

State of Hawai'i
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Aquatic Resources
Honolulu, Hawai'i 96813

July 10, 2015

Board of Land and Natural Resources
Honolulu, Hawai'i

Request for Authorization and Approval to Issue a Papahānaumokuākea Marine National
Monument Research Permit to Christopher Wall, Hawai'i Institute of Marine Biology,
University of Hawai'i, for Access to State Waters to Conduct Coral Bleaching
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 Applicant Christopher Wall, Hawai'i Institute of Marine Biology, University of Hawai'i, pursuant to § 187A-6, Hawai'i Revised Statutes (HRS), Chapter 13- 60.5, Hawai'i 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, including the NWHI State Marine Refuge and the waters (0-3 nautical miles) surrounding the following site:

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

The activities covered under this permit would occur between July 15, 2015- July 14, 2016.

The proposed activities are largely a continuation of work previously permitted and conducted in the Monument.

INTENDED ACTIVITIES

The proposed project would assess the bleaching recovery of reef corals on shallow-water reefs throughout the Monument. In 2014, extensive and severe coral bleaching occurred across PMNM and the Main Hawaiian Islands. Dr. Courtney Couch and NOAA documented this

bleaching event by recording the extent of bleaching along randomly selected sites (RAMP) and permanent transects in PMNM. To better understand how high temperature stress affected bleaching susceptibility and recovery of corals from the physiological to community scale, the Applicant proposes to use minimally invasive sampling. This analysis will reveal the coral taxa most vulnerable and resilient to coral bleaching and identify physiological factors contributing to bleaching resilience across reef habitats. Further, these data will contribute valuable baseline data for coral health and bleaching recovery in the PMNM. Conclusions can be disseminated broadly to other marine resource managers that are also experiencing climate change impacts.

To fulfill these objectives, the Applicant proposes to:

Monitor reefs using non-invasive transects and perform video and photographic surveys using SCUBA on shallow-water coral reefs (10 to 80 ft) throughout the Monument on transect lines in order to create digital reconstructions of the habitat. Transect locations will be established by utilizing a random stratified sampling design in order to objectively survey all study sites. The analyzed data will be used to determine coral bleaching recovery dynamics across spatial and temporal scales for all surveyed reefs within the Monument.

Additionally, activities would include swimming, snorkeling and SCUBA diving, touching living or dead coral, seawater collection (no more than 100L total), sediment collection (no more than 1L total), plankton collection (2 per island from 29 vertical plankton tows), and collecting samples of *Montipora spp.* corals (no more than 400 fragments total) as well as filter-feeding invertebrates and epibionts which may include the following genus: *Litophaga*, *Arca*, *Isognomon*, *Spondylus*, *Serpulorbis* and *Dendropoma* (15 per island and no more than 50 total)

Furthermore, this research will contribute to long-term monitoring which addresses the impacts of ocean warming on coral reefs and identify factors contributing to bleaching resistance and recovery. Coral bleaching has contributed to declining coral abundance worldwide and is a leading cause of coral mortality. Ocean warming and climate change is predicted to increase the frequency and magnitude of bleaching events. Since 2002, three widespread bleaching events have occurred in PMNM with 2014 being the most extensive and severe bleaching to date, suggesting that ocean warming is already affecting the remote islands of PMNM.

This research will contribute to effective management strategies in the PMNM and other global reef systems by (1) identifying factors affecting bleaching and bleaching recovery and (2) enabling resource managers to identify reef systems resilient or vulnerable to climate change stress in order to support science- and ecosystem-based management in Hawai'i.

The activities proposed by the Applicant 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 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
- 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: Hawai'i Division of Aquatic Resources, Hawai'i 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 February 18, 2015, 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:

The following questions were raised:

QUESTIONS:

1. Is there comparative work from the Main Hawaiian Islands?

Our lab is working to do a comprehensive physiological and genetic analysis of the effects of the 2014 bleaching event on reefs of Kaneohe Bay. Additionally, ecological data for bleaching and bleaching recovery at patch reefs within Kaneohe Bay has been analyzed and will be used in combination with physiological data to better understand how corals responded to and recovered from the bleaching event. While the datasets from Kaneohe Bay and PMNM will be different and the ability to sample tagged colonies and monitor abiotic conditions is greatest in Kaneohe Bay, it is our aim to use data from the Main Hawaiian Islands and PMNM to evaluate the consequences of the 2014 bleaching event and factors contributing to coral recovery from bleaching.

2. This appears to be a good collaboration with the research proposed in PMNM-2015-013 (Couch). Since Dr. Couch is listed as a Co-PI and is proposing identical sampling, are these samples being shared?

Dr. Couch and I are eager to collaborate in this research plan in PMNM, and we appreciate the reviewers comment. However, the collection of biological material is not overlapping between the two permits. The samples used by Dr. Couch are designated to evaluate coral health and disease and therefore may include those colonies showing signs of pathogen infection. In contrast, corals collected in the 2015-016 permit [application] are designed to randomly sample the population of the coral *Montipora* spp. and are not specific to disease, bleached, or unbleached samples. However, should the opportunity exist for Dr. Couch and myself to share

coral samples between the two permits we will consider this option.

3. On page 3 it states, "... water samples (10L), seawater samples (10 mL), and plankton will be collected...". Did the applicant intend for the 10 mL total collection be for marine sediments instead of seawater? If not, please clarify why total water samples and seawater samples are separated.

Thank you for noticing this error. Yes, 10L of seawater would be collected and filtered, 10mL of sediment would be collected, and a plankton sample will also be obtained.

COMMENTS:

1. On page 10 applicant states a total of 1 L of sediment would be collected, but in the same paragraph states final volume (for sediment) would not exceed 10 mL. Please confirm the total amount of sediment the applicant intends to collect.

Apologies for the confusion, and thank you for noticing this inconsistency. The total amount of sediment collected in the entire monument would not exceed 1L of materials. At each transect a discrete sample of 10 mL of sediment will be collected.

