

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

May 23, 2014

Board of Land  
and Natural Resources  
Honolulu, Hawaii

Request for Authorization and Approval to Issue a Papahānaumokuākea Marine National Monument Research Permit to Dr. Courtney Couch, Hawai‘i Institute of Marine Biology, University of Hawai‘i, for Access to State Waters to Conduct Coral Health and Community Structure Assessment 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 applicants Dr. Courtney Couch, Postdoctoral Fellow, Hawai‘i Institute of Marine Biology, University of Hawai‘i, 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 management 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 site:

- Nihoa Island
- Necker Island (Mokumanamana)
- French Frigate Shoals
- Gardner Pinnacles
- Maro Reef
- Laysan Island
- Lisianski Island, Neva Shoal
- Pearl and Hermes Atoll
- Kure Atoll State Wildlife Sanctuary

The activities covered under this permit would occur between August 1, 2014 to July 31, 2015.

The applicant is new and the proposed activities are largely a continuation of work previously permitted and conducted in the Monument. Newly proposed activities include the collection of voucher specimens of diseased coral.

INTENDED ACTIVITIES

The proposed project would assess the health and community structure of corals on shallow-water reefs throughout the Monument. Surveys would provide useful data for assessing the

dynamics of coral community structure and health throughout the Monument. They would also help determine how coral changes and provide a baseline to track changes to coral health and ecosystem function through time, which is especially important when facing climate change and ocean acidification threats. Proposed activities are complementary to work previously conducted by Dr. Greta Aeby in the Monument and would build upon previous studies conducted in 2012 and 2013.

To fulfill these objectives, the applicants propose to perform visual and photographic surveys using SCUBA on shallow water coral reefs (15 to 80 ft) throughout the Monument on established and new permanent transect lines. The applicant would collect detailed descriptions of the surveyed colonies, recording any visible signs of disease to calculate disease prevalence and severity. By establishing permanent transects and/or resurveying a subset of sites with reoccurring disease outbreaks or highly sensitive *Acroporid* populations, the applicant would be able to determine changes over time at discrete locations. Permanent transects established by Dr. Greta Aeby or National Oceanic and Atmospheric Administration Coral Reef Ecosystem Division (NOAA CRED) would be used whenever possible using GPS coordinates provided by both groups.

The activities proposed by the applicants directly support the Monument Management Plan's priority management need 3.1 – Understanding and Interpreting the NWHI, 3.1.1 – Marine Conservation Science Action Plan, through Activity MCS 1.2 – Continue monitoring of shallow-water coral reef ecosystems to protect ecological integrity and Activity MCS 2.4 – Implement management-driven research priorities identified in the Monument Natural Resources Science Plan. Both Activities emphasize the importance of establishing baseline surveys of Monument resources in shallow water coral reef ecosystems (PMNM MMP Vol I. p. 123, 126-7).

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 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

March 5, 2014, 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 questions were raised:

Questions:

- 1. Is the focus on only disease in acroporids or will other coral species be included in the study? It would be beneficial to managers to know about susceptibility and disease of any species within the PMNM. Section 9a lists a suite of species but only acroporids are mentioned in the sampling description.**

*The applicant responds that these surveys will be comprehensive in nature. The applicant will count and identify all coral colonies to species. Each colony will then be inspected and signs of disease or compromised health recorded using well-established categories.*

- 2. What type of markers are being used for the fixed transects? Highly discourage rebar due to documented iron enrichment issues. See:**
  - a. Work TM, Aeby GS, Maragos JE (2008) Phase shift from a coral to a corallimorph dominated reef associated with a shipwreck on Palmyra Atoll. PLOSOne DOI:10.1371/journal.pone.0002989**
  - b. Maragos J, Friedlander AM, Godwin S, Musburger C, Tsuda R, Flint E, Obura D (2008). US coral reefs in the Line and Phoenix Islands, Central Pacific Ocean: Status, threats and significance. In Coral Reefs of the USA (pp. 643-654). Springer Netherlands.**

*The applicant responds that while the applicant proposes to use rebar stakes due to their longevity and conspicuousness, she is open to alternative suggestions. Ideally, the applicant prefers to have markers that will last and are easy for future researchers to find, who may or may not be familiar with the study sites.*

*The applicant responds that yes, they would be more than willing to use stainless steel markers.*

- 3. Is there a minimum colony size for colonies that could be sampled for lesions and healthy tissue? If the proposed sample size is 4 cm<sup>2</sup>, that would be a minimum of 8 cm<sup>2</sup> collected for a colony or a portion of a colony.**

*The applicant states that only colonies greater than 20cm in diameter will be sampled from.*

Comments:

- 1. Although the method is likely in place, the applicant fails to describe how repairs will be made to the areas where plugs are taken from encrusting corals. The applicant must ensure that any injury to a coral colony is permanently repaired to prevent the possibility of infection.**

*The applicant states that previous researchers have used epoxy and cement plugs to repair areas where plugs have been taken. However, based on the applicant's prior experience and discussions with other coral experts, it is often less harmful to leave the plug unrepaired. While many marine epoxies are non-toxic they are not biodegradable and administration underwater often results in the release of excess epoxy into the water column. In addition, the administration often increases damage to the tissue surrounding the plug. The applicant is open to alternative suggestions.*

**The agency reviewers were asked to provide alternative suggestions as per the applicant's response. The reviewers responded:**

**Reviewer #1: The consensus was that we do not have a strong opinion for or against plugging the holes for this particular study, given that it is a small number of holes in a very large area of living reef that is not influenced by non-natural inputs. We are not aware of any studies that show the need for a small hole in coral under non-stressed conditions to be repaired in order for it to heal naturally. The coral should regrow as long as the environmental conditions are reasonable.**

**Although epoxy fills can work, applying the epoxy to the small area can cause stress to the surrounding tissue and create further damage. On the other hand, leaving the holes un-repaired might allow other organisms like algae to colonize the skeleton and then affect the living tissue. So the case for plugging or not plugging is equivocal.**

**Overall, having weighed the above considerations, we do not feel that hole plugging should be a mandatory condition for this permit, although we would not discourage the applicant from doing so.**

