

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

June 8, 2012

Board of Land
and Natural Resources
Honolulu, Hawaii

Request for Authorization and Approval to Issue a Papahānaumokuākea Marine National Monument Research Permit to Dr. Florence Thomas, Associate Researcher, University of Hawaii, Hawaii Institute of Marine Biology, for Access to State Waters to Conduct Coral Reef Environmental Assessment and Monitoring Research Activities

The Division of Aquatic Resources (DAR) hereby submits a request for your authorization and approval for issuance of a Papahānaumokuākea Marine National Monument research permit to Dr. Florence Thomas, Associate Researcher, University of Hawaii, Hawaii Institute of Marine Biology, pursuant to § 187A-6, Hawaii Revised Statutes (HRS), Chapter 13-60.5, Hawaii Administrative Rules (HAR), and all other applicable laws and regulations.

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

- Nihoa Island
- Necker Island
- French Frigate Shoals
- Gardner Pinnacles
- Maro Reef
- Laysan Island
- Lisianski Island
- Pearl and Hermes Atoll
- Kure Atoll

The activities covered under this permit would occur between July 1, 2012 and June 30, 2013.

INTENDED ACTIVITIES

The Applicant proposes to deploy an array of *in situ* environmental sensors to measure habitat variability at ecologically-relevant temporal and spatial scales. The purpose of these collections is to understand how coral reefs in the NWHI will experience changes in physical parameters caused by global climate change. The rate of growth and degradation of coral reefs, both determining factors in resilience of reefs in the face of climate change, are tightly coupled to environmental parameters and stressors such as temperature, light and nutrient loading. Thus, the applicant intends to use these sensors to collect environmental data close to the reef itself, which would develop a baseline for understanding how physical parameters at this spatial scale will

change over time under climate change. Further, the applicant will use the data and compare it to larger scales of variability detected by ocean buoys. This cross-spectral and cross-correlation analysis would provide information on how small scale variation at the reef itself compares to larger scale variation measured by the buoys, and allow Monument managers to determine how oceanic changes in the physical environment are translated to variation at the organism's scale. Data obtained from this activity would also be coupled with existing research on bioerosion rates and community composition, to better quantify ecosystem changes.

To carry out these activities, the applicant proposes to use SCUBA to deploy six (6) sensor packages. Of these sensors, two would be larger (80 cm x 35 cm; see photo in application, Item F-5a) and used to record temperature, conductivity, pressure, pH, and oxygen. The remaining four packages would include a bundled temperature logger, O₂ and pH logger in each, less than 30 cm in length. Five of the sensor packages would be deployed at one atoll system (preferably French Frigate Shoals), and they would like to deploy one sensor package at one additional atoll system if possible. All packages would be deployed at depths of less than 60 feet, and would not be on or near live coral. The applicant intends to attach the sensors near or to existing CRED sites, but is prepared to use weights and leave them on sandy areas if necessary. Exact locations would be dependent on cruise logistics and would be chosen under the guidance of NOAA Chief Scientists or qualified Monument staff present. The applicant also hopes to deploy sensors near one of the locations used by Dr. Megan Donahue (PMNM-2012-033) for her research to provide the collaborative framework for her bioerosion work. Sensors would be deployed for 1-2 months and then would be retrieved by the Donahue team, no later than the subsequent September NOAA ship HI'IALAKAI cruise.

The activities proposed by the Applicant directly support the Monument Management Plan's priority management needs 3.1 – Understanding and Interpreting the NWHI (through action plan 3.1.1 – Marine Conservation Science).

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

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

REVIEW PROCESS:

The permit application was sent out for review and comment to the following scientific and cultural entities: Hawaii Division of Aquatic Resources, Hawaii Division of Forestry and Wildlife, Papahānaumokuākea Marine National Monument (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO), United States Fish and Wildlife Service Hawaiian and Pacific Islands National Wildlife Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application has been posted on the Monument Web site since April 16th, 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 and addressed by the Applicant.

1. *How many sensor packages would be deployed in total?*

The applicant responds that there would be 5 packages in total: 2 YSI 600XLM Sondes with temperature, conductivity, pressure, ph, and oxygen, and then 3 packages containing a temperature logger O2 and a pH logger. In addition, if possible they would like to deploy one sensor group (Temp, O2, pH) on any other atoll (associated with a CRED site or CAU) to capture variance at larger scales. This additional sensor suite is not necessary but would provide added information.

