologist to for staining of filters, facilitating cell size measurement.)
- 32% Paraformaldehyde (Used by the microbiologist to halt biological activity in water samples)
- HCl (33-40%) (Used by the microbiologist to remove dissolved inorganic carbon from water samples.)
- Glutaraldehyde (Used by the microbiologist to halt biological activity in water samples as part of the flow cytometry process.)
- Chloroform (Used by the microbiologist to purify genetic samples.)
- Liquid Nitrogen (Used by the microbiologist to freeze flow cytometry samples.)

13. Describe any fixed installations and instrumentation proposed to be set in the Monument:

1.) Oceanography:

In situ instrument deployments are maintained or swapped every three years to build long time-series of data at deployment sites.

Techniques:

- SST Removal: After the instrument is recovered, the anchor to which the instrument was moored will be removed by divers utilizing lift bags.
- CAU/BMU Replacement: Establishing a permanent CAU/BMU sites involves manual installation of hardened stainless steel stakes or pins on hard dead substrate, away from living corals. Underwater epoxy is used to better affix the stake to the substrate. Each stake measures 1/2 in diameter; similar stakes have been used successfully with no signs of corrosion over a 3-year period. All other equipment (hammers, epoxy applicators, transect tapes) will be removed from the reef at the completion of each survey. A GPS location will be recorded for each new site established. Up to 5 CAU sties at each island/atoll visited will be selected for CAU installation. Each CAU site will consist of 5 deployed CAU units. One BMU will be attached to each CAU stake, when BMUs are deployed. BMUs will only be deployed on a subset of CAU sites, up to a maximum of 50 BMUs and 75 CAUs in Papahanaumokuakea Marine National Monument.
- STR Replacement: STRs are replaced by divers carrying a new instrument and anchor (4 lbs) to the existing STR site where the old STR, anchor and mooring ties are recovered. The new STR is then installed with mooring ties.

2.) Algae, Corals and Coral Disease:

N/A.

3.) Non-coral Invertebrates:

Establishing a permanent ARMS sites involves manual installation of hardened stainless steel stakes or pins on hard dead substrate, away from living corals. Underwater epoxy is used to better affix the stake to the substrate. Each stake measures 1/2 in diameter; similar stakes have been used successfully with no signs of corrosion over a 3-year period. All other equipment (hammers, epoxy applicators, transect tapes) will be removed from the reef at the completion of each survey. A GPS location will be recorded for each new site established. Up to 4 ARMS sties at each island/atoll visited will be selected for ARMS installation. Each site will consist of 3 deployed ARMS units. Up to a maximum of 36 ARMS will be deployed in Papahanaumokuakea Marine National Monument.

14. Provide a time line for sample analysis, data analysis, write-up and publication of information:

A Hawaiian Archipelago cruise report containing data collected in the field will be completed and submitted to PMNM within 6 months from the completion of the cruise. The PMNM cruise completion report will also be completed and submitted according to PMNM guidelines and requirements.

15. List all Applicants' publications directly related to the proposed project:

1.) Oceanography:

Hoeke, R.K., et. al. 2009. Coral Reef Ecosystem Integrated Observing System: In-situ Oceanographic Observations at the US Pacific Island and Atolls. *Journal of Operational Oceanography*. Vol. 2, No. 2: 3-14.

Price, N. N., et al. 2012. Diel Variability in Seawater pH Relates to Calcification and Benthic Community Structure on Coral Reefs. *PLoS ONE* 7(8):e43843.
doi:10.1371/journal.pone.0043843

2.) Algae, Corals and Coral Disease:

Aeby, G. S. 2006. Baseline levels of coral disease in the Northwestern Hawaiian Islands. *Atoll Res. Bull.* 534: 471–488.

Ben-Haim, Y., F.L. Thompson, C.C. Thompson, M.C. Cnockaert, B. Hoste, J. Swings, and E. Rosenberg. 2003. *Vibrio coralliilyticus* sp. nov., a temperature dependent pathogen of the coral *Pocillopora damicornis*. *Int. J of Syst. & Evol. Microbio* 53: 309–315.

Bythell J, O. Pantos, L. Richardson. 2004. White plague, white band, and other "white diseases". Pages 351–365 In: Rosenberg E, Loya Y (eds) *Coral Health and Disease*, Springer-Verlag, Berlin, 488 p.

Golbuu, Y., A. Barman, J. Kuartei, and S. Victor. 2005. The state of the coral reef ecosystems of Palau. Pages 488–507 in J. Waddell, ed. The state of the coral reef ecosystems of the United States and Pacific Freely Associated States: 2005. NOAA Technical Memorandum NOS NCCOS 11. NOAA/NCCOS Center for Coastal Monitoring and Assessment's Biogeography Team. Silver Spring, MS, 552pp.