2. It is not clear in the literature cited within the application if the proposed research methods have been successfully employed in other projects. Please provide a citation for a relevant publication or literature source that supports the methodology.

The use of lipids and other energetic metrics has been successfully employed in studying the effects of bleaching and bleaching recovery in corals from Hawai'i and elsewhere (Grottoli et al. 2004, 2006; Rodrigues and Grottoli 2007; Hughes and Grottoli 2013). The application of stable isotope and nutrient analysis in understanding the food sources used by corals is an established methodology (Nahon et al. 2013; Leal et al. 2014) and has been informative in the investigation of nutritional changes according to changes in water quality (Nahon et al. 2013) and in response to bleaching (Grottoli et al. 2004; Hughes et al. 2010; Levas et al. 2013).

3. It is necessary to establish a baseline of current biological conditions and coral health in order to measure future change. Continued monitoring of these sites in the future will provide managers with information on how or if coral health differs spatially across the Monument.

Thank you for your comment; we agree with the reviewer and appreciate their support in this research plan.

4. The size and number of the tissue samples requested for analysis is not a concern. The nubbin/plug sizes are small and should not cause mortality to the remaining colony.

Thank you for your comment.

5. The applicant should attempt to minimize (to the greatest extent practicable) contact with any coral colony, and take the smallest sample possible that will meet the research objectives. If it will serve the purpose of the research, the applicant should consider taken pieces of broken

corals which will further limit contact with the colonies. As possible, samples should be collected from the tips of the branches and away from the center of a colony.

We will make every effort to avoid contact with corals. We will only collect fragments from areas where our impact on the whole colony will be minimal.

6. Due to the number of samples, the applicant should, as much as possible, limit the size of each sample to the minimum necessary to achieve the research design.

We agree with the reviewer and we will only collect enough coral biomass to examine the metrics we proposed in the application.

7. The applicant should adhere to the established PMNM Best Management Practices, as well as, implement sterilization protocols for all equipment used at one site before being used at another site to prevent the spread of any diseases or invasive species from one site to another.

Thank you for this important comment. We will implement sterilization protocols in our collection to safeguard against the unintentional introduction or spread of diseases or invasive species.

8. It would be good to see a document from the Dr. Ruth Gates in support of Wall applying as the Field PI for this research and the methods being applied in this effort.

A letter of support from Dr. Gates has been included with the response to reviewers. See below:

UNIVERSITY OF HAWAI'I AT MANOA

Hawai'i Institute of Marine Biology Moku O Lo'e (Coconut Island), P.O. Box 1346, Kāne'ohe, Hawai'i 96744-1346 Telephone: (808) 236-7401, Facsimile: (808) 236-7443 An Equal Opportunity/Affirmative Action Institution

April 4, 2015

To Whom It May Concern:

I am writing to you in support of a Ph.D. student in my lab, Chris Wall, and his proposed research in the Papahānaumokuākea Marine National Monument (PMNM). With my support, Chris has applied as the Field PI on a PMNM collection permit that received positive reviews from the agencies of the Monument Management Board, and his permit is scheduled for review by the Hawai'i State Board of Land and Natural Resources in May. I have known Chris for a number of years. In addition to being his current Ph.D. advisor at the University of Hawai'i at Mānoa, I previously served as the outside member on the committee for a master's degree that was awarded by the California State University at Northridge. Chris is experienced and knowledgeable, and has performed collaborative and independent research in Hawai'i, Taiwan, and French Polynesia. Chris works at both ecological and physiological scales, and his skillset is well matched with his proposed research in the PMNM. The corals of PMNM were affected by an island-wide bleaching event in 2014, and Chris has proposed to examine factors contributing to the susceptibility and resilience of corals to bleaching stress in the PMNM. Chris is experienced in studying coral bleaching; his master's research specifically focused on the effects of environmental stress and

bleaching on corals. The research Chris proposes in the PMNM will contribute to our understanding of how the reefs of the PMNM respond to—and recover from—bleaching events, and aims to identify factors contributing to the susceptibility and resilience of corals to future bleaching stress. Chris is organized and knowledgeable, and I am confident he will successfully complete his proposed PMNM research plan.

Yours sincerely,
Ruth D. Gates, Ph. D.
Research Professor

9. Once preliminary findings are completed a briefing in conjunction with the Couch permit to the Deputy Sup. for Field and Research to provide to MMB and RAC would be much appreciated.

Thank you for the comment. We will be happy to share our findings with the MMB and RAC as soon as possible.

10. OHA appreciates this application and the potential to report on recent coral bleaching within Papahānaumokuākea. We see the value in further studying this bleaching event and the areas' ability to recover in the face of climate change. If a permit is issued, we look forward to discussing with the applicant on proper cultural conduct within Papahānaumokuākea and sharing the cultural history of the place.

Thank you for your support. We look forward to speaking with OHA and learning more on the cultural significance of this special place.

References:

Grottoli, A. G., Rodrigues, L., & Juarez, C. (2004). Lipids and stable carbon isotopes in two species of Hawaiian corals, *Porites compressa* and *Montipora verrucosa*, following a bleaching event. *Marine Biology*, 145(3), 621–631.

Grottoli, A. G., Rodrigues, L., & Palardy, J. (2006). Heterotrophic plasticity and resilience in bleached corals. *Nature*, 440(7088), 1186–1189.

Hughes, A. D., & Grottoli, A. G. (2013). Heterotrophic Compensation: A Possible Mechanism for Resilience of Coral Reefs to Global Warming or a Sign of Prolonged Stress? *PLoS ONE*, 8(11), e81172.

Hughes, A. D., Grottoli, A. G., Pease, T. K., & Matsui, Y. (2010). Acquisition and assimilation of carbon in non-bleached and bleached corals. *Marine Ecology Progress Series*-, 420, 91–101.