2. *Please clarify what is meant by “standalone sensors” and “suite of sensors”?*

The applicant explains that standalone sensors are the small loggers that record only one parameter (temperature, O2 or pH). By “suite of sensors” they mean a bundle of different sensors, particularly one including one of the Multiparametric sondes. The standalone sensors are similar to the ones on this web page (<http://www.rbr-global.com/products/sm-dual-channel-loggers/temperature-a-dissolved-oxygen-rbrduo-tdo>). They measure 26 cm x 6 cm. The applicant realizes that their language may have been confusing. Standalone sensors could be deployed separately as for single parameters. Their intent is to bundle them when they have enough to form a suite. In some cases they would only deploy a single sensor because they do not have enough to form a suite in all locations.

3. *Please confirm that the applicant is intending to deploy sensors at one atoll system.*

The applicant states that their primary goal is to deploy 5 sensor packages at one Atoll (“location” in the permit application- preferably FFS). If possible, however they think a great deal of information could be gained by deploying one additional sensor or suite at any other Atoll to get a baseline for regional variation. This additional sensor package would contain only a Temp, O2 or pH sensor or a bundle of the 3 if they are able to purchase them by cruise time.

4. *Where will the sensors be located, and are all sensors or sensor packages identical to the picture on page 9 of the application?*

The applicant responds that Yes, all sensor packages would be identical to the picture, except that the suite of sensors would not include the ADV (3 pronged device) placed vertically in the frame. They plan to deploy the sensors close to CRED sites to assist in finding them and limiting new impact.

Additionally, the sensors would be located either on top of dead substrate or in a nearby sand-channel. The small single parameter loggers (pH and O2 sensors) would also be tied to a CAU along with the weights. Those sensors not tied to a CAU would have a small, painted, subsurface buoy attached to it-to ensure that they can find and remove these sensors.

5. *Please describe the weights that would be used to deploy the “small standalone sensors” (page 13).*

The applicant states that they would use common diving lead weight, of 2 lbs. to 6 lbs., attached to the sensors by cable ties and hose clamps.

6. *What precautions or steps would be taken to ensure that these “sensors” are held in place over a 1-2 month proposed duration?*

The applicant reports that sensors would be attached independently to at least 2 weights. The amount of weight for each sensor would be more than sufficient to hold them in place in all but very extreme meteorological conditions. Wherever existing structures from ongoing monitoring projects exist, the sensors would also be attached to them for extra security. The loggers would be tied to each other and to a dead piece of the substrate or a CAU if available. They believe that this should alleviate any loss of sensors and reduce any chance that they could break loose in a storm.

7. *How close would these sensors be to live coral?*

The applicant states that they would deploy the sensors in sandy areas or on top of dead coral, never near live coral.

8. *Is it possible to ensure the sensor packages are secured to the bottom (e.g. via sand screws) in the absence of another artificial structure to anchor them to, in order to minimize the potential for these items to move around on the substrate?*

The applicant thanks the reviewers for this suggestion, and responds that they have never used sand screws but would bring sand screws and would use them when necessary.

9. *We appreciate her effort and her intentions for her researchers to “reflect on the importance of the site they are being given the privilege to enter and will be asked to develop their own offering and spiritual reflection on the importance of Papahānaumokuākea. In respect for the importance of ritual we will gather on the ship deck for each person to offer his or her own vision for reflection.” Her intentions are well placed. We hope that her researchers will make at least the same, respectful effort. Furthermore, because natural resources are cultural resources, and with her intentions to learn more about those resources in order to better protect them, without damaging them in the process; these steps actually make her proposed activities have a potential positive effect on the sacred natural and cultural resources of Papahānaumokuākea.*

The applicant responds that this is understood and thanks the reviewer.

10. *Please list the number of individuals that would be involved in conducting this project. Please note the number of individuals involved in the project would need to be designated in the permit, if approved; with names and roles identified in the Compliance Information Sheet, submitted prior to each entry into the Monument.*

The applicant states that Oscar Guadayol would be the field PI on this project. Sherril Leon Soon would assist him if there is enough berthing. If not, he would work with Scott

Godwin's team. Nyssa Silbiger of the Donahue group would accomplish pick up of the sensors on the following cruise.