Harvell, C. D., R. Aronson, N. Baron, J. Connell, A. Dobson, S. Ellner, L. Gerber, K. Kim, A. Kuris, H. McCallum, K. Lafferty, B. McKay, J. Porter, M. Pascual, G. Smith, K. Sutherland, and J. Ward. 2004. The rising tide of ocean diseases: unsolved problems and research priorities. *Front. Ecol. Environ.* 2:375–382.

Kaczmarzky, L. T. 2006. Coral disease dynamics in the central Philippines. *Dis. Aquat. Org.* 69:9–21.

Loya, Y. 2004. The coral reefs of Eilat– past, present and future: three decades of coral community structure studies. Pages 1–34 in E. Rosenberg and Y. Loya, eds. *Coral Health and Disease*, Springer-Verlag, Berlin, 488 pp.

Porter, J., P. Dustan, W. Jaap, K. Patterson, V. Kosmynin, O. Meier, M. Patterson, and M. Parsons. 2001. Patterns of spread of coral disease in the Florida Keys. *Hydrobiology* 159: 1-24.

Sutherland, K. P., J. Porter, and C. Torres. 2004. Disease and immunity in the Caribbean and Indo-Pacific zooxanthellate corals. *Marine Ecol. Prog. Ser.* 266:273–302.

Vargas-Ángel, B., E. C. Peters, E. Kramarsky-Winter, D. Gilliam, and D.E. Dodge. 2007. Cellular reactions to sedimentation and temperature stress in the Caribbean coral *Montastraea cavernosa*. *J. Invertebr. Pathol.* 95:140–145.

Vargas-Angel, B., J.C. Kenyon, J. Maragos, and R.E. Brainard. In prep. Ecological assessment of coral diseases in the US Pacific Remote Island Areas.

Weil, E., G. Smith, and D. L. Gil-Agudelo. 2006. Status and progress in coral disease research. *Dis. Aquat. Org* 69: 1–7.

Willis, B. L., C. Page, and E. Dinsdale. 2004. Coral Diseases on the Great Barrier Reef. Pages 69–104 in E. Rosenberg and Y. Loya, eds. *Coral Health and Disease*, Springer-Verlag, Berlin, 488pp.

3.) Non-coral Invertebrates:

Asakura, A. and L.S. Godwin. 2005. A new species of hermit crab (Crustacea, Decapoda, Anomura, Diogenidae) of the genus *Dardanus* from the U.S Equatorial Islands. *Zootaxa*. (In prep).

Asakura, A. and L.S. Godwin. 2005. *Diogenes maclaughlinae*, a new species of hermit crab (Crustacea, Decapoda, Anomura, Diogenidae) from American Samoa. *Invertebrate Taxonomy* (In prep).

Brainard, R.E., et al. 2007. Coral Reef Ecosystem Monitoring Report for American Samoa: 2002-2006. NOAA-PIFSC, Honolulu.

Castro, P. and L.S. Godwin. 2005. The first records in the Hawaiian Archipelago for two genus of crab from the family Trapeziidae. *Bishop Museum Occasional Papers* (In press).

DeFelice, R., D. Minton and L.S. Godwin. 2002. Records of the shallow-water marine invertebrates from French Frigate Shoals, Northwestern Hawaiian Islands, with a note on non-indigenous species.

Fisher R, N Knowlton, RE Brainard, MJ Caley (2011) Differences among Major Taxa in the Extent of Ecological Knowledge across Four Major Ecosystems. *PLoS ONE* 6(11): e26556-8. doi:10.1371/journal.pone.0026556

Godwin, L.S. 2003. Coral Reef Ecosystem Division Cruise OES-03-06, Northwestern Hawaiian Islands, Marine Invertebrates, Cruise report to NOAA, NMFS, Coral Reef Ecosystem Division.

Godwin, L.S. 2002. Coral Reef Ecosystem Investigation Cruise TC-02-07, Northwestern Hawaiian Islands, Marine Invertebrates, Cruise report to NOAA, NMFS, Coral Reef Ecosystem Investigation.

Godwin, L.S. 2002. Rapid ecological assessment of the marine invertebrate fauna of American Samoa and the U.S. Phoenix and Line Islands. Preliminary report Submitted to the NOAA National Marine Fisheries Service, Honolulu Laboratory, Coral Reef Ecosystem Investigation.