**Reviewer #2: I agree with the (above) feedback that plugging the area from which a small sample (no more than 2 cm x 2 cm) of coral tissue has been removed should not be a mandatory part of the permit. I'm familiar with epoxy plugs being used when deep cores are taken from massive colonies, but this is qualitatively different from what Couch is proposing to do - her tissue samples will be much smaller, only from the surface, and will not directly expose deeper portions of a massive coral to infection or bioeroders.**

*The applicant states that they have read both reviewers' comments and understand that filling in the plugs is recommended but not required under this permit given the small nature of their proposed sample areas.*

2. **Equipment used to collect samples must be sanitized between uses to prevent the spread of disease from one colony to another.**

*The applicant states that they will follow PMNM Best Management Practice 011 (Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment). This BMP recommends equipment is disinfected between uses at each dive site.*

3. **NMFS notes that, although not currently listed, three species of coral which occur in PMNM are proposed for listing under the US Endangered Species Act: *Montipora dilata* / *flabellata* / *turgescens*, *Montipora patula*, and *Acropora paniculata*. These species may become listed during the timeframe covered under the applicant's permit. Therefore, NMFS recommends further discussion on the need for Section 7 consultations with NMFS/PRD experts. Given the potential coral listings, NMFS recommends that the applicant familiarize themselves with identification of these species and distribution. If possible, NMFS would ask that, if the applicant identifies any potentially listed corals during the course of their work, they photodocument and GPS reference the coral and share this information with PMNM to aid in management.**

*The applicant responds that while it is unlikely that the applicant will collect the aforementioned species, she agrees to consult with NMFS/PRD regarding the collection of these species. The applicant is also willing to photodocument and GPS the locations of these species, as well as share this information with PMNM.*

*The applicant responds that while it is unlikely that they will collect these species, they would like the opportunity to do so if necessary. They understand that they will be subject to a formal ESA consultation.*

4. **The applicant's work on coral disease is much appreciated, and is of interest to managers. If possible, we would like to see the results of this research through a presentation to the MMB or Agency staff.**

*The applicant will certainly share the results of this research with MMB and Agency staff.*

5. **Previously established transects should be utilized to the maximum extent possible. When using previously established transects, the applicant should also plan to repair transect markers that have become dislodged. In addition to permanent transects established by NOAA CRED and Dr. Greta Aeby, Dr. James Maragos (Coral Reef Biologist, retired, U.S. Fish and Wildlife Service) also established a number of permanent transects throughout the Northwestern Hawaiian Islands. Dr. Maragos has shared the GPS location of these transects, and the FWS would be happy to provide them to the applicant, so as to minimize the installation of new transect markers.**

*The applicant will strive to use previously marked transects whenever possible and only establish new markers when absolutely necessary. The applicant thanks FWS for offering to share Dr. Maragos’s GPS coordinates and will contact them in the near future to acquire these coordinates.*

- 6. OHA recognizes the importance of scientific research for Papahānaumokuākea Marine National Monument and its benefits to increase our understanding of the place. However, we recommend that the applicant take the time to reflect on how their project proposal can affect change and benefit the people of Hawai‘i and the types of outreach and messaging approaches that they have planned for the future once their research is complete. If a permit should be issued, we look forward to discussing this topic more with the applicant at the required cultural briefing.**

*The applicant states that while the narrative of the project does not explicitly mention dissemination of information to broader communities, this will be an important part of the proposed project. Proposed team member John Burns has actively collaborated with various staff at PMNM to incorporate videos and photos into various education and outreach efforts for the Monument. It is reasonable to assume that this will continue. In collaboration with Dr. Greta Aeby, Dr. Couch will be developing a series of coral health and disease training modules for managers and reef monitoring programs. This training program will build capacity across a variety of agencies both within the Hawaiian Islands and other Indo-Pacific Islands to accurately and consistently monitor coral disease.*

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

Cultural reviews support the acceptance of this application. No concerns were raised.

**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:

- The proposed activities are in compliance with the National Environmental Policy Act.
- The proposed activities are in compliance with the National Historic Preservation Act.
- 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 PAPAHA NAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR. COURTNEY COUCH, HAWAI‘I INSTITUTE OF MARINE BIOLOGY, UNIVERSITY OF HAWAI‘I,

FOR ACCESS TO STATE WATERS TO CONDUCT CORAL HEALTH AND COMMUNITY STRUCTURE ASSESSMENT ACTIVITIES UNDER PERMIT PMNM-2014-012.”

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 by Dr. Greta Aeby in 2011 and 2012 (PMNM-2011-020 and PMNM-2012-040, respectively) and Dr. John Burns in 2012 and 2013 (PMNM-2012-031 and PMNM-2013-008, respectively).

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 the applicants have properly demonstrated valid justification for their application and should be allowed to enter the NWHI State waters and 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 applicants have 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:

That the Board authorize and approve a Research Permit to Dr. Courtney Couch, Hawai‘i Institute of Marine Biology, University of Hawai‘i, with the following special conditions:

1. 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.
2. 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.

3. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocols attached to this permit.
4. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.
5. 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 NWHI Marine Refuge.

Respectfully submitted,



Frazer McGilvray  
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.**

ITEM F-3a

## **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:** Courtney Couch

**Affiliation:** UH Manoa, Hawai'i Institute of Marine Biology (HIMB)

**Permit Category:** Research

**Proposed Activity Dates:** August 1, 2014 to July 31, 2015

**Proposed Method of Entry (Vessel/Plane):** R/V Hī'ialakai

**Proposed Locations:** (Shallow water reef (<100 ft depth), TBD, dependent on NOAA field cruise destinations)

**Estimated number of individuals (including Applicant) to be covered under this permit:** 4 (Dr. Courtney Couch, John Burns, Jamie Sziklay, Megan Ross). Only 2-3 individuals will need to enter the Monument to perform field surveys.

**Estimated number of days in the Monument:** 60

**Description of proposed activities:** (complete these sentences):

a.) The proposed activity would...

Assess the health and community structure of corals on shallow-water reefs throughout the Papahānaumokuākea Marine National Monument. Our survey techniques will primarily utilize a stratified random sampling approach to objectively survey the spatial variation in coral health at multiple sites within the Monument. To better understand how coral health is changing over time in the Monument, we will also opportunistically establish permanent transects at sites with ongoing disease outbreaks and/or highly susceptible Acroporid populations. The resulting data will enable a comprehensive examination of coral health at large spatial scales throughout the Monument and the necessary framework for understanding the long-term consequences of coral disease in PMNM.

b.) To accomplish this activity we would ....