11. *Similar to the question above, who on the next cruise is scheduled to retrieve these sensors, if the project is permitted?*

The applicant states that Nyssa Silbiger and Megan Donahue are their collaborators on this project; Nyssa or her alternate would pick up the sensors on the next cruise.

12. *Request that the PI work with FWS on-island staff to develop non-technical year-round monitoring methods at FFS. Also recommend the PI work with current USGS climate change staff (e.g. Michelle Reynolds staff) to ensure that data collected is effective for seabird and ecosystem modeling.*

The applicant thanks the reviewer for this suggestion, and says that they are very interested in helping to develop long term monitoring and in understanding impacts of birds. The applicant states that she will contact Michelle and see if their data can be used in their program.

13. *Request additional information on what insurance they have to mitigate any potential impacts resulting from this activity (Question 7g).*

The applicant responds that they are taking every precaution to ensure that these sensors would have no impact on the environment. Their plan is to use existing monitoring structures where possible, attach all sensors to weights exceeding that needed to keep the sensors in place and attach sensors to either sand screws or dead objects to ensure the sensors cannot break off and move around the environment.

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

Cultural reviews support the acceptance of this application.

Comments received from the public are summarized as follows:

No comments were received from the public on this application.

Additional reviews and permit history:

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

If so, please list or explain:

- The proposed activities are in compliance with the National Environmental Policy Act.
- A Section 7 ESA consultation has been initiated and is in process.
- 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 PAPA HANAUMOKU AKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR.

FLORENCE THOMAS, ASSOCIATE RESEARCHER, UNIVERSITY OF HAWAII, HAWAII INSTITUTE OF MARINE BIOLOGY, FOR ACCESS TO STATE WATERS TO CONDUCT CORAL REEF ENVIRONMENTAL ASSESSMENT AND MONITORING RESEARCH ACTIVITIES UNDER PERMIT PMNM-2012-032")

Has Applicant been granted a permit from the State in the past? Yes No
If so, please summarize past permits:

- The applicant was granted permit PMNM-2011-027 to conduct nutrient productivity research activities.

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

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

STAFF OPINION

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

MONUMENT MANAGEMENT BOARD OPINION

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

RECOMMENDATION

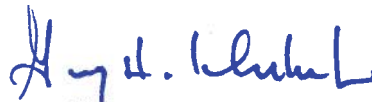
Based on the attached proposed declaration of exemption prepared by the department after consultation with and advice of those having jurisdiction and expertise for the proposed permit actions:

1. That the Board declare that the actions which are anticipated to be undertaken under this permit will have little or no significant effect on the environment and is therefore exempt from the preparation of an environmental assessment.
2. Upon the finding and adoption of the department's analysis by the Board, that the Board delegate and authorize the Chairperson to sign the declaration of exemption for purposes of recordkeeping requirements of Chapter 343, HRS, and Chapter 11-200, HAR.

3. That the Board authorize and approve a Research Permit to Dr. Florence Thomas, Associate Researcher, University of Hawaii, Hawaii Institute of Marine Biology, with the following special conditions:

- a. This permit is not to be used for nor does it authorize the sale of collected organisms. Under this permit, the authorized activities must be for noncommercial purposes not involving the use or sale of any organism, by-products, or materials collected within the Monument for obtaining patent or intellectual property rights.
- b. The permittee may not convey, transfer, or distribute, in any fashion (including, but not limited to, selling, trading, giving, or loaning) any coral, live rock, or organism collected under this permit without the express written permission of the Co-Trustees.
- c. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocol attached to this permit.
- d. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.
- e. Refueling of tenders and all small vessels must be done at the support ships and outside the confines of lagoons or near-shore waters in the State Marine Refuge.
- f. No fishing is allowed in State Waters except as authorized under State law for subsistence, traditional and customary practices by Native Hawaiians.