Leal, M. C., Ferrier-Pages, C., Calado, R., Brandes, J. A., Frischer, M. E., & Nejstgaard, J.C. (2014). Trophic ecology of the facultative symbiotic coral *Oculina arbuscula*. *Marine Ecology-Progress Series*-, 504, 171–179.

Levas, S. J., Grottoli, A. G., Hughes, A., Osburn, C. L., & Matsui, Y. (2013). Physiological and Biogeochemical Traits of Bleaching and Recovery in the Mounding Species of

Coral *Porites lobata*: Implications for Resilience in Mounding Corals. PLoS ONE, 8(5), e63267.

Nahon, S., Richoux, N. B., Kolasinski, J., Desmalades, M., Ferrier-Pagès, C., Lecellier, G., et al. (2013). Spatial and Temporal Variations in Stable Carbon ($\delta^{13}\text{C}$) and Nitrogen ($\delta^{15}\text{N}$) Isotopic Composition of Symbiotic Scleractinian Corals. PLoS ONE, 8(12), e81247.

Rodrigues, L., & Grottoli, A. G. (2007). Energy reserves and metabolism as indicators of coral recovery from bleaching. *Limnology and Oceanography*, 52(5), 1874–1882.

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.
- A request to the National Marine Fisheries Service (NMFS) for Section 7 informal consultation coverage pursuant to the Endangered Species Act of 1973 is underway to have the proposed activities considered under PMNM's programmatic Section 7 informal consultation (Letter of concurrence dated 13 April 2015). The outcome of this request may require the applicant to adhere to other NMFS-prescribed conditions. Such conditions would be reflected in the PMNM permit, prior to issuance.
- 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 PAPAHAŌNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO CHRISTOPHER WALL, HAWAII INSTITUTE OF MARINE BIOLOGY, UNIVERSITY OF HAWAII, FOR ACCESS TO STATE WATERS TO CONDUCT CORAL BLEACHING ASSESSMENT ACTIVITIES UNDER PERMIT PMNM-2015-016.")

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

If so, please summarize past permits:

However, past permits have been awarded for similar requests:

- 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).
- Similar activities have been conducted by Dr. Courtney Couch in 2014 (PMNM-2014-012 and approved permit PMNM-2015-013)

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

PMNM staff is of the opinion that the Applicant has 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

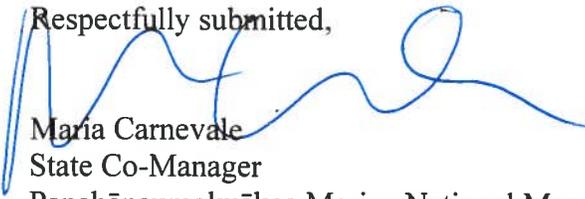
The MMB is of the opinion that the Applicant has met the findings of Presidential Proclamation 8031 and this activity may be conducted subject to completion of all compliance requirements. The MMB concurs with the special conditions recommended by PMNM staff.

RECOMMENDATION:

That the Board authorize and approve a Research Permit to Christopher Wall, Hawai'i Institute of Marine Biology, University of Hawai'i, with the following special conditions:

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 permittee provide, to the best extant possible, a summary of their Monument access, including, but not limited to, any initial findings, to the DLNR for use at educational institutions and outreach events.
4. 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.
5. 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.
6. 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.
7. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.
8. 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,


Maria Carnevale
State Co-Manager

Papahānaumokuākea Marine National Monument

APPROVED FOR SUBMITTAL


SUZANNE CASE

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: Christopher Wall

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

Permit Category: Research

Proposed Activity Dates: May 1st - December 31st, 2015 (specific dates TBD)

Proposed Method of Entry (Vessel/Plane): R/V Hi'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 Christopher Wall, Dr. Courtney Couch, two TBD UH Manoa Scientific Divers (* no more than 3 divers will enter the Monument at a time for the purpose of this research plan).

Estimated number of days in the Monument: 30

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...

assess the bleaching recovery in reef corals from shallow-water reefs throughout the Papahānaumokuākea Marine National Monument. In 2014, extensive and severe coral bleaching occurred across PMNM and the Main Hawaiian Islands. Dr. Courtney Couch and NOAA documented this bleaching event by recording the extent of bleaching along randomly selected sites (RAMP) and permanent transects in PMNM. To better understand how high temperature stress affected bleaching susceptibility and recovery of corals from the physiological to community scale, we propose to use non-destructive field ecology and minimally invasive sampling. This analysis will reveal the coral taxa most vulnerable and resilient to coral bleaching and identify physiological factors contributing to bleaching resilience across reef habitats. Further, these data will contribute valuable baseline data for coral health and bleaching recovery in the PMNM.

b.) To accomplish this activity we would

conduct ecological surveys by SCUBA on shallow-water reefs to determine whether changes in coral cover and species diversity at each site and reef habitat can be attributed to the 2014 bleaching. In August and September 2014, bleaching prevalence and severity, as well as benthic community structure (e.g. % cover of benthic taxa), were quantified in PMNM along permanent transects at French Frigate Shoals, Lisianski Island, Midway Atoll, and Pearl and Hermes Atoll. In 2015, we will visit the sites sampled in 2014 to assess post-bleaching recovery using field ecology methods employed in 2014 (i.e., photographs, transects, video). These data will be leveraged with bleaching information collected in 2014 to determine the impacts of bleaching on the PMNM reef coral community. Additionally, we will examine the physiological basis for coral bleaching recovery to test for site-specific traits conferring resilience to bleaching using the coral *Montipora* spp. as a model organism. Physiological assessments will include: examining the diversity of the coral's symbiotic alga community, and the nutritional and energetic status of coral biomass in small fragments (<4cm² fragment). *Montipora* spp. is abundant across the Hawaiian archipelago and has been shown to be sensitive to bleaching stress, therefore this coral taxa is an ideal system to explore the dynamics of bleaching and recovery in the PMNM.

c.) This activity would help the Monument by ...
examining the ecological outcomes of coral bleaching on Papahānaumokuākea Marine National Monument reef coral communities; identifying reef habitats and coral taxa resilient to bleaching stress; and examining the physiological characteristics conferring resilience to bleaching. This study provides the ideal opportunity to implement the PMNM Climate Change Action Plan by developing a monitoring strategy to survey climate change impacts within the Monument and directly builds from previous PMNM research (PMNM-2014-012 Couch). Through this study, we will augment the invaluable ecological baseline data and conduct the first study on the physiological outcomes of bleaching in the Monument. As a result of anthropogenic climate change, the frequency and magnitude of coral bleaching is expected to increase over the course of this century. Therefore, evaluating the impacts of climate change and bleaching on corals within the PMNM is imperative for the long-term management of this valuable ecosystem.