Conduct surveys using SCUBA on shallow-water reefs to collect data on the health of corals as well as coral community structure along belt transects. Detailed descriptions of the surveyed colonies and visible disease signs will be recorded to calculate disease prevalence and severity. By assessing coral health and disease along a subset of permanently marked transects, we will also be able to track disease prevalence, severity, incidence and rate of disease progression over time. We will also conduct overlapping photo and video surveys in order to create digital reconstructions of the benthic habitat, which builds on previous research conducted in 2012 and 2013. Ultimately we will obtain detailed data on the community structure and health characteristics of surveyed corals. This research will allow us to decipher important characteristics of reduced health states affecting corals in the Papahānaumokuākea Marine National Monument.

c.) This activity would help the Monument by ...

Enabling a detailed analysis of coral health and community structure on shallow-water reefs of the Papahānaumokuākea Marine National Monument. Surveying at randomly chosen coordinates within each site will create a robust dataset for an objective analysis of the prevalence and severity of coral health afflictions. These data will also be incorporated into a larger Indo-Pacific meta-analysis that addresses the role of global and local stressors in coral disease. By establishing new permanent transect and/or resurveying a subset of sites with reoccurring disease outbreaks or highly sensitive Acroporid populations, we will also be able to determine how coral health is changing overtime and what effects these outbreaks may have on long term coral demographics. The photo and video surveys will provide useful data for assessing the dynamics of coral community structure throughout the Monument. This research will be critical for tracking changes to coral health and ecosystem function in the face of increasing global stressors such as climate change and ocean acidification.

**Other information or background:**

Given the rising threat of climate change and strong link to increased bleaching and disease risk, it is imperative to continue monitoring coral health using standardized survey methods that facilitate broad scale analyses both within the Papahānaumokuākea Marine National Monument and across the Pacific. We will establish a comprehensive coral health monitoring program for the Papahānaumokuākea Marine National Monument by adapting standardized methods used by experts across the Indo-Pacific. Utilizing an objective and randomized survey approach on reefs throughout the Papahānaumokuākea Marine National Monument will enhance the capability monitoring the health of coral populations over broad spatial scales within this valuable ecosystem. By using a combination of stratified-random and permanent sites, we will be able to assess both large scale variation in coral health across the Monument as well track disease progression and incidence rates over time in sites of concern, however the data is less useful for determining disease characteristics at the population level. We are also requesting permission to opportunistically sample a small number coral fragments for histopathology on unknown coral lesions. While most

coral lesions in PMNM have been previously characterized by Dr. Greta Aeby, we would like to the opportunity to sample previously undescribed lesions since histopathological assessments have not been conducted in the Monument during the last ten years. Through this research, we will not only be able to provide managers with information on how coral health differs spatially across the Papahānaumokuākea Marine National Monument and target sites with declining coral health, but also provide a crucial basis against which to compare future change.

**Section A - Applicant Information**

**1. Applicant**

Name (last, first, middle initial): Couch, Courtney, S.

Title: Postdoctoral Fellow, UH Manoa, HIMB

**1a. Intended field Principal Investigator (See instructions for more information):**  
Dr. Courtney Couch

**2. Mailing address (street/P.O. box, city, state, country, zip):** [REDACTED]  
[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):**  
HIMB, UH Manoa, UH Hilo

**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):**

- 1. Dr. Courtney Couch, Research Diver & PI , Postdoc at UH Manoa/HIMB
- 2. John Burns, Research Diver & Co-PI Investigator, PhD Candidate at UH Manoa
- 3. Jamie Sziklay, Back up Research Diver, PhD Student Candidate at at UH Manoa
- 4. Megan Ross, Back up Research Diver, PhD Student Candidate at at UH Manoa

\*\*Only 2 to 3 divers will be participating in this research.

**Section B: Project Information**

**5a. Project location(s):**

- |  |                                     |   |                                     |
|--|-------------------------------------|---|-------------------------------------|
| <input checked="" type="checkbox"/> Nihoa Island                 | <input type="checkbox"/> Land-based | <input checked="" type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> Necker Island (Mokumanamana) | <input type="checkbox"/> Land-based | <input checked="" 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 type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> Gardner Pinnacles            | <input type="checkbox"/> Land-based | <input checked="" type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> Maro Reef                    |                                     |   |                                     |
| <input checked="" type="checkbox"/> Laysan Island                | <input type="checkbox"/> Land-based | <input checked="" 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 type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> Pearl and Hermes Atoll       | <input type="checkbox"/> Land-based | <input checked="" type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> Midway Atoll                 | <input type="checkbox"/> Land-based | <input checked="" type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> Kure Atoll                   | <input type="checkbox"/> Land-based | <input checked="" 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:

**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 purpose of our proposed activities is to perform visual surveys to collect coral health data for shallow-water reefs throughout the Papahānaumokuākea Marine National Monument. This work is needed in order to monitor and track changes in coral health on reefs within this valuable and pristine ecosystem. Corals provide the foundation of productive reef ecosystems throughout Hawai'i, as global changes affect marine environments it is important to track and quantify impacts imposed on coral reefs. As one of the world's few 'near-pristine' coral reef ecosystems, Papahānaumokuākea Marine National Monument provides an invaluable system against which to compare regions with high levels of anthropogenic stress. Through these comparisons, we will be able to dissect out the relative contribution of global and local stressors to coral disease dynamics in the Indo-Pacific. Our comprehensive coral health and disease monitoring program will also serve as a model for other Big Ocean sites, many of which do not have standardized coral health programs in place. The proposed methods in this permit will complement and improve upon the current assessments of coral health that utilize permanent survey sites and repeatedly surveyed colonies. In addition, our stratified random design will enable us to assess spatial variation in coral health dynamics throughout the Monument while still working within the logistical constraints of PMNM cruises. By characterizing spatial variation in coral health, PMNM managers will be able to identify areas of high disease prevalence and severity. Furthermore, continuing these surveys over time will equip managers with the capability to temporally track the health of coral populations within the Monument. While we do not anticipate needing to sample a large number of coral lesions due to previous research, it will be important to sample previously un-described lesions to understand the underlying causes of the lesion and distinguish coral disease from other conditions such as predation. This approach is especially valuable in coral that demonstrate a limited number of responses (e.g. lesions) to a broad suite of abiotic and biotic stressors.