Respectfully submitted,



GUY KAULUKUKUI
Acting Administrator

APPROVED FOR SUBMITTAL



WILLIAM J. AILA, JR.
Chairperson

Papahānaumokuākea Marine National Monument
RESEARCH Permit Application

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

ADDITIONAL IMPORTANT INFORMATION:

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

INCOMPLETE APPLICATIONS WILL NOT BE CONSIDERED

Send Permit Applications to:

Papahānaumokuākea Marine National Monument Permit Coordinator

6600 Kalaniana'ole Hwy. # 300

Honolulu, HI 96825

nwhipermit@noaa.gov

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

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

Papahānaumokuākea Marine National Monument Permit Application Cover Sheet

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

Summary Information

Applicant Name: Florence I Thomas

Affiliation: Hawaii Institute of Marine Biology, University of Hawaii at Manoa

Permit Category: Research

Proposed Activity Dates: 06/01/12 through 11/15/12

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

Proposed Locations: Shallow water habitats (< 100 feet depth), focused on deploying sensors for high frequency time series analysis.

Sensor deployment will be on islands that will be visited on the subsequent cruise. Thus French Frigate Shoals is our first choice, but any island likely to be revisited will be fine.

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

Two berthing positions for my research team, plus available members of researchers from other permitted activities. The persons taking these berths are Óscar Guadayol i Roig and Sherril Leon Soon. These researchers will also work with Donahue's team on data analysis of data related to subsequent cruise.

Estimated number of days in the Monument: Up to approximately 50 days

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...

1) help us understand how coral reefs in different regions of the NWHI will experience changes in physical parameters caused by global climate change. The persistence of coral reefs, under increasing pressure from global climate change, depends on their growth exceeding degradation. Growth and degradation are both tightly coupled to environmental parameters and stressors such as temperature, light, and nutrient loading. Our understanding of how these parameters vary over time is primarily based on long-term changes in average values. However, organisms experience fluctuations in the environment on smaller temporal and spatial scales than are captured in these average values. It is expected that the frequency and intensity of such fluctuations will be altered in the context of global climate change (IPCC 2007). For example, the frequency of extreme meteorological events is predicted to increase. Challenged with the need to manage reefs in the

face of changing climate, it is important to understand how variation in parameters that control coral reef resilience vary at scales that are relevant to the corals themselves. Long-term averages that are meant to represent large spatial scales may not provide the information needed for best management practices. We have developed a protocol for time series analysis, involving cross-spectrum analyses that are designed to examine variation in environmental variables at organism relevant temporal and spatial scales. We intend to apply this technique to examine how some physical parameters vary among islands within Papahānaumokuākea and present a new approach for spatial and temporal analysis of physical data that is essential for management of reef systems within the monument.

b.) To accomplish this activity we would

1) deploy an array of *in situ* sensors over one reef system to measure habitat variability (30 x 30 meters) as a function of off shore buoys to demonstrate the applicability of our approach. The array would be composed of small (<300mm x <25mm Ø) stand-alone sensors for oxygen (DO-1060, RBR), temperature (TR-1060P, RBR) and pH (WQL-pH pH Datalogger). In addition, a suite of sensors would be deployed to measure variations in temperature, pH, dissolved oxygen, and water flow. It would include a multiparametric probe (YSI 600XLM Sonde), with *in situ* sensors for temperature, conductivity, pH and dissolved oxygen, and an acoustic Doppler current profiler (Aquadop Profiler, Nortek A.S.). The multiparametric sonde is 638 x 49mm Ø. The ADCP is 628mm x 75mm Ø. All sensors would be fixed to small weights that would be recovered along with the instrument, which would not be directly attached to the bottom. Sandy areas or existing structures from ongoing monitoring projects would be selected to deploy the instruments. These sensors would be deployed on the earliest cruise and collected on the following cruise by Donahue lab members.

The results of these deployments would be compared to both historical and concurrent data from NOAA offshore buoys and monitoring stations in the monument. Current schemes for monitoring of environmental variability in Papahānaumokuākea are centered in the assessment of regional low frequency scales by using buoys. Understanding how variability at such scales may be linked to smaller scales, from inter or intra-island scales down to the size of individual organisms, is of particular importance if we are to predict or manage the effects of the anticipated increase in the frequency of extreme meteorological events. Our goal is to develop a base line at the scale of individual corals on the reef that can be compared to larger scale processes easily characterized by offshore buoys in Papahānaumokuākea.