Other information or background:

In order to understand and manage for the impacts of climate change on marine ecosystems, particularly within marine sanctuaries, long-term monitoring is needed to address the impacts of ocean warming on coral reefs and identify factors contributing to bleaching resistance and recovery. Coral bleaching has contributed to declining coral abundance worldwide and is a leading cause of coral mortality. Ocean warming and climate change is predicted to increase the frequency and magnitude of bleaching events. Since 2002, three widespread bleaching events have occurred in PMNM with 2014 being the most extensive and severe bleaching to date, suggesting that ocean warming is already affecting the remote islands of PMNM. While ecological studies provide invaluable information on the communities-level responses of reef corals to

these events, coral physiological assessments provide insight into the underlying mechanisms driving these larger-scale patterns in bleaching response. Lipid biomass and heterotrophic nutrition associate with bleaching resilience. Therefore identifying environmental factors supporting alternative sources of nutrition (e.g., lipid biosynthesis, heterotrophy) will provide insight into bleaching susceptibility and recovery. This research will directly address the science needs specified by the Office of Marine Sanctuaries for the PMNM by determining the ecological impacts of an archipelagic-bleaching event. Additionally, this research will contribute to effective management strategies in the PMNM and other global reef systems by (1) identifying factors affecting bleaching and bleaching recovery and (2) enabling resource managers to identify reef systems resilient or vulnerable to climate change stress in order to support science- and ecosystem-based management in Hawai'i.

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Wall, Christopher B.

Title: Ph.D. student, UH Manoa, HIMB

1a. Intended field Principal Investigator (See instructions for more information):
Christopher B. Wall

2. Mailing address (street/P.O. box, city, state, country, zip): 3285 Pinaoula St., Honolulu, HI 96822

Phone: 214-499-4238

Fax: none

Email: cbwall@hawaii.edu

For students, major professor's name, telephone and email address: Dr. Ruth Gates, (808) 236-7420, rgates@hawaii.edu

3. Affiliation (institution/agency/organization directly related to the proposed project):
HIMB, UH Manoa

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. Christopher B. Wall, Research Diver & PI, Ph.D. student UH Manoa/HIMB
2. Dr. Courtney Couch, Research Diver & Co-PI, Postdoc at UH Manoa/HIMB
3. TBD Diver (UH Manoa/HIMB)
4. TBD Diver (UH Manoa/HIMB)

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 utilize qualitative field ecological assessments of coral bleaching and bleaching recovery on shallow-water reefs throughout the Papahānaumokuākea Marine National Monument. The significance of this work is two-fold: (1) understanding bleaching recovery in PMNM is essential for managing for the impacts of climate change on the pristine ecosystem of the Monument, specifically, the extent to which these reefs are resilient to increased ocean warming; (2) providing baseline data for coral-symbiont assemblages across atolls/islands and habitats; (3) identifying those species resilient to ocean warming and the physiological characteristics that contribute to coral resilience to environmental stress using the coral *Montipora* spp. as a model organism. Corals are the "ecosystem engineers" of tropical reef systems, central to the construction of reef substrate, providing habitat for a multitude of marine species, and serve as energy transformers taking light energy to produce oxygen and dissolved materials critical to reef ecosystem food webs. Therefore, the health of the coral communities directly affects the health of the reef ecosystem as a whole. Climate change is a leading threat to reef corals, and as global changes progresses it is important to study the impacts environmental stress on the reefs of PMNM to determine which reefs and species will be most vulnerable. As one of the world's few 'near-pristine' coral reef ecosystems, PMNM provides an invaluable system against which to compare regions with high levels of anthropogenic stress. Additionally, as physical conditions and seasonal variance vary across regions of PMNM, it is important for resource managers to have detail on the spatial variance of stress susceptibility and bleaching recovery across PMNM. This will aid in identification of areas threatened by bleaching stress, and conversely, those reefs or habitats more resilient to environmental stress. The proposed methods in this permit will complement and improve upon the current assessments of coral health that utilize permanent survey sites (PMNM-2014-012 Couch) by repeatedly surveying colonies and providing a framework for future studies. Furthermore, continuing these surveys over time will equip managers with the ability to track episodes of coral bleaching within the Monument, and compare bleaching and bleaching recovery in a future of more frequent climate change-driven bleaching events.

*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. We respect the natural and cultural resources around coral reefs and recognize the immense importance of these ecosystems to indigenous peoples. In this work, we will actively employ every precautionary measure to minimize impacts of fieldwork on the reefs of the Monument. We have carefully designed our study to retain a robust scientific nature with minimal collection requirements, and have opted for non-invasive methods when possible. Results produced from this work will be useful for scientists and managers and will contribute to the conservation efforts of the Monument and other reef systems worldwide. 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. No 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 archaeological sites are encountered, Global Positioning System (GPS) coordinates for the sites as well as a general description will be taken and provided to Monument staff.