\*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?

As conservation biologists, we study how best to conserve the ecological integrity of marine ecosystems and ensure that our science has the least amount of impact on these ecosystems as possible. As the PI on this project, I will also ensure that every member of my team respects the natural and cultural resources around them and take every precaution to minimize their impacts during our fieldwork. This respect requires that we carefully consider the impact of our study design, that our study design is robust and will produce useful results, and that our work is disseminated to scientists and managers to improve the conservation efforts in these systems. We believe that we have implemented every reasonable safeguard for the natural resources and ecological integrity of the Monument in our research, and we do not expect any detectable impact from our research sampling. As outlined in detail below, our sample size and methodologies have all been selected to provide robust and scientifically rigorous information to managers with the least possible impact to the natural and cultural resources of the Monument. Not surveys or collections will occur in the vicinity of any known Native Hawaiian or western archaeological sites within the Monument, and thus are unlikely to impact any such resources. If possible archaeological sites are seen, Global Positioning System (GPS) coordinates for the sites as well as a general description will be taken and provided to Monument staff.

Field Surveys (Stratified random design):

Surveys will be conducted in a manner that brings the divers in very limited direct contact with the natural resources and corals that are visually assessed will not be collected. All data is collected visually using transect surveys and photographs. The only physical impact is the deployments of transect tape. Transects will be carefully deployed and placed above the substrate in a manner to ensure no harmful contact with any living corals or other organisms. No tape will be wrapped or anchored in any manner that could damage any living coral or substrate. The methods used to deploy transect tape are nearly identical to those used for CRED research activities and will have the same negligible impact on living substrate. Our research team has substantial experience conducting surveys in this manner and is adequately trained (please see diver qualification descriptions in Question #7-F) to avoid imposing any harmful effects on the benthic substrate.

Field Surveys (Permanent transects):

When possible, we will use existing permanently marked transects to track coral health dynamics through time. We will coordinate with Dr. Greta Aeby and NOAA's CRED to receive GPS coordinates prior to the cruise. If we encounter a new disease outbreak,



such as those previously reported on French Frigate Shoals and there no existing permanent transects in that location, we will establish three permanent transects per site. Great care will be taken to ensure that the rebar stakes are installed into the dead coral substrate and/or bare rock. At no point will any installation gear be placed on or come in contact with live coral.

#### Coral Sample Collection:

Coral tissue samples will only be taken from previously un-described lesions to minimize the number of samples collected during this project. Given the extensive previous research on coral histopathology in the Monument, we anticipate that our sample collection needs will be minimal (no more than a 80 4cm<sup>2</sup> fragments in total). If sample collection is deemed necessary, tissue will be collected from an apparently healthy region of the colony and lesion margin. Apparently healthy tissue is necessary to confirm the absence of the etiological agent compared to the lesion tissue. Whenever possible, we will collect tissue from the apical regions of the coral colonies, which have the capacity to heal faster than the central regions. I have extensive experience in coral sampling and histopathology, and have developed sample collection techniques that minimize damage to the overall colony. For branching species, I will use clippers to remove the region in question. For massive or encrusting taxa, I will create a shallow set of angled grooves by lightly tapping with a hammer and chisel around the areas of interest until the "plug" is removed. In all cases, we will collect no more than 4cm<sup>2</sup>/sample. Samples will immediately be placed in whirl pak bags and transported to the surface, where they will be placed in air/water tight specimen containers filled with zinc-buffered formalin. These specimen bottles will be placed in a larger watertight container for transportation to ensure that no fixative is released in to the surrounding water. At no point will any live tissue be transported between sites or released back into the marine environment.

#### Equipment and Dive Gear Disinfection:

If sample collection of coral lesions is necessary, we will follow PMNM's Best Management Practices #011 (DISEASE AND INTRODUCED SPECIES PREVENTION PROTOCOL FOR PERMITTED ACTIVITIES IN THE MARINE ENVIRONMENT) to prevent disease spread.

Our work will not impact historic resources: we do not set foot on land within the Monument, and we report but do not touch any submerged artifacts discovered during our diving activities.

Each participant is required to participate in a Cultural Briefing prior to departure on the Hi'iialakai. In addition, the chief scientist, other appropriate personnel and myself will consult with the Office of Hawaiian Affairs (OHA) and the Monument's Native Hawaiian program coordinator on proper conduct while in the NWHI, on cultural sensitivities associated with the proposed activities and locations. Each member of my team is aware of the unique ecological status of the Monument, and this briefing reminds all team

members of the cultural significance of the place. Stewardship of natural resources is a central theme in the relationship that Hawaiians have with the natural world and, thus, there is no difference between a natural and cultural resource. Papahānaumokuākea is a sacred place to native Hawaiians; a place that is included in the oral history of chants and mele; a place where native Hawaiians have travelled for hundreds of years. Because of the close relationship between Native Hawaiians and the ocean, the CR marine life of Papahānaumokuākea also constitute a living cultural resource whose well-being is integral to the perpetuation of cultural values and practices. We acknowledge that the corals we will survey hold great cultural significance to Native Hawaiians, in spiritual, religious, nutritional, utilitarian, and other ways. Similar to the RAMP and NOAA CRED program, we aim to characterize and monitor the Monument's living marine resources, and directly inform traditional managers and Native Hawaiian practitioners of the health of these fragile resources within the Monument. We strive to approach our work in the Monument with the same humility, and regard for the natural world as these people. We intend that our research in the Monument will give a strong foundation to stewardship practices that best manage and protect the coral reefs ecosystems of Papahānaumokuākea.