Plaisance L, MJ Caley, RE Brainard, and N Knowlton (2011) The Diversity of Coral Reefs: What are we missing?. *PLoS One* 6(10): e25026. doi:10.1371/journal.pone.0025026

Plaisance L, R Brainard, MJ Caley, N Knowlton. (2011). Using DNA Barcoding and Standardized Sampling to Compare Geographic and Habitat Differentiation of Crustaceans: A Hawaiian Islands Example. *Diversity* 3, no. 4: 581-591.

Timmers MA et al. (2011) Widespread dispersal of the crown-of-thorns sea star, *Acanthaster planci*, across the Hawaiian Archipelago and Johnston Atoll. *Journal of Marine Biology*. Article ID 934269, 10 pages, 2011. doi:10.1155/2011/934269

Timmers MA, Bird CE, Skillings DJ, Smouse PE, Toonen RJ (2012) There's No Place Like Home: Crown-of-Thorns Outbreaks in the Central Pacific Are Regionally Derived and Independent Events. PLoS ONE 7(2): e31159. doi:10.1371/journal.pone.0031159

Zimmerman T.L., and J. W. Martin. 2004. Artificial reef matrix structures (ARMS): an inexpensive and effective method for collecting coral reef-associated invertebrates. Gulf and Caribbean Research 16:59-64.

With knowledge of the penalties for false or incomplete statements, as provided by 18 U.S.C. 1001, and for perjury, as provided by 18 U.S.C. 1621, I hereby certify to the best of my abilities under penalty of perjury of that the information I have provided on this application form is true and correct. I agree that the Co-Trustees may post this application in its entirety on the Internet. I understand that the Co-Trustees will consider deleting all information that I have identified as “confidential” prior to posting the application.

Signature

Date

SEND ONE SIGNED APPLICATION VIA MAIL TO THE MONUMENT OFFICE BELOW:

Papahānaumokuākea Marine National Monument Permit Coordinator
6600 Kalaniana'ole Hwy. # 300
Honolulu, HI 96825
FAX: (808) 397-2662

DID YOU INCLUDE THESE?

- Applicant CV/Resume/Biography
- Intended field Principal Investigator CV/Resume/Biography
- Electronic and Hard Copy of Application with Signature
- Statement of information you wish to be kept confidential
- Material Safety Data Sheets for Hazardous Materials

Papahānaumokuākea Marine National Monument Compliance Information Sheet

1. Updated list of personnel to be covered by permit. List all personnel names and their roles here (e.g. John Doe, Diver; Jane Doe, Field Technician, Jerry Doe, Medical Assistant):

First Name	Last Name	Position	Affiliation	Telephone	Email
Charles	Young	Chief Scientist, Oceanographer	NOAA-CRED/JIMAR	808.983.3718	charles.young@noaa.gov
Mark	Manuel	Operations Chief, Marine Ecosystems Research Specialist	NOAA-CRED/JIMAR	808.983.3707	mark.manuel@noaa.gov
Jamison	Gove	Oceanographer	NOAA-CRED/JIMAR	808.983.3744	jamison.gove@noaa.gov
Oliver	Vetter	Oceanographer	NOAA-CRED/JIMAR	808.983.3718	oliver.vetter@noaa.gov
Roberto	Venegas	Oceanographer	NOAA-CRED/JIMAR	808.983.3715	roberto.venegas@noaa.gov
Elizabeth	Johnson	Oceanographer	University of Hawaii	N/A	abbyj2@hawaii.edu
Brett	Schumacher	Coral Reef Researcher	NOAA-CRED/JIMAR	808.983.3717	brett.schumacher@noaa.gov
Hatsue	Bailey	Marine Ecosystems Research Specialist	NOAA-CRED/JIMAR	808.983.3780	hatsue.bailey@noaa.gov
Benjamin	Knowles	Microbiologist	San Diego State University	N/A	creativeemancipationleague@gmail.com
Andrew	Gray	Marine Ecosystems Research Specialist	NOAA-CRED/JIMAR	808.983.3743	andrew.gray@noaa.gov
Russell	Reardon	Marine Ecosystems Research Specialist	NOAA-CRED/JIMAR	808.983.3724	russell.reardon@noaa.gov
Molly	Timmers	Marine Ecosystems Research Project Manager	NOAA-CRED/JIMAR	808.983.3749	molly.timmers@noaa.gov
Kerry	Reardon	Marine Ecosystems Research Specialist	NOAA-CRED/JIMAR	808.983.3765	kerry.reardon@noaa.gov
Jeff	Anderson	Marine Ecosystems Research Specialist	NOAA-CRED/JIMAR	808.983.3780	jeff.anderson@noaa.gov
Paula	Ayotte	Marine Ecosystems Research Specialist	NOAA-CRED/JIMAR	808.983.3743	paula.ayotte@noaa.gov
Kaleonani	Hurley	Biologist	University of Hawaii	N/A	hurleyk@hawaii.edu
Jesse	Tootell	Biologist	Scripps Institution of Oceanography	N/A	jstootell@gmail.com
Clint	Edwards	Biologist	Scripps Institution of Oceanography	N/A	clint@ucsd.edu
Scott	Godwin	Biologist	NOAA-PMNM	808.694.3945	scott.godwin@noaa.gov
Kevin	Trick	Data Management Specialist	NOAA-CRED/JIMAR	808.983.3722	kevin.trick@noaa.gov
Jim	Bostik	Dive Master/Chamber Operator	NOAA-OMAO	206.526.6475	jim.bostick@noaa.gov