Field Surveys (Permanent transects):

Surveys in 2015 will return to permanent reef transects sampled in 2014; permanent transects were established by Dr. Jim Maragos, NOAA's CRED and Dr. Courtney Couch. Analysis of coral community bleaching (2014), recovery (2015), and the ecological outcomes of bleaching (changes in % coral cover or % species abundance) is performed using transect tape and photographs. This methodology relies on pre-existing pins and affords the diver very limited contact with the benthos, with the exception of deployment of transect tape, and leaves virtually no trace of the divers presence. 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. I have experience performing field ecological surveys using SCUBA and have surveyed reefs in Hawai'i (O'ahu and

Hawai'i Island) and internationally (Taiwan; Mo'orea French Polynesia). The co-PI on this project (Dr. Courtney Couch) also has substantial experience conducting surveys in this manner and has visited the Monument previously to conduct these surveys. All divers are adequately trained (please see diver qualification descriptions in Question #7-F) in benthic surveys by SCUBA.

Coral Sample Collection:

The sampling of coral tissue will be minimal and will not affect the health of the coral colony as a whole. Bleaching in 2014 was characterized at Midway Atoll, Pearl and Hermes Atoll, Lisianski Island, and French Frigate Shoals at 2 depths [shallow (0-30') and moderate (31-60')], 2 reef habitats (backreef and forereef), along 2-3 transects within each depth and habitat. During 2014, *Montipora* spp. was most severely affected by bleaching across all sampled locations. In 2015, we will use *Montipora* spp. to assess factors contributing to bleaching recovery and susceptibility; *Montipora* spp. was selected as a model organism to examine post-bleaching recovery and resilience due to its wide range across the Hawaiian archipelago, abundance in PMNM, and high sensitivity to bleaching stress. Our research plan will consist of collection of 20 4cm² fragments of *Montipora* spp. (which could include *M.captitata*, *M.patula*, *M.turgescens/dilatata*, *M.flabellata*) at each depth and habitat (no more than 20/site), for a total sampling effort of 80 fragments collected at each island/atoll (total area equal to 0.03m²) and no more than a total of 400 fragments, equalling a total sampling area of 0.16m² across the entire Monument (>1000km). These samples will be judiciously collected by carefully removing an apical region of individual plating *Montipora* spp. colonies using metal clippers, hammer and chisel. Collections of this nature are common in coral biology, and can be made without causing damage or mortality risk to the coral colony. The apical regions of corals are the sites of most active growth, and these areas are fastest to recover relative to central regions of the animal. Both Dr. Couch and I have extensive experience in coral sampling and marine ecology. Samples will immediately be placed in whirl pak bags and transported to the surface, where they will be placed in a cooler filled with ice. Once we return to the wetlab on the Hi'ialakai, we will remove a small fragment (~0.5cm²) from the sample and place it into DNA extraction buffer (see MSDS for details), which will be placed in an airtight container and stored in the wetlab freezer until we return to Honolulu. At no time will chemicals be released into the Monument. At no point will any live tissue be transported between sites or released back into the marine environment.

Returning to Midway Atoll, Pearl and Hermes Atoll, Lisianski Island, and French Frigate Shoals is dependent upon the logistical support of NOAA and the planned research objectives set forth by NOAA lead scientists. Therefore, we are requesting sampling from the entirety of the Monument in order to plan for uncertainty in the ultimate destination of the research voyage. However, we anticipate the sampling design to be fixed, with the objective of sampling bleaching recovery across habitats in the three regions of the Monument (northern, central, southern).

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'ialakai. 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, and on cultural sensitivities associated with the proposed activities and locations. Our research team is aware of the unique ecological status of the Monument, and this briefing reminds all members of the cultural significance of this 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 coral reef marine life of Papahānaumokuākea Marine National Monument 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. The significance of this work will contribute to the management of the Monument and will provide information on the health of these ecosystems following an unprecedented archipelagic bleaching event in 2014. 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". The genealogical chant, Kumulipo, describes the first life form created was the coral polyp, therefore reef corals hold an important place in Hawaiian culture, as well as in the reef ecosystems that bare their name. This Kumulipo 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. Climate change is a threat to all coral ecosystems; regardless of the protection afforded them, all coral reefs will be impacted by climate change. Therefore, we must manage for climate change effects in the hopes of mitigating these impacts on reef corals. In recognition of this threat, PMNM is in the final stages of implementing a Climate Change Action Plan that will improve the management of PMNM's ecological and cultural resources in the face of climate change. Determining the resilience of reefs to environmental stress is an important step in advancing the objective of understanding the impacts of climate change on the Monument. Due to their profound ecological and cultural importance, it is imperative that we work to conserve and protect Hawaiian corals. This research plan will contribute to the effective management of the Monument and predicting how PMNM reefs are affected--and more importantly how reefs recover--from environmental stress and climate change. Our goal is to collect data on the health and structure of coral communities in order to monitor and protect these organisms. Hawaiian corals are regarded 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 resilience and vulnerability to environmental stress. 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. Our proposed research plan will provide valuable baseline data on physiological metrics that contribute to bleaching tolerance and recovery (e.g., lipid biomass, symbiont genotype), and will work in combination with field ecology to better understand the ecological outcomes of bleaching in PMNM. These results will allow managers to identify sites of concern, for instance, where coral bleaching was severe and recovery was low. Our proposed methods directly complement the annual Reef Assessment and Monitoring Program (RAMP) by providing supplemental data on coral health, bleaching, and coral ecology within the standardized monitoring program for future surveys. Additionally, this dataset can be leveraged in future reef assessments and will contribute to an understanding of the effects of ocean warming within the Monument. To date, few studies have examined bleaching recovery in the PMNM and little information exists on coral reef resilience following bleaching in the PMNM, with the exception of general characteristics of dominant coral taxa from other regions. Therefore, this research plan will provide the first account of valuable physiological and ecological data for bleaching recovery, as well as the factors contributing the physiological resilience of corals across spatial scales. This data is urgently needed and has the potential to significantly contribute to the management and protection of the PMNM ecosystem.

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.