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? The research we propose here is the type of research directly mandated by the Proclamation: it is "research designed to further understanding of monument resources and qualities... [and] will assist in the conservation and management of the monument". According to the Kumulipo, the coral polyp was the first life form to be created. This genealogical chant shows a deep respect for corals as the backbone of our productive marine ecosystems. Corals deserve this appreciation as they provide habitat for a plethora of creatures, many of which we depend on for food. Due to their profound ecological and cultural importance, it is imperative that we work to conserve and protect Hawaiian corals. Our goal is to collect data on the health and structure of coral communities in order to monitor and protect these organisms. Hawaiian corals can be considered as Kupuna that we must care for, as they are the ancestors and backbone of all marine life. Loss of corals will result in loss of habitat and function of the marine ecosystems. We hope our work will provide insight into the health of corals within the monument as well as what factors may be connected to reduced health and disease. Ultimately this work aims to safeguard these culturally and ecologically important organisms. The research methods utilized in this study have no detrimental impacts on the marine ecosystems within the Monument. The goal of collecting coral health data is to determine the impacts of deleterious health afflictions and provide management with information necessary for maintaining healthy coral reef ecosystems. Implementing our proposed survey approach, utilizing random sampling design, will facilitate objective

results at the population level. These results will allow managers identify sites of concern with ongoing disease outbreaks and/or high abundance of susceptible coral taxa. It will also allow managers to better understand the underlying processes determining disease dynamics throughout the Monument. Our proposed methods directly complement the annual Reef Assessment and Monitoring Program (RAMP) by providing more detailed data on coral health, and a standardized monitoring program for future surveys. For instance, RAMP coral disease surveys utilize categorical variables for colony size and disease severity. Our methods encompass more comprehensive disease assessments by monitoring not just disease, but also other biological interactions such as algal overgrowth, pigmentation response and predation that are often just as important as disease in colony-level mortality. Furthermore, we record extensive details of disease-related features such as colony morphology (branching, encrusting, etc.) and lesion descriptions proposed by Work and Aeby (2006, Diseases of Aquatic Organisms) in order to develop a comprehensive epizootiological (the study of the frequency, distribution, and causation of disease in an animal population; the counterpart in nonhuman animals of epidemiology) dataset. Conducting overlapping photo and video surveys provide a detailed assessment of coral community structure at each surveyed location. The resulting data enables a more thorough characterization of reduced coral health states and disease dynamics. Utilizing this epizootiological approach has enabled previous identification of environmental and biological parameters (disease cofactors) associated with disease severity (Burns and Takabayashi 2011, Couch et al. in review). Combining epizootiological data with ecosystem characterization data collected throughout the Monument may provide critical insight into environmental cofactors associated with coral health. By sampling with a stratified random design we will obtain an objective assessment of coral health and community structure that will complement data collected from permanent survey sites and repeatedly surveyed colonies. Utilizing the random sampling design will develop a robust dataset that will enable an objective determination of coral health characteristics at the population level. We also propose to return to permanently marked sites/transects established by CRED and Dr. Greta Aeby in previous surveys (Aeby et al. 2011 Journal of Marine Biology) to assess the fate of previous disease outbreaks. By resurveying these transects, we will be able to determine how outbreaks have changed in susceptible populations such as the Acroporids in French Frigate Shoals. Ultimately, the dataset will allow for multiple disease parameters to be analyzed, in addition to those collected with RAMP and other surveys, in order to improve the understanding of coral health and disease dynamics throughout the Monument.

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.

It is important that these research activities be conducted as they are not invasive and will provide useful data for monitoring and assessing coral health within the Monument. There is no practicable alternative as the goal is to develop a robust dataset pertaining to coral health dynamics within the Monument itself. Our proposed survey methodology will complement and enhance the current coral health data being collected in the

Monument. Utilizing a stratified random sampling design will provide a platform to determine general trends of coral health (prevalence and severity, spatial and temporal patterns, disease cofactors) at the population level. By conducting repeated surveys at the same location and on the same colonies, we will be able to determine how incidence, transmission, and progression are changing over time. This will complement the surveys being conducted at repeatedly visited sites and be immensely useful for assessing coral health characteristics throughout the Monument. Furthermore, this work will provide valuable data for meta-analyses of the processes driving coral disease dynamics across the Indo-Pacific.

d. How does the end value of the activity outweigh its adverse impacts on Monument cultural, natural and historic resources, qualities, and ecological integrity?

These data will be of great value for aiding management decisions and tracking changes in coral health across spatial and temporal scales. The end value of these activities will greatly outweigh the impacts since the survey methods are non-invasive and will have relatively no effect on the coral reef ecosystems. Conducting surveys at several sites within the Monument will enable assessment of disease dynamics at various spatial scales. All transect locations will be georeferenced to enable multiple post-hoc spatial analyses. These data will help identify sites with compromised coral health as well as elucidate the underlying processes determining disease risk. By collating data pertaining to site characteristics (i.e. benthic data, water quality data, fish data) with coral health data we can also develop predictive models to assess determinates of the various disease states. For example, coral colony size and water motion are strong determinates of coral disease on Hawai'i Island (Burns et al. 2010, Couch 2014). We can also perform spatially based analyses, such as the nearest neighbor algorithm, to investigate if the prevalence of certain afflictions display patterns indicative of vector-borne disease transmission. While our proposed methods are more detailed than those conducted by RAMP surveys, certain basic parameters can still be combined to improve the spatial resolution of coral health data collected throughout the Monument. Data from the Monument can also be collated with data collected from the Main Hawaiian Islands and wider Indo-Pacific to assess patterns in coral health across the Hawaiian archipelago. Continuing our surveys in the future will enable an even more robust temporal analysis, this may be very useful when investigating disease severity and can shed light on which health afflictions pose the largest "threat" to coral reefs within the Monument.

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

The duration of our activities is dependent on the planned NOAA research cruises. We will use the allotted time efficiently to maximize our data collection, therefore needing no time outside that planned by the PMNM research coordinators.

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

Our research team has been conducting coral health surveys throughout Hawai'i the last seven years. Through this research, we have not only acquired extensive experience in coral disease science, experimental design, monitoring, and data analysis, but we have also developed the a profound respect for Hawaii's cultural resources. Our work has resulted in multiple publications and presentations. John and Jamie have also previously conducted research in the Monument.