2. Specific Site Location(s): (Attach copies of specific collection locations):

82 oceanographic monitoring sites composed of: Ecological Acoustic Recorder (EAR), Subsurface Temperature Recorder (STR), Sea Surface Temperature Buoy with STR (SST-STR), Subsurface Salinity Instrument (SBE-37), Wave-Tide Recorder (WTR); 12 Autonomous Reef Monitoring Structures (ARMS) sites; and 15 Calcification Accretion Units (CAU) sites:

Latitude	Longitude	Oceanographic Mooring Type/Location
27.94060316	-175.8617209	EAR, Pearl and Hermes Reef
27.75448330	-175.8940833	EAR, Pearl and Hermes Reef
27.85392690	-175.8158758	STR, Pearl and Hermes Reef
27.85392690	-175.8158758	SST-STR, Pearl and Hermes Reef
27.77473921	-175.9787157	STR, Pearl and Hermes Reef
27.91184284	-175.8943118	STR, Pearl and Hermes Reef
27.95767928	-175.780838	STR, Pearl and Hermes Reef
27.80261943	-175.779335	STR, Pearl and Hermes Reef
27.89800524	-175.8313905	STR, Pearl and Hermes Reef
27.85392690	-175.8158758	ANCHOR, Pearl and Hermes Reef
27.85392690	-175.8158758	STR, Pearl and Hermes Reef
27.78206181	-175.8809973	STR, Pearl and Hermes Reef
27.78168300	-175.88088	ANCHOR, Pearl and Hermes Reef
27.78164690	-175.8809328	STR, Pearl and Hermes Reef
27.78250186	-175.882137	STR, Pearl and Hermes Reef
27.79097200	-175.862992	ANCHOR, Pearl and Hermes Reef
27.94235422	-175.8634055	STR, Pearl and Hermes Reef

27.94431634	-175.8649835	STR, Pearl and Hermes Reef
27.78193952	-175.7834911	STR, Pearl and Hermes Reef
27.86619642	-175.7311846	STR, Pearl and Hermes Reef
27.94056687	-175.8617143	ANCHOR, Pearl and Hermes Reef
27.94060316	-175.8617209	EAR, Pearl and Hermes Reef
27.78211948	-175.881429	BATTERY, Pearl and Hermes Reef
27.78211948	-175.881429	ANCHOR, Pearl and Hermes Reef
27.78211948	-175.881429	SBE37, Pearl and Hermes Reef
27.78211948	-175.881429	ADP, Pearl and Hermes Reef
27.78571439	-175.7804599	STR, Pearl and Hermes Reef
27.75312882	-175.9489414	STR, Pearl and Hermes Reef
25.90183300	-173.776166	EAR, Lisianski Island
25.96761991	-173.9158715	STR, Lisianski Island
25.96761161	-173.9158361	SST-STR, Lisianski Island
26.10010042	-173.9979861	ANCHOR, Lisianski Island
26.10017301	-173.9979678	ANCHOR, Lisianski Island
25.96761991	-173.9158715	STR, Lisianski Island
25.96761991	-173.9158715	ANCHOR, Lisianski Island
25.98699016	-173.9943768	STR, Lisianski Island
25.94301567	-173.8841434	ANCHOR, Lisianski Island
25.94301567	-173.8841434	STR, Lisianski Island
25.94301567	-173.8841434	WTR, Lisianski Island
25.94461746	-173.9536197	STR, Lisianski Island
26.07838458	-173.9970317	STR, Lisianski Island
23.63730000	-166.2632166	EAR, French Frigate Shoals
23.76904126	-166.2612977	STR, French Frigate Shoals
23.86605324	-166.2196974	STR, French Frigate Shoals
23.64515824	-166.173743	STR, French Frigate Shoals
23.73812906	-166.1674967	STR, French Frigate Shoals
23.85626083	-166.275186	STR, French Frigate Shoals
23.85626083	-166.275186	SST-STR, French Frigate Shoals
23.63880593	-166.1797021	STR, French Frigate Shoals
23.63498000	-166.185593	ANCHOR, French Frigate Shoals
23.63507000	-166.18554	EAR, French Frigate Shoals
23.85626167	-166.2751585	ANCHOR, French Frigate Shoals
23.85626167	-166.2751585	STR, French Frigate Shoals
23.76887103	-166.2619694	ANCHOR, French Frigate Shoals
23.88048529	-166.2730727	STR, French Frigate Shoals