In order to understand how the corals of the Monument are affected by climate change, we must conduct research on the corals from these unique habitats. To accomplish this, the most care and respect must be afforded to these unique and pristine habitats.

Therefore, sampling efforts must balance a rigorous design and judicious, well-thought out sampling plan. In this research plan the majority of activities are non-invasive and

will contribute to the understanding of reef recovery and resilience following a widespread bleaching event. The biological sampling will be performed to couple the ecological outcomes--both the extent of bleaching and bleaching recovery--with coral physiology to evaluate biological mechanisms contributing to bleaching and recovery. It is important that these research activities be conducted and will provide useful data for monitoring and assessing coral health within the Monument. There is no practical alternative as the goal is to develop a robust dataset pertaining to coral health dynamics within the Monument itself. However, the dataset from this research plan will be used to its full potential and archived for longevity and historical reference. Furthermore, findings of this study will be used to formulate hypotheses regarding bleaching recovery that will be experimentally tested by myself at HIMB using corals collected from reefs across O'ahu. Our proposed survey methodology will complement and enhance the current coral health data being collected in the Monument, and contribute to the knowledge of the physiology of reef corals across this unique ecosystem.

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

The sampling outlined in this research plan is informative for the management and conservation of coral reefs within the Monument and is vital in our understanding of the ecological and physiological outcomes of environmental stress in the Monument. For instance, three bleaching events have been recorded in the Monument since 2002, and the reefs of the northern and central region of Monument are consistently most severely bleached. While this may represent physical factors, including high temperature water retained in these areas due to stratification of seawater, it is uncertain whether these corals show any physiological signs of acclimation to increased frequency of thermal stress, or if there is a physiological or genetic basis for the vulnerability of these reefs to thermal stress. Further, the dynamics of bleaching recovery are not well described, specifically: what environmental conditions favor bleaching recovery, and what determines the physiological mechanisms used by corals to recover from bleaching? Results from this research will inform these important aspects of coral ecology and physiology. The sampling outlined in this research plan relies heavily on non-invasive metrics of assessing the coral community. Also, the research offers a unique chance to evaluate coral recovery along permanent transects where long term data collected by NOAA and CRED has already been obtained. Ecological sampling and biological sampling will be collected with minimal impact on the reefs of the Monument, and no coral colonies will be adversely affected by the actions detailed in this research plan. Protection, management, and kokua for the reefs of Hawai'i and the PMNM is a central theme to the research of Dr. Couch and myself, and we will respect the cultural value of this habitat at all times.

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.

Dr. Couch and I have extensive experience working on coral reefs in the field and in the laboratory, and we share a long history of conducting coral health surveys throughout Hawai'i and reefs around the world. Beyond our professional expertise and training as coral scientists, we have a deep respect and kokua for coral reefs and appreciate the value of these cultural resources to indigenous cultures, especially here in Hawai'i. Separately, our work has resulted in many peer-reviewed scientific publications, and presentations of our research has been exhibited at scientific conferences, community events, educational outreach activities, and the Monument Management Board (MMB)

Dr. Courtney Couch is a postdoctoral research fellow at the Hawaii Institute of Marine Biology. She is co-funded by NOAA/PMNM and The Nature Conservancy and tasked with standardizing coral health and disease monitoring across the Indo-Pacific, addressing the role of land-based pollution in coral health in Hawai'i, and building a capacity with marine resource managers to address coral disease. She has a decade of scientific diving experience, is a NAUI Rescue Diver with Nitrox certifications, a member of the American Academy of Underwater Sciences and an active UH Manoa Lead Scientific Diver. She was also the lead diver on a 3-year coral health disease project on Hawai'i Island, a 2-year project in Indonesia through Cornell University, has conducted coral disease assessments in the Caribbean, Philippines and Indonesia, and has extensive experience in managing and analyzing large datasets. Dr. Couch also led the coral bleaching response in 2014, participated in both the RAMP and Biogeography cruise in 2014 and is familiar with the nuances of working in the PMNM.

Christopher Wall is a Ph.D. student in the Marine Biology Program at the UH Manoa, and performs the majority of his research at the Hawai'i Institute of Marine Biology. Christopher has 18 years of diving experience, and is a certified NAUI Master Diver and Rescue Diver, a member of the American Academy of Underwater Sciences and an active UH Manoa Lead Scientific Diver. Christopher has conducted extensive ecological surveys on the reefs of O'ahu, Hawai'i Island, Mo'orea French Polynesia, and southern Taiwan, and is trained as a coral reef physiological ecologist. He has 5 years experience performing coral physiology assessments, and his masters thesis was on the impacts of ocean warming and ocean acidification on reef corals.

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 Drs. Ruth Gates (HIMB) and Megan Donahue (HIMB) are well funded by several federal and private 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. There are no anticipated deleterious impacts of this work.

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.

Methods employed are designed to produce a robust dataset describing the ecology of reef corals with non-invasive field ecology, including videography, photography, and first-hand observations. Biological sampling has been designed to be minimal in scope while retaining a robust nature adequate to address the scientific questions on bleaching recovery. At no time with these activities compromise the health of these reefs, or the individual corals, and will not impact the cultural or historic resources of these reef. Following the sampling in 2014, returning in 2015 to sample bleaching recovery will allow us to non-invasively evaluate the recovery of these reefs. Building on this dataset, collections for host (animal) and symbiont (animal) analysis will allow for a comparison of observed ecological outcomes with the physiology and genetics of the coral-algal symbiosis. Our methods make use of a large historical dataset of coral reef ecology obtained by NOAA and CRED, and supplementing this with information of organismal biology. The combination of field sampling and biological sampling will contribute to evaluating climate change effects, and recovery from these effects, in a near-pristine coral reef ecosystem. Results from this work will be leveraged with other research projects being undertaken at HIMB addressing bleaching recovery at nine patch reefs at a human-impacted reef in Kāne'ōhe Bay, O'ahu. Results from both projects will advance the understanding of environmental factors contributing to bleaching and recovery and will aid in identifying the physical and biotic factors contributing to coral resilience to climate change.