John is a PhD candidate at UH Manoa, and is a graduate as well as an instructor for the QUEST program. He is a NAUI instructor as well as a lead scientific diver and supervisor/trainer for the UH Dive Safety program, and he is also a certified fill station operator. John is also currently working on several large grant collaborations collecting coral health data using SCUBA from several sites throughout Hawai'i Island. Jamie is a PhD student at UH Manoa and is currently developing predictive models of disease risk in Hawaii. She is a NAUI Master Diver with NITROX certifications, as well as an active member of the UH Dive program. Jamie successfully conducted coral health surveys with John in 2013. Megan is a graduate student specializing in coral demographics and coral disease ecology. Megan has conducted extensive field studies on the causes of coral cover loss on Maui and has conducted detailed assessments of Montipora white syndrome outbreaks along East Maui. She has extensive scientific diving experience and is an active UH divers. I myself, am a postdoctoral research fellow at the Hawaii Institute of Marine Biology. I am currently co-funded by NOAA/PMNM and The Nature Conservancy to standardize coral health and disease monitoring across the Indo-Pacific, address the role of land-based pollution in coral health in Hawai'i, and build capacity with marine resource managers to address coral disease. I have nine years of scientific diving experience, as well as my NAUI Rescue Diver and Nitrox certifications. I was also the lead diver on a 3-year coral health disease project on Hawai'i Island and a 2-year project in Indonesia through Cornell University. I am also an active University of Hawai'i Diver. I have also conducted coral disease assessments in the Caribbean, Philippines and Indonesia, and have extensive experience in managing and analyzing large datasets. Collectively our work has resulted in several coral health related publications and presentations that are listed below in our Permit Application as well as in my attached curriculum vitae.

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. The research labs of Ruth (HIMB) and Misaki (UH Hilo Marine Science) are well funded by several grants and are equipped with all the analytical software necessary for disseminating the collected data. Due to the un-invasive nature of our survey methods we would be capable of mitigating any potential impacts if they occurred.

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.

Our methods and procedures are designed to be un-invasive and as thorough as possible. We utilize a unique approach to assessing coral health and colony characteristics in order to decipher the dynamics of health afflictions at the population scale. As mentioned above, our surveys use quantitative and detailed methodology to create a comprehensive epizootiological dataset pertaining to coral health for all surveyed areas. We plan to assess and measure any and all forms of visible coral health afflictions present on surveyed corals within the Monument. Several parameters, such as disease prevalence and severity, can be collated with RAMP data to assess temporal changes in coral health. If we are fortunate to perform these surveys in the future, we will be able to comprehensively assess changes in coral health over time on surveyed reefs throughout the Monument. Georeferencing our survey areas allow for various spatial analyses to be employed to investigate disease dynamics within and between surveyed sites. Georeferencing the coral health data will also enable spatial comparisons to sites within the Indo-Pacific. Incorporating terrestrial and marine parameters in the spatially analyses will have great utility for determining ecosystem characteristics associated with coral health. Furthermore, our research labs are currently investigating the biological implications of various coral diseases. Once we determine the impacts of these diseases at the organismal level our findings can be collated with disease severity data to quantify the impact and threat of various diseases at the population level within the Monument. Ultimately, this work will provide the Monument with a comprehensive and robust dataset pertaining to the health of shallow-water coral reefs. Corals are a cultural and ecological resource, providing critical habitat to a multitude of marine species. It is important to determine disease cofactors and track health changes to avoid any large-scale mortality associated with outbreaks of disease.

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

Our work will be conducted in conjunction with the planned NOAA summer field cruises; we will therefore operate on NOAA vessels and be in compliance with all marine vessel requirements.

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

Our activities in PMNM will be restricted to those explicitly described in this permit application.

#### **8. Procedures/Methods:**

Surveys will be conducted using SCUBA, transport to the sites will be facilitated by NOAA research vessels. Two divers will descend on the shallow-water coral reef sites (~15-80ft) chosen for surveys. Divers will deploy 3 15 to 20m transect at a pre-

determined location in the direction of a pre-determined bearing. Transect locations will be established by utilizing a random stratified sampling design in order to objectively survey all study sites. Working in unison, divers will investigate all corals underneath the deployed transect tape. Divers will record multiple parameters, such as colony size and severity (proportional surface area), for each surveyed colony and visible health affliction. All observed colonies will also be photographed to facilitate digital image analyses. Divers will also conduct an overlapping photo and video survey so the transect can be digitally reconstructed. The analyzed data will be used to determine coral health dynamics (i.e. spatial, temporal, cofactors) for all surveyed reefs within the Monument.

**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:

Table coral, finger staghorn coral, rice coral, branching rice coral, pork chop coral, corrugated coral, maldive coral, ocellated coral, crust coral, oval mushroom coral, swelling coral, lace coral, thin cauliflower coral, cauliflower coral, antler coral, brigham's coral, finger coral, mound coral, lobe coral, nierstrasz's coral, stellar coral

Scientific name:

Acropora cytherea, Acropora humilis, Montipora capitata, Montipora incrassata, Pavona duerdeni, Pavona varians, Pavona maldivensis, Cyphastrea ocellina, Leptastrea purpurea, Fungia scutaria, Leptoseris incrustans, Pocillopora damicornis, Pocillopora eydouxi, Pocillopora ligulata, Pocillopora meandrina, Porites brighami, Porites compressa, Porites evermanni, Porites lobata, Psammocora nierstraszi, Psammocora stellata

# & size of specimens:

up to a total of 80 coral fragments, with a maximum fragment size of 4cm<sup>2</sup> each

Collection location:

a maximum of 8 fragments per island region at up to 10 regions

Whole Organism  Partial Organism

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

Preserved samples remain the property of the Monument and will be made available to others requesting access to these materials through the appropriate permit process. PI Couch will maintain a database of samples and provide for the storage of all samples collected at HIMB until such time as the Monument co-trustees request that they be returned to them.

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

All samples will be preserved in 20% zinc-buffered formalin (Z-fix) immediately following collection. This will be conducted by placing samples in pre-filled watertight specimen jars with zinc-buffered formalin. These jars will be transported in an air and watertight container to prevent chemical pollution into PMNM waters.

• General site/location for collections:

Collections will be stored in the wetlab on the Hiialakai after field collection and then kept at Dr. Megan Donahue's lab at HIMB.

• Is it an open or closed system?  Open  Closed  
N/A

• Is there an outfall?  Yes  No

• Will these organisms be housed with other organisms? If so, what are the other organisms?  
N/A

• Will organisms be released?

At no point will any live samples be transported between locations or released back into Monument waters.

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

Specimen jars will be transported in an air and watertight container to prevent chemical pollution into Monument waters. These will be transported back to HIMB aboard the R/V Hi'ialakai. See attached MSDS sheets.