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

1) helping understand how information provided by oceanographic buoys may be reflecting perturbations in environmental parameters at scales relevant to coral reef organisms, and assessing the need for finer scale sensor grids. One of the major needs of the Monument is to develop a baseline understanding of how physical parameters will change over time under global climate change. We need baseline data but we also need to develop techniques for data analysis that allow us to compare variability among sites and to compare these variations within reefs to

larger scales of variability detected by ocean buoys. Oceanographic buoys are cheaper to maintain and cover large geographic regions, but they provide little information about variability at the reef or organism scale. Our data would provide information on how small scale variation compares to larger scale measures so that we would know what is happening on specific reefs based on this larger scale data. In summary, our project would i) provide baseline data and ii) develop and test new cross-spectral and cross correlation analyses to describe cross reef variation. This data and analysis would allow the monument to determine how oceanic changes in the physical environment are translated to variation at the organisms scale, and to determine if some reefs are more environmentally resilient than others.

Other information or background:

1) There has been rapid development in sensor technology during the last ten years. We are now able to obtain relatively high frequency data for a large number of important physical parameters. This technology has allowed us to measure high frequency data, which provides an opportunity to use cross correlation analyses to determine how parameters vary or co-vary over small spatial and temporal scales. These emergent technologies and statistical analyses also allow us to develop models comparing small-scale variations to larger scale change in physical parameters. In 2011 under the Donahue permit we were able to deploy sensor arrays and to compare physical parameters and isotope ratios. Results indicated that there are small-scale variations in microhabitats across reefs and led to the development of cross-spectral analysis of data using data from the MHI. We developed the techniques using data from the MHI and compared it to the NWHI because development of the techniques was time consuming and outside of the time frame of a single cruise. We will present our results at the NWHI symposium and it will result in at least two publications that are under development. Our data forms the basis for collaboration with Dr. Donahue's lab on bio-erosion.

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Florence I Thomas

Title: Associate Researcher, Hawaii Institute of Marine Biology

1a. Intended field Principal Investigator (See instructions for more information):
Oscar Guadayol i Roig

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

Hawaii Institute of Marine Biology
[REDACTED]

Phone: [REDACTED]

Fax: [REDACTED]

Email: [REDACTED]

For students, major professor's name, telephone and email address:
Florence I Thomas, HIMB
[REDACTED]

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

Hawaii Institute of Marine Biology,
School of Ocean & Earth Science & Technology,
University of Hawaii at 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):

Florence Thomas, PI
Oscar Guadayol i Roig Field PI and research diver
Sherril Leon Soon research diver
Unnamed individual replacement research diver.

Section B: Project Information

5a. Project location(s):

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

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

Location Description:

We would use one location to deploy sensors. The specific island location would depend on the sequence of cruises as we need to deploy the sensors on the first cruise and have them picked up by the Donahue lab on a later cruise. Each sensor group, Temperature, Oxygen, pH (20 cm long by 3 cm wide) would be deployed on or near a CRED site and would be retrieved by the Donahue group. The values listed below are potential sites and represent general shallow water areas within the monument.

Specific locations

Specific locations for the study would depend on cruise logistics, but our target sites are associated with those of the Donahue lab:

| Island/Atoll | Site Name | Latitude | Longitude | |
|---------------------|------------------|-----------------|------------------|----|
| FFS | H6 | 23.88048529 | -166.2730727 | 28 |
| FFS | 21 | 23.84694519 | -166.3269911 | 40 |