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 (~10-80ft) chosen for surveys. Divers will deploy three 15-20m 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, bleached area (proportional surface area; if bleaching observed), coral species, percent cover, and dead coral 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 and archived for future use. The analyzed data will be used to determine coral bleaching recovery dynamics across spatial and temporal scales 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:

Rice coral, ringed rice coral, pore coral/blue coral, sandpaper rice coral

Scientific name:

Montipora capitata, Montipora patula, Montipora turgescens/dilatata, Montipora flabellata

& size of specimens:

up to a total of 400 coral fragments, with a maximum fragment size of 4cm² each

Collection location:

a maximum of 80 fragments per island region at up to 5 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 Wall 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 frozen at -20C or preserved in DNA extraction buffer immediately following collection. This will be conducted by placing samples in pre-filled watertight

specimen jars with DNA extraction buffer. 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 Hi'ialakai after field collection and then kept at Dr. Ruth Gates' 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. We will also 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.

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. We will coordinate with Dr. Aeby and NOAA CRED to ensure no sampling interferes with or impacts permanent sampling sites in the Monument. Bleaching surveys will also be conducted alongside the RAMP divers to ensure that the data augment ongoing benthic monitoring efforts and minimize overlap.

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

Coral bleaching surveys: SCUBA gear (BCD, regulator, mask, fins, snorkels, weights, computers, compass, dive knife), slates, rulers, underwater cameras, transect tape.

Coral tissue collection: whirl pak bags, clippers, specimen bottles, air/watertight bins, DNA extraction buffer.

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

Tissue preservation solutions include DNA extraction buffer (50% [w/v] guanidinium isothiocyanate; 50 mmol/L Tris pH 7.6; 10 mmol/L EDTA; 4.2% [w/v] sarkosyl; 2.1% [v/v] b-mercaptoethanol). Tissue preservation for lipid analysis will consist of freezing samples at -20C.

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

No permanent or fixed installations are deemed necessary for this study.

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 anticipate processing of coral samples for algal symbiont DNA to be completed within a few years. We hope to complete several publications and a Ph.D. dissertation utilizing this coral dataset within a few years of data collection.

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

- 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, CS, 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.
- Edmunds PJ, Burgess SC, Putnam HM, Baskett ML, Bramanti L, Fabina NS, Han X, Lesser MP, Wall CB, Yost DM, Gates RD (2014) Evaluating the causal basis of ecological success within the Scleractinia: An integral projection model approach. Marine Biology. DOI: 10.1007/s00227-014-2547-y
- Edmunds PJ, Wall CB (2014) Evidence that high pCO₂ affects protein metabolism in tropical reef corals. Biological Bulletin 227:68-77
- Wall CB, T-Fan, Edmunds PJ (2013) Ocean acidification has no effect on thermal bleaching in the coral *Seriatopora caliendrum*. Coral Reefs 33:119-130
- Wall CB, Edmunds PJ (2013) In situ effects of low pH and elevated HCO₃⁻ on juvenile *Porites* spp. in Moorea, French Polynesia. Biological Bulletin 225:92-101

- Wall CB (2012) Effects of temperature and ocean acidification on juvenile scleractinian corals. MSc Thesis, Dept of Biology, California State University-Northridge

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):

Chris Wall, PI, Diver
Hawai'i Inst of Marine Biology
46-007 Lilipuna Rd, Kāne'ōhe, HI 96744
cbwall@hawaii.edu

Courtney Couch, co-PI, Diver
Hawai'i Inst of Marine Biology
46-007 Lilipuna Rd, Kāne'ōhe, HI 96744
courneyscouch@gmail.com

TBD Diver

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

The following site will be visited during the summer NOAA RAMP cruise: French Frigate Shoals, Maro, Pearl and Hermes, Kure, Midway, Lisianski, Laysan. Sampling will take place at permanent transects established on the aforementioned islands and atolls depending on weather conditions and feasibility of sampling as specified in the permit application.

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

Chris Wall is included on the SAP-2015-17 permit granted by the State of Hawai'i Department of Land and Natural Resources to study the response of corals to ocean warming and acidification within Kāne'ōhe Bay, O'ahu.
Courtney Couch was included on a previous Monument research permit in 2014 and has a permit application currently in review for 2015.

3a. 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. None

4. Funding sources (Attach copies of your budget, specific to proposed activities under this permit and include funding sources. See instructions for more information): C. Wall: assorted graduate research grants awarded through the Zoology Department of UH Manoa and the Graduate Division Office (~\$7000)

5. Time frame:

Activity start: July 27 2015

Activity completion: August 25 2015

Dates actively inside the Monument:

From: July 28 2015

To: August 21 2015

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

Dates have been confirmed by NOAA, however these may be subject to slight modification depending on extraordinary circumstances.

Personnel schedule in the Monument:

Diving and performing field research as a part of the NOAA RAMP cruise.

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 dives carry DAN Divers insurance and carry insurance through the University of Hawai'i that will cover any emergency or diving related injury sustained while working in the Monument.

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

- Vessel
 Aircraft

Provide Vessel and Aircraft information: NOAA 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 (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#:

* 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:

DAVID Y. IGE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

SUZANNE CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

KEKOA KALUHIWA
FIRST DEPUTY

W. ROY HARDY

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
KAIHOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

July 10, 2015

TO: Division of Aquatic Resources File

THROUGH: Suzanne Case, Chairperson

FROM: Maria Carnevale
Papahānaumokuākea Marine National Monument

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 CHRISTOPHER WALL, HAWAII INSTITUTE OF MARINE BIOLOGY, UNIVERSITY OF HAWAII, FOR ACCESS TO STATE WATERS TO CONDUCT CORAL BLEACHING ASSESSMENT ACTIVITIES UNDER PERMIT PMNM-2015-016

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 Christopher Wall, Hawaii Institute of Marine Biology, University of Hawaii, for Access to State Waters to Conduct Coral Bleaching Assessment Activities.