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

All HIMB researchers working on similar species have coordinated to share samples and avoid duplicate sampling. This project reflects this coordination, as a joint effort between Drs. Couch and Aeby at HIMB, PMNM and the RAMP program, and NOAA CRED. Given Dr. Aeby's previous coral disease research and description of coral lesions using histopathology, we will collaborate with Dr. Aeby and NOAA CRED to review previously described lesions prior to the 2014 PMNM cruises. These surveys will



also be conducted alongside the RAMP divers to ensure that the data augment ongoing benthic monitoring efforts and minimize overlap. We will only collect samples from previously un-described lesions or those that are unclear in origin. All findings will be discussed with coral disease specialists at HIMB, UH Hilo and NOAA CRED.

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

Coral health and disease surveys: SCUBA gear (BCD, regulator, mask, fins, snorkels, weights, computers, compass, dive knife), slates, rulers, underwater cameras, transect tape. Rebar stakes and cable ties may also be used if permanent transects are established.

Coral lesion collection: whirl pak bags, hammer, chisel, clippers, specimen bottles, air/water tight bins, 20% zinc-buffered formalin.

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

Tissue preservation solutions include zinc-buffered formalin (Z-fix). MSDS sheets attached.

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

If time permits, we will establish permanent rebar stakes at a subset of sites of concern to determine whether coral disease levels are changing over time in PMNM. Sites will be chosen based on the presence of disease outbreaks or highly susceptible taxa, such as Acroporids. When possible, we will use permanent transects previously established by Dr. Greta Aeby or NOAA CRED. If permanent transects are deemed necessary, we will drive rebar stakes into the dead coral substrate and/or bar rock using a hammer. Two stakes will be used per transect to mark the beginning and end of the transects, with three transects per site (6 stakes per site). Each site will be marked with a GPS and all transects will be mapped, photographed and marked with cable ties (on the rebar stakes) to facilitate easy relocation in subsequent years.

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

Photo analyses, data analyses, sample processing and a report write-up will be completed within a year of the field surveys. We hope to complete several publications utilizing this coral health dataset within a few years of data collection.

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

- Burns JHR, Takabayashi M (2011) Histopathology of Growth Anomaly Affecting the Coral, *Montipora capitata*: Implications on Biological Functions and Population Viability. PLoS ONE 6(12): e28854

- Burns JHR, Rozet NK, Takabayashi M (2011) Morphology, severity, and distribution of growth anomalies in the coral, *Montipora capitata*, at Wai'ōpae, Hawai'i. *Coral Reefs* 30: 819-826
- Couch, C. S. 2014. Intrinsic host and extrinsic environmental factors of coral health and disease. PhD Dissertation, Dept. of Ecology and Evolutionary Biology, Cornell University.
- Couch, C. S., J. Garriques, C. Barnett, L. Preskitt, S. Cotton, J. Giddens, W. Walsh (in review). Spatial and Temporal Patterns of Coral Health and Disease along Leeward Hawai'i Island. *Coral Reefs*.
- Ross, M., Stender, Y., White, D., Aeby, G. Outbreak of the coral disease, *Montipora White Syndrome* in Maui, Hawai'i. Proceedings of the 12<sup>th</sup> International Coral Reef Symposium, Cairns, Australia, 9-13 July 2012.
- Walsh, W., R. Sparks, C. Barnett, C. Couch, S. Cotton, D. White, K. Stone, E. Conklin. 2013. Long-term monitoring of coral reefs of the Main Hawaiian Islands Final Report. 2009 NOAA CRCP. State of Hawai'i Monitoring Report. NA06NOS4260113.

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):**

Dr. Courtney Saltonstall Couch (Hawaii Institute of Marine Biology): PI/diver  
John Burns (Hawaii Institute of Marine Biology): Scientific/coral health diver  
Jamie Sziklay (Hawaii Institute of Marine Biology): Scientific/coral health diver  
Megan Ross (Hawaii Institute of Marine Biology): Scientific/coral health diver

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

Shallow water habitats in Nihoa Island, Necker Island, French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan Island, Lisianski Island & Neva Shoal, Pearl and Hermes Atoll, Kure Atoll, Midway Atoll

We will be working closely with the RAMP divers and will rely on them to provide exact study site locations.

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

There are currently no other permits related to this project.

**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):**

Dr. Couch's postdoctoral salary and research stipend partially funded by NOAA/PMNM will cover her time and fees for histological analyses. The other scientific diver's time will be covered by their graduate stipend.

**5. Time frame:**

Activity Start: August 1, 2014

Activity Completion: July 31, 2015

Personnel Schedule/Dates actively in Monument: August 1-31<sup>st</sup>, 2014 & 4 weeks during spring/summer 2015. We propose to participate in the 2015 RAMP cruise to continue monitoring and revisit permanent sites. We are unable to provide exact dates at the time as the cruise dates for 2015 have not been established.

**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:**

All personnel covered under this permit have Diver's Alert Network insurance to cover medical evacuation and removal.

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

- Vessel  
 Aircraft

Provide Vessel and Aircraft information: NOAA Ship Hi'ialakai

**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):**

- 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 (m<sup>3</sup>):  
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:

**Additional Information for Land Based Operations**

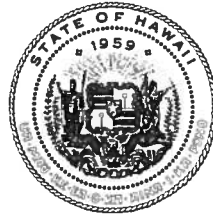
**11. Proposed movement of personnel, gear, materials, and, if applicable, samples:**

**12. Room and board requirements on island:**

**13. Work space needs:**

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



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621  
HONOLULU, HAWAII 96809

May 23, 2014

WILLIAM J. AILA, JR.  
CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCES  
COMMISSION ON WATER RESOURCE MANAGEMENT

JESSE K. SOUKI  
FIRST DEPUTY

WILLIAM M. TAM  
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES  
BOATING AND OCEAN RECREATION  
BUREAU OF CONVEYANCES  
COMMISSION ON WATER RESOURCE MANAGEMENT  
CONSERVATION AND COASTAL LANDS  
CONSERVATION AND RESOURCES ENFORCEMENT  
ENGINEERING  
FORESTRY AND WILDLIFE  
HISTORIC PRESERVATION  
KAIHOOLAWE ISLAND RESERVE COMMISSION  
LAND  
STATE PARKS

TO: Division of Aquatic Resources File

THROUGH: William J. Aila Jr., Chairperson *[Signature]*

FROM: Frazer McGilvray  
Division of Aquatic Resources *[Signature]*

DECLARATION OF EXEMPTION FROM THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT UNDER THE AUTHORITY OF CHAPTER 343, HRS AND CHAPTER 11-200 HAR, FOR PAPAHAŌNUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR. COURTNEY COUCH, HAWAII' I INSTITUTE OF MARINE BIOLOGY, UNIVERSITY OF HAWAII' I, FOR ACCESS TO STATE WATERS TO CONDUCT INTERTIDAL BIODIVERSITY ACTIVITIES UNDER PERMIT PMNM-2014-012.