ARMS Site	Latitude	Longitude
PHR-R26	27.785833	-175.780283
PHR-33	27.785438	-175.823543
PHR-R42	27.753133	-175.948767
PHR-R44	27.910617	-175.904833
LIS-18	26.004283	-173.994028

LIS-R14	26.0784150	-173.9970110
LIS- R10	25.9446200	-173.9536100
LIS-R9	26.0394080	-174.0125450
FFS-H6	23.8804552	-166.2730599
FFS-12	23.6383500	-166.1800500
FFS-34	23.6279200	-166.1353800
FFS-R46	23.7692800	-166.2617300

CAU Site	Latitude	Longitude
PHR-R26	27.7858330	-175.7802830
PHR-33	27.7854380	-175.8235430
PHR-R39	27.9404600	-175.8613100
PHR-R44	27.9106170	-175.9048330
PHR-R42	27.7531330	-175.9487670
LIS-18	26.0042830	-173.9940280
LIS-R14	26.0784150	-173.9970110
LIS-R9	26.0394080	-174.0125450
LIS-09	25.9580730	-173.8823800
LIS- R10	25.9446200	-173.9536100
FFS-21	23.8469537	-166.3269575
FFS-H6	23.8804552	-166.2730599
FFS-R46	23.7692800	-166.2617300
FFS-12	23.6383500	-166.1800500
FFS-34	23.6279200	-166.1353800

3. Other permits (list and attach documentation of all other related Federal or State permits):

The Papahānaumokuākea Marine National Monument Research Permit covers all planned research activities.

a. For each of the permits listed, identify any permit violations or any permit that was suspended, amended, modified or revoked for cause. Explain the circumstances surrounding the violation or permit suspension, amendment, modification or revocation.

N/A

4. Funding sources (Attach copies of your budget, specific to proposed activities under this permit and include funding sources. See instructions for more information):

The multi-year reef assessment is sponsored by the NOAA Coral Reef Conservation Program.

5. Time frame:

Activity Start: September 3, 2013

Activity Completion: September 19, 2013

Dates actively inside the Monument: September 4-18, 2013

Note: CRED aspires to continue biennial reef assessment and monitoring of the Papahānaumokuākea Marine National Monument as part of the Pacific Reef Assessment and Monitoring Program (RAMP).

Describe any limiting factors in declaring specific dates of the proposed activity at the time of application:

N/A

Personnel schedule in the Monument:

The 21 participating personnel listed in Question #1 will be conducting research within the shallow water reef environments (<30m) of the Monument including the reefs associated with: Pearl & Hermes Reef, French Frigate Shoals, and Lisianski Island.

6. Indicate (with attached documentation) what insurance policies, bonding coverage, and/or financial resources are in place to pay for or reimburse the Monument trustees for the necessary search and rescue, evacuation, and/or removal of any or all persons covered by the permit from the Monument:

NOAA ships and the activities conducted off of them are to be considered self-insured by the federal government.

7. Check the appropriate box to indicate how personnel will enter the Monument:

- Vessel
 Aircraft

Provide Vessel and Aircraft information: NOAA ship *Hi'ialakai*, Monument permit number: PMNM 2013-005.

8. The certifications/inspections (below) must be completed prior to departure for vessels (and associated tenders) entering the Monument. Fill in scheduled date (attach documentation):

N/A

Note: The NOAA Ship *Hi'ialakai* provides this information directly to the Papahānaumokuākea Marine National Monument.

- Rodent free, Date:
 Tender vessel, Date:
 Ballast water, Date:
 Gear/equipment, Date:

Hull inspection, Date:

9. Vessel information (NOTE: if you are traveling aboard a National Oceanic and Atmospheric Administration vessel, skip this question):

Vessel name:

Vessel owner:

Captain's name:

IMO#:

Vessel ID#:

Flag:

Vessel type:

Call sign:

Embarkation port:

Last port vessel will have been at prior to this embarkation:

Length:

Gross tonnage:

Total ballast water capacity volume (m³):

Total number of ballast water tanks on ship:

Total fuel capacity:

Total number of fuel tanks on ship:

Marine Sanitation Device:

Type:

Explain in detail how you will comply with the regulations regarding discharge in the Monument. Describe in detail. If applicable, attach schematics of the vessel's discharge and treatment systems:

Other fuel/hazardous materials to be carried on board and amounts:

Provide proof of a National Oceanic and Atmospheric Administration (NOAA) Office of Law Enforcement-approved Vessel Monitoring System (VMS). Provide the name and contact information of the contractor responsible for installing the VMS system. Also describe VMS unit name and type:

VMS Email:

Inmarsat ID#:

Contact:

***Individuals MUST ENSURE that a type-approved VMS unit is installed and that its automatic position reports are being properly received by the NOAA OLE system prior to the issuance of a permit. To make sure your VMS is properly configured for the NOAA OLE system, please contact NOAA OLE at (808) 203-2503 or (808) 203-2500.**

***PERMITS WILL NOT BE ISSUED TO INDIVIDUALS ENTERING THE MONUMENT VIA VESSEL UNTIL NOAA OLE HAS CONTACTED THE MONUMENT PERMIT COORDINATOR WITH A 'POSITIVE CHECK' READING.**

10. Tender information:

On what workboats (tenders) will personnel, gear and materials be transported within the Monument? List the number of tenders/skiffs aboard and specific types of motors:

1. HI-1A, 10-m Northwind jet boat; twin Cummins Engines, 8-cylinder, 375 HP/diesel.
2. HI-2, 8-m Ambar jet boat; Yanmar Engine, 6-cylinder, 315 HP/diesel.
3. HI-3, 5.2-m Northwind Rigid Hull Boat (RHB); Honda Engine, 90 HP/ unleaded.
4. HI-4 (Rescue Boat), 5.3-m Ambar Jet boat; Honda Engine, 115 HP/unleaded.
5. HI-7, 5.3-m Zodiac Inflatable boat; Honda Engine, 50 HP/unleaded.
6. PIFSC 6-m SAFE Boat; twin Honda Engines, 90 HP/unleaded
7. PIFSC 6-m SAFE Boat; twin Honda Engines, 90 HP/unleaded
8. CRED 5.3-m AVON Rigid Hull Inflatable boat (RHIB); Honda Engine, 50 HP/unleaded.

Additional Information for Land Based Operations

11. Proposed movement of personnel, gear, materials, and, if applicable, samples:

N/A

12. Room and board requirements on island:

N/A

13. Work space needs:

N/A

DID YOU INCLUDE THESE?

Map(s) or GPS point(s) of Project Location(s), if applicable

Funding Proposal(s)

Funding and Award Documentation, if already received

Documentation of Insurance, if already received

Documentation of Inspections

Documentation of all required Federal and State Permits or applications for permits

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



**STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES**

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August 23, 2013

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KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

TO: Division of Aquatic Resources File

THROUGH: William J. Aila, Jr., Chairperson *(Signature)*

FROM: William Tam *(Signature)*
Water Deputy and Acting Administrator, Division of Aquatic Resources

SUBJECT:

DECLARATION OF EXEMPTION FROM THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT UNDER THE AUTHORITY OF CHAPTER 343, HRS AND CHAPTER 11-200 HAR, FOR PAPAHA NAUMOKU AKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR. RUSSELL BRAINARD, CORAL REEF ECOSYSTEM DIVISION, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, FOR ACCESS TO STATE WATERS TO CONDUCT REEF ASSESSMENT AND MONITORING RESEARCH ACTIVITIES UNDER PERMIT PMNM-2013-024.

The following permitted activities are found to be exempted from preparation of an environmental assessment under the authority of Chapter 343, HRS and Chapter 11-200, HAR:

Project Title:

Papahānaumokuākea Marine National Monument Native Hawaiian Practices Permit to Dr. Russell Brainard, Coral Reef Ecosystem Division, National Oceanic and Atmospheric Administration, for Access to State Waters to Conduct Reef Assessment and Monitoring Research Activities

Permit Number: PMNM-2013-024

Project Description:

The Applicant proposes to conduct diving, non-coral invertebrate collections, seawater sampling, and the installation/removal of equipment as related to reef assessment and monitoring activities within the Monument, as part of the Pacific Reef Assessment and Monitoring Program (RAMP) and mandated within the NOAA National Coral Reef Monitoring Program (NCRMP). Activities would be conducted from the NOAA vessel R/V HI'IALAKAI from September 3 to 19, 2013. Within the Monument, there are over 300 permanent transects and mooring sites. The survey sites for the is permit application have been randomly selected from among these permanent sites focusing on French Frigate Shoals, Lisianski Island, and Pearl and Hermes Atoll.