| | | | | |
|-----|-----|-------------|--------------|----|
| FFS | R46 | 23.76932046 | -166.2618196 | 27 |
| FFS | 12 | 23.63830604 | -166.1800664 | 33 |
| FFS | 34 | 23.6280284 | -166.1353977 | 31 |
| KUR | 12 | 28.38231395 | -178.3244947 | 33 |
| KUR | R33 | 28.41675653 | -178.3784283 | 51 |
| KUR | 2 | 28.45365015 | -178.3439881 | 38 |
| KUR | 4 | 28.42664827 | -178.2858767 | 37 |
| KUR | 6 | 28.38678209 | -178.347914 | 32 |
| LIS | 18 | 26.00425931 | -173.99409 | 26 |
| LIS | R10 | 25.94461746 | -173.9536197 | 44 |
| LIS | R14 | 26.07838458 | -173.9970317 | 48 |
| LIS | R9 | 26.03954921 | -174.0124643 | 27 |
| LIS | 9 | 25.9580487 | -173.8823619 | 48 |
| PHR | R26 | 27.78571439 | -175.7804599 | 47 |
| PHR | 33 | 27.78546679 | -175.8236217 | 43 |
| PHR | R39 | 27.94045941 | -175.8613056 | 38 |
| PHR | R44 | 27.91097866 | -175.9046626 | 45 |
| PHR | R42 | 27.75312882 | -175.9489414 | 47 |

However, cruise logistics will influence the specific locations for our study, so I have listed all possible sites below. This ensures maximum flexibility due to weather or unforeseen changes to our cruise schedule. All activities would occur within the area outlined by the following coordinates.

| Location: | Longitude | Latitude |
|------------------------|------------------|-----------------|
| Kure Atoll | -178.19706492000 | 28.55825235580 |
| Kure Atoll | -178.19623585400 | 28.29958375730 |
| Kure Atoll | -178.45987884800 | 28.29958375730 |
| Kure Atoll | -178.46070791400 | 28.55742328970 |
| Midway Atoll | -177.19638223300 | 28.37419969920 |
| Midway Atoll | -177.19721129900 | 28.13377055310 |
| Midway Atoll | -177.52800864100 | 28.13459961920 |
| Midway Atoll | -177.52800864100 | 28.37419969920 |
| Pearl and Hermes Atoll | -176.08850981800 | 28.04643025580 |
| Pearl and Hermes Atoll | -175.63289162600 | 28.04539944540 |
| Pearl and Hermes Atoll | -175.63289162600 | 27.70729363750 |
| Pearl and Hermes Atoll | -176.08954062900 | 27.70626282710 |
| Lisianski Island | -173.67292570900 | 26.25150771120 |
| Lisianski Island | -173.67292570900 | 25.83942708400 |
| Lisianski Island | -174.23095155800 | 25.83942708400 |
| Lisianski Island | -174.23095155800 | 26.25150771120 |
| Laysan Island | -171.47900122300 | 25.96027179830 |
| Laysan Island | -171.47725234300 | 25.65596666490 |
| Laysan Island | -171.97918092500 | 25.65771554490 |
| Laysan Island | -171.97918092500 | 25.96202067840 |

| | | |
|-----------------------|------------------|----------------|
| Maro Reef | -170.18133220600 | 25.69968866680 |
| Maro Reef | -170.17958332600 | 25.21524888540 |
| Maro Reef | -171.00505472200 | 25.21524888540 |
| Maro Reef | -171.00505472200 | 25.69968866680 |
| Gardner Pinnacles | -167.74832319300 | 25.26070709440 |
| Gardner Pinnacles | -167.75087047400 | 24.34878019150 |
| Gardner Pinnacles | -168.36221811900 | 24.35132747340 |
| Gardner Pinnacles | -168.36476540100 | 25.26070709440 |
| French Frigate Shoals | -165.93465851400 | 23.94630965900 |
| French Frigate Shoals | -165.93465851400 | 23.56421738120 |
| French Frigate Shoals | -166.45685129400 | 23.56421738120 |
| French Frigate Shoals | -166.45685129400 | 23.94630965900 |
| Necker Island | -164.13627752700 | 23.71705429230 |
| Necker Island | -164.13373024500 | 23.20505064020 |
| Necker Island | -164.92084033700 | 23.20505064020 |
| Necker Island | -164.92338761900 | 23.71960157420 |
| Nihoa Island | -161.66031956700 | 23.23816530420 |
| Nihoa Island | -161.66286684900 | 22.94013332760 |
| Nihoa Island | -162.05005369100 | 22.94268060940 |
| Nihoa Island | -162.05260097200 | 23.23561802240 |

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:*

1) Alterations in the frequency, intensity and duration of meteorological and hydrological events have been observed and predicted in the context of global climate change. Developing a baseline for variation of physical parameters is essential to understanding how the NWHI will be affected by global climate change. We have developed new techniques to analyze high frequency physical data and these techniques may offer a new way to set a framework for analyzing the effects of global climate change on the ecosystems of the NWHI's.