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 Research Permit to Dr. Courtney Couch, Hawaii' i Institute of Marine Biology, University of Hawaii' i, for Access to State Waters to Conduct Coral Health and Community Structure Assessment Activities.

Permit Number: PMNM-2014-012

Project Description:

The research permit, as described below, would allow entry and activities to occur in Papahānaumokuākea Marine National Monument (Monument), including the NWHI State waters from August 1, 2014 to July 31, 2015.

The proposed project would assess the health and community structure of corals on shallow-water reefs throughout the Monument. Surveys would provide useful data for assessing the dynamics of coral community structure and health throughout the Monument. The applicant proposes to perform visual and photographic surveys using SCUBA on shallow water coral reefs (15 to 80 ft) throughout the Monument on established and new permanent transect lines.

The proposed project would be supported by the NOAA ship HI'IALAKAI (PMNM-2014-005) from August 7 - 31, 2014. Two (2) divers would perform surveys, though four (4) people would be



covered under this permit. Permanent transects established by Dr. Greta Aeby or NOAA would be used whenever possible using GPS coordinates provided by both groups. Using a randomized stratified sampling design, if coral disease is encountered and no established transect exists, divers would opportunistically establish three (3) transects measuring 15 to 20 m in length using transect tape. Divers would take care not to wrap or anchor tape in any manner that could damage any living coral or substrate. The applicant has agreed to use stainless steel markers instead of rebar stakes. The stainless steel markers would be driven into dead coral substrate and/or bar rock using a hammer at the beginning and end of each new transect. Each site would be marked with a GPS, mapped, photographed, and marked with cable ties to facilitate relocation. Divers would investigate all corals underneath the deployed transect tape recording colony size, disease severity, and visible health affliction. Overlapping photograph and video surveys would be performed so that each transect could be digitally reconstructed. These data would be used to determine coral health dynamics. Coral tissue samples would be taken from undescribed lesions (voucher specimens). Applicant would follow Monument Best Management Practices (BMP 011) to prevent the introduction or spread of disease when sampling and transporting diseased lesions. Up to eighty (80) coral fragments of a maximum size of 4 cm<sup>2</sup> or a maximum of eight (8) fragments per island region (10 regions – including water within Midway Atoll Special Management Area).

The proposed activities are in direct support of the Monument Management Plan's priority management needs 3.1 – Understanding and Interpreting the NWHI (through action plan 3.1.1 Marine Conservation Science). This action plan states the need for “quantitative surveys of coral” (Activity MCS-1.2, PMNM MMP Vol 1, p. 123) and “establishing baselines on abundance and health of Monument biota (Activity MCS-2.4, PMNM MMP Vol 1, p. 126). Activities to support marine conservation science, including coral health and community structure surveys such as those to be carried out by the permittee, are also addressed in the Monument Management Plan (MMP) Environmental Assessment (EA). This EA summarizes that assessment of coral disease, such as those proposed, would enhance this understanding (PMNM MMP Vol 2, p. 171).

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 March 5, 2014 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 transect monitoring in shallow coral reefs and coral tissue biopsy sampling, 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. This permit may involve an activity that is precedent to a later planned activity, i.e. the continuation of coral health monitoring and sampling; the categorical exemption determination here will treat all planned activities as a single action.

2. The Exemption Class for Scientific Research Management with no Serious or Major Environmental Disturbance Appears to Apply. Chapter 343, HRS, and § 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.” The proposed removal activities here appear to fall squarely under the exemption class #5, exempt item #5 as described under the Division of Forestry and Wildlife exemption list published on June 12, 2008. This exemption class has been interpreted to include “wildlife surveys, new transect lines, photographing, recording, and sampling”, such as those being proposed. As discussed below, no significant disturbance to any environmental resource is anticipated in the monitoring and removal of a limited number of diseased coral samples. Thus, so long as the below considerations are met, an exemption class should include the action now contemplated.

The visual surveys are designed to be non-invasive. To minimize the potential of disease introduction or transfer during field sampling, the applicant would follow Monument Best Management Practice (BMP) 011 – Disease and Introduced Species Prevention. For sample storage and transport, the applicant would follow Monument BMP 006 – General Storage and Transport Protocols for Collected Samples. The applicant would also follow Monument BMP 004 – Boat Operations and Diving Activities to eliminate any adverse impacts of protected marine species during boating and diving activities.

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.

Though the applicant is new, the proposed activities would in part be a continuation of a previously permitted projects. Similar coral health and biodiversity monitoring activities have also been permitted and performed within the NWHI. Past permitted projects including similar collections and techniques have shown no adverse impacts. No adverse impacts are expected from the proposed activities. With that 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 that would occur as a result of these activities.

The proposed project would be supported by the NOAA ship HI‘IALAKAI (PMNM-2014-005) (Table 1), from August 7 - 31, 2014. The following projects have the potential to also take place from this vessel:

Table 1: Concurrent projects aboard NOAA Ship HI‘IALAKAI

Permit	Purpose and scope	Location
PMNM-2014-005 Ellis-Simon HI‘IALAKAI (approved)	This permit allows the NOAA Ship HI‘IALAKAI entry into the Monument. Personnel aboard the vessel would be permitted under separate permits	All locations
PMNM-2014-014 Meyer (proposed)	This proposed action would be to conduct top predator research consisting of fishing for various shark and fish species.	French Frigate Shoals, Pearl and Hermes, Midway
PMNM-2014-024 Donahue (proposed)	This proposed action would be to evaluate coral reef bioerosion in the NWHI.	French Frigate Shoals, Pearl and Hermes Atoll, Lisianski Island, Midway Atoll
PMNM-2014-025 Donahue (proposed)	This proposed action would be to characterize <i>Pocillopora meandrina</i> (POME) colony fish and invertebrate communities.	All locations
PMNM-2014-018 Godwin (proposed)	This proposed action would be conduct Pacific Reef Assessment and Monitoring Program.	All locations

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 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 conservation and management 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.

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

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Date