ITEM F-4c

A total of twenty-two (22) trained researchers and field staff would conduct the following activities in waters from the surface to 30 m:

1. Oceanographic water sampling, including:
2. Visual surveys of benthic community structure and coral disease, including in water photoquadrat and benthic transect surveys;
3. Retrieving, installing, and/or replacing seafloor instrumentation and associated seafloor anchors including:
4. Removing non-coral invertebrates collected through random recruitment and colonization of sampling equipment (removal of the 36 ARMS deployed); and
5. Fortuitous collection of up to a maximum of ten (10) crown-of-thorns sea stars (*Acanthaster planci*) for a population connectivity study and up to a maximum of forty (40) 1 liter sand samples for a molluscan diversity study. Not the focus of the cruise and will therefore only occur as the opportunity arises.

The proposed activities are a continuation of activities that have already been permitted in the Monument. The GPS locations of all sites are reported on the permit application.

The proposed activities are in direct support of the Monument Management Plan's (MMP) priority management needs through 3.1.1 – Marine Conservation Science Action Plan (Strategy MCS-1: Continuing to enhance research, characterization and monitoring of marine ecosystems for the life of the plan, as appropriate, and Strategy MCS-2: Assess and prioritize research and monitoring activities over the life of the plan). Strategy MCS-1 focuses on “continuing marine research, characterization, and monitoring designed to support an ecosystem-based approach to protection and management” and for the continuation of characterizing “types and spatial distributions of shallow-water marine habitats to inform protection and management efforts”. Strategy MCS-2 calls specifically for integrating collaborative “independent monitoring initiatives...such as...water chemistry and water quality”. Reef assessment and monitoring activities and associated long-term data sets such as those proposed fit into these two strategies of the MMP. Activities such as those to be carried out by the permittee, are also addressed in the Monument Management Plan Environmental Assessment (December 2008) which resulted in a FONSI.

Consulted Parties:

The permit application was sent out for review and comment to the following scientific and cultural entities: Hawaii Division of Aquatic Resources, Hawaii Division of Forestry and Wildlife, Papahānaumokuākea Marine National Monument (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO), United States Fish and Wildlife Service Hawaiian and Pacific Islands National Wildlife Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application has been posted on the Monument Web site since July 5, 2013, giving the public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument's Public Notification Policy.

Exemption Determination:

After reviewing HAR § 11-200-(8), including the criteria used to determine significance under HAR § 11-200-12, DLNR has concluded that the activities under this permit would have minimal or no significant effect on the environment and that issuance of the permit is

categorically exempt from the requirement to prepare an environmental assessment based on the following analysis:

1. All activities associated with this permit, including activities associated with reef assessment, monitoring, and collection have been evaluated as a single action. As a preliminary matter, multiple or phased actions, such as when a group of actions are part of a larger undertaking, or when an individual project is precedent to or represents a commitment to a larger project, must be grouped together and evaluated as a single action. HAR § 11-200-7. Since this permit involves an activity that is precedent to a later planned activity, i.e. the retrieval of monitoring equipment, the categorical exemption determination here will treat all planned activities as a single action.

2. The Exemption Class for Scientific Research with no Serious or Major Environmental Disturbance Appears to Apply. Chapter 343, HRS, and section 11-200-8, HAR, provide for a list of classes of actions exempt from environmental assessment requirements. HAR §11-200-8.A.5. exempts the class of actions which involve “basic data collection, research, experimental management, and resource evaluation activities, which do not result in a serious or major disturbance to an environmental resource.” This exemption class has been interpreted to include visual and photography benthic survey collection, the collection of non-coral invertebrates, installation/retrieval of sampling equipment, and seawater collection. Additionally, Exemption Class #5, Exempt Item #2 includes game and non-game wildlife surveys, photographing, recording, sampling, and collection in the field. DEPARTMENT OF LAND & NATURAL RESOURCES, EXEMPTION LIST FOR THE DIVISION OF FORESTRY AND WILDLIFE (June 12, 2008).

The proposed reef assessment and monitoring activities here appear to fall squarely under the exemption class identified under HAR § 11-200-8.A.5., and are succinctly described under the former Fish and Game Division exemption list published in 1976. As discussed below, no significant disturbance to any environmental resource is anticipated in from seawater collection activities, visual benthic surveys and photography, instrumentation retrieval/installation, removal of non-coral invertebrates collected through recruitment on sampling equipment, and the collection of crown-of-thorns sea stars and sand samples for molluscan diversity. Thus, so long as the below considerations are met, an exemption class should include the action now contemplated.