Permit Number: PMNM-2015-016

Project Description:

The research permit, as described below, would allow entry and activities to occur in Papahānaumokuākea Marine National Monument, including the NWHI State waters from July 15, 2015 through July 14, 2016.

The proposed project would be supported by the NOAA ship HI'IALAKAI (PMNM-2015-006). Three (3) divers would perform surveys, though four (4) people would be covered under this permit.

The proposed project would assess the bleaching recovery of reef corals on shallow-water reefs throughout the Monument. This analysis will reveal the coral taxa most vulnerable and resilient to coral bleaching, after the most recent 2014 bleaching event, and identify physiological factors contributing to bleaching resilience across reef habitats. Further, these data will contribute valuable baseline data for coral health and bleaching recovery in the PMNM. Conclusions can be

disseminated broadly to other marine resource managers that are also experiencing climate change impacts.

To fulfill these objectives, the Applicant proposes to perform video and photographic surveys using SCUBA on shallow-water coral reefs (10 to 80 ft) throughout the Monument on transect lines in order to create digital reconstructions of the habitat. Transect locations will be established by utilizing a random stratified sampling design in order to objectively survey all study sites. The analyzed data will be used to determine coral bleaching recovery dynamics across spatial and temporal scales for all surveyed reefs within the Monument.

The applicant proposes to conduct activities consisting of: reef assessment monitoring using non-invasive transects; in situ still and video photography; swimming, snorkeling and SCUBA diving, seawater collection, sediment collection, plankton collection, touching living or dead coral, collecting filter-feeding invertebrates and epibionts, and collecting samples of *Montipora spp.* corals. Up to 20 L per location (includes all Special Preservation Areas (SPAs) and the Midway Atoll Special Management Area (MASMA), but no more than 100L of seawater will be collected. Sediment samples will consist of 10ml of the upper 1cm of sediment adjacent to sampled corals and total no more than 1L. Plankton samples will be obtained from 20 vertical plankton tows (two (2) per island area). A maximum of 80 fragments per location (all SPAs and MASMA), but no more than 400 fragments of *Montipora spp.* coral fragments of a maximum size of 4 cm² total would be sampled from colonies greater than 20 cm in diameter. *Montipora spp.* coral samples may include the following species: *M. capitata*, *M. patula*, *M. turgenscens/ dilatata*, and *M. flabellata*). No more than 15 filter-feeding invertebrates and epibionts greater than 2 cm in size per location (all SPAs and MASMA), but a maximum of 50 across PMNM would be collected. Filter-feeding invertebrate and epibiont species sampled may include the following genus: *Litophaga*, *Arca*, *Isognomon*, *Spondylus*, *Serpulorbis* and *Dendropoma*. Collected samples would be shared with other HIMB researchers and scientists.

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: Hawai'i Division of Aquatic Resources, Hawai'i 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 February 18, 2015 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.

See Tables 1-3 for a list activities potentially occurring at the same time as the proposed permit. At this time, no other concurrent activities are known. The culmination of this permit is not anticipated to have significant cumulative impacts. Three projects aboard the HI‘IALAKAI will involve coral-related research, however, each applicant has a different emphasis. Godwin (PMNM-2015-012) will be conducting the annual Reef Assessment and Monitoring Program (RAMP) activities while Couch (PMNM-2015-013) will be focusing on coral health and community structure. The Applicant’s proposed permit does not overlap or contribute to a cumulative impact of these research projects.

Table 1: Concurrent projects aboard NOAA Ship HI‘IALAKAI

Permit	Purpose and scope	Location
PMNM-2015-006 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-2015-012 Godwin (proposed)	This proposed action would be to conduct Reef Assessment and Monitoring Program (RAMP) activities	All locations
PMNM-2015-015 Gleason (proposed)	This proposed action would be to conduct maritime heritage activities in the NWHI	All locations
PMNM-2015-013 Couch (proposed)	This proposed action would be to conduct coral health and structure assessment activities in the NWHI	All locations

Table 2: Concurrent projects about NOAA ship SETTE

Permit	Purpose and scope	Location
PMNM-2014-005 Koes SETTE (approved)	This permit allows the NOAA SETTE entry into the Monument. Personnel aboard the vessel would be permitted under separate permits	All locations
PMNM-2014-001 Co-Trustee (approved)	This permit allows monk seal field camp operations with activities from June - September 2014.	French Frigate Shoals, Lisianski Island, Pearl and Hermes Atoll, Midway Atoll, Kure Atoll

Table 3: Concurrent projects aboard NOAA Ship OKEANOS

Permit	Purpose and scope	Location
PMNM-2015-025 Wetzler OKEANOS (proposed)	The permit would allow NOAA Ship OKEANOS into the Monument to support separately permitted activities	All locations
PMNM-2015-018 Elliott (proposed)	The proposed action would conduct bathymetric mapping activities to characterize deepwater areas and coral communities	Nihoa, Mokumanamana, French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan, Lisianski and Neva Shoal, Pearl and Hermes

The proposed activities would, in part, be a continuation of a previously permitted projects. Similar coral health, biodiversity monitoring, and bleaching documentation activities have also been permitted and performed within the NWHI. Past permitted projects including similar collections and techniques have shown no adverse impacts and 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-2015-006). The activities proposed by the Applicant are similar to those currently approved for Couch (PMNM-2015-013) and Godwin (PMNM-2015-012) which will also be supported by HI‘IALAKAI. Couch’s proposed activities involve coral health and community structure monitoring and will be a collaborative effort with the Applicant as they are both working through the Hawai‘i Institute of Marine Biology. Godwin’s proposed activities will center on reef assessment and monitoring activities.

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.

Suzanne Case
Board of Land and Natural Resources

Date