3. Cumulative Impacts of Actions in the Same Place and Impacts with Respect to the Potentially Particularly Sensitive Environment Will Not be Significant. Even where a categorical exemption appears to include a proposed action, the action cannot be declared exempt if “the cumulative impact of planned successive actions in the same place, over time, is significant, or when an action that is normally insignificant in its impact on the environment may be significant in a particularly sensitive environment.” HAR § 11-200-8.B. To gauge whether a significant impact or effect is probable, an exempting agency must consider every phase of a proposed action, any expected primary and secondary consequences, the long-term and short-term effects of the action, the overall and cumulative effect of the action, and the sum effects of an action on the quality of the environment. HAR § 11-200-12. Examples of actions which commonly have a significant effect on the environment are listed under HAR § 11-200-12.

This study involves reef assessment and monitoring activities, including oceanographic seawater sampling, benthic surveys, instrument installation/retrieval, removal of non-coral invertebrates

on sampling equipment, and the fortuitous collection of crown-of-thorns sea stars and sand sampling for molluscan diversity. Minimal impact to the benthos is expected. With this in mind, significant cumulative impacts are not anticipated as a result of this activity, and numerous safeguards further ensure that the potentially sensitive environment of the project area will not be significantly affected. All activities will be conducted in a manner compatible with the management direction of the Monument Proclamation in that the activities do not diminish monument resources, qualities, and ecological integrity, or have any indirect, secondary, cultural, or cumulative effects. The joint permit review process did not reveal any anticipated indirect or cumulative impacts, nor did it raise any cultural concerns, that would occur as a result of these activities.

The activities would be conducted from the NOAA ship R/V HI‘IALAKAI permitted under PMNM-2013-005. These activities will be conducted from a small boat deployed from the R/V HI‘IALAKAI around French Frigate Shoals (FFS), Lisianski Island, and Pearl and Hermes Atoll.

Table 1: Current projects aboard the HI‘IALAKAI.

Permit	Purpose and scope	Location
PMNM-2013-005 Ellis (issued)	This permit allows NOAA ship HI‘IALAKAI entry into the Monument. Personnel aboard the vessels will be permitted under separate permits.	All locations
PMNM-2013-024 Brainard (proposed)	This permit would allow activities related to reef assessment and monitoring in shallow water.	French Frigate Shoals

Other permitted activities occurring in the same area include the targeted removal of Galapagos sharks at FFS for Hawaiian monk seal recovery could occur between June 1, 2013 through May 31, 2014 by Frank Parrish and Alecia Van Atta (PMNM-2013-017). These activities would be conducted from the seasonal monk seal field camp based on FFS. The operation of the field camp, and associated monitoring activities, are covered under the Manager’s permit PMNM-2013-001. There is no seafloor monitoring in either project therefore no interaction of activities is anticipated and the culmination of these permits is not anticipated to have significant cumulative impacts.

Permits issued to Drs. Robert Toonen and Christopher Bird (PMNM-2012-049-A1) and Ms. Kehaunani Springer (PMNM-2012-52-A1) to conduct intertidal biodiversity assessment and cultural monitoring, respectively, would occur at FFS prior to the Applicant’s arrival. These permits are issued for August 1 to 30, 2013. Activities for the Applicant’s permit will take place outside the intertidal area therefore there is no anticipated interaction between the projects.

Mr. Frank Bachar is permitted to conduct filming activities of wildlife interactions at FFS. He is expected to conduct activities in July 2013 only. Activities covered under Jacob Asher’s permit to conduct videographic surveys of coral reef fishes in shallow and deep water are permitted to occur for twelve (12) days between August and October 2013 at FFS (PMNM-2013-018). Since both Mr. Bachar and Mr. Asher activities are observational only no anticipated interaction of these activities is expected. Mr. Asher intends to conduct activities from M/V SEARCHER (PMNM-2013-001) which is not scheduled to be at FFS in September 2013 therefore there is no anticipated interactions of these activities nor any cumulative impacts.

Since no significant cumulative impacts or significant impacts with respect to any particularly sensitive aspect of the project area are anticipated, the categorical exemptions identified above should remain applicable.

4. Overall Impacts will Probably be Minimal and Insignificant.

Again, any foreseeable impacts from the proposed activity will probably be minimal, and further mitigated by general and specific conditions attached to the permit. Specifically, all research activities covered by this permit will be carried out with strict safeguards for the natural, historic, and cultural resources of the Monument as required by Presidential Proclamation 8031, other applicable law and agency policies and standard operating procedures.

Conclusion. Upon consideration of the permit to be approved by the Board of Land and Natural Resources, the potential effects of the above listed project as provided by Chapter 343, HRS and Chapter 11-200 HAR, have been determined to be of probable minimal or no significant effect on the environment and exempt from the preparation of an environmental assessment.

William J. Aila, Jr.
Chairperson, Board of Land and Natural Resources

Date