We are proposing a novel approach that may offer a new way to set a framework for analyzing

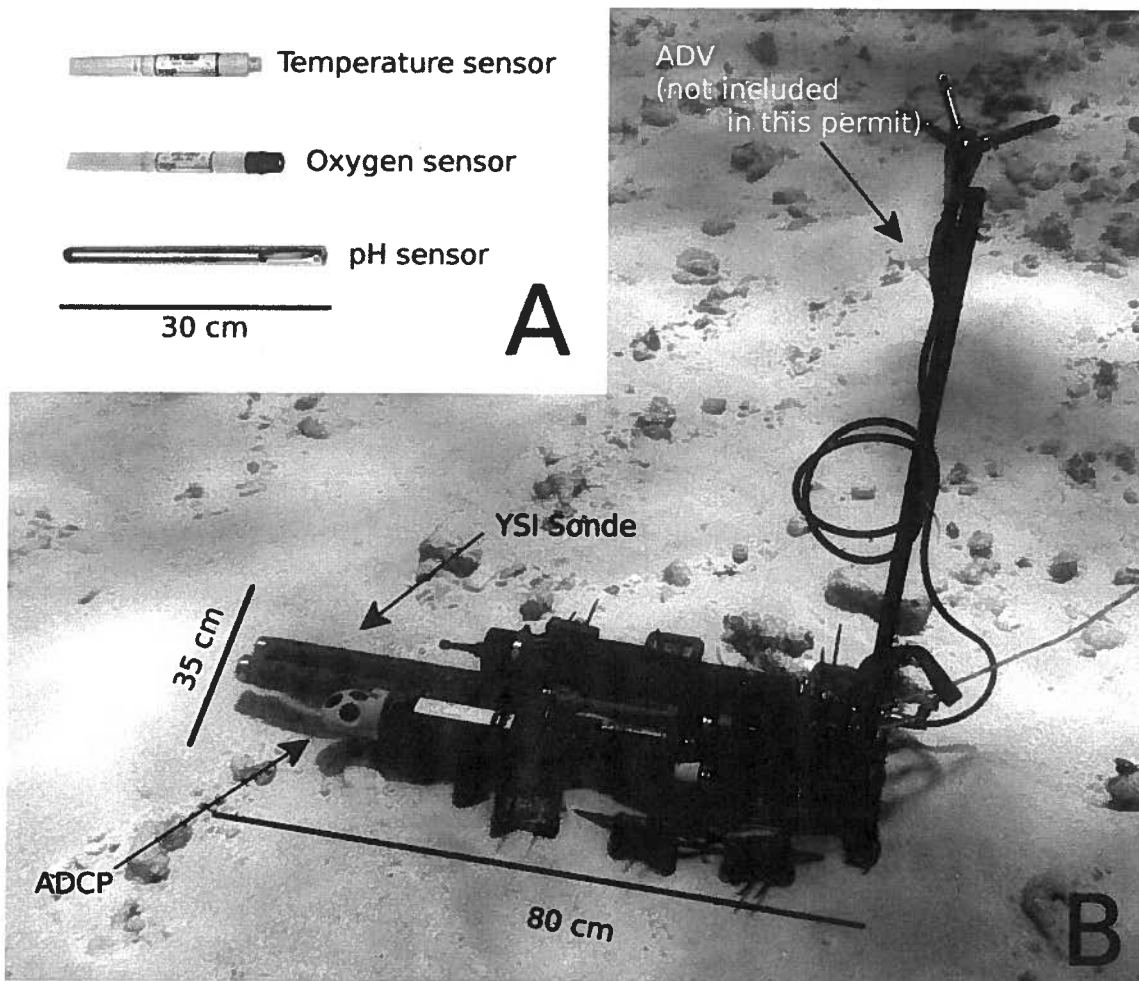


Figure 1: Sensors to be used in this study. A) standalone sensors for temperature (RBR TR-1060), dissolved oxygen (RBR DO-1060) and pH (WQL-pH Logger). B picture of the sensor array as used in the previous year, showing the ADCP (Aquadop Profiler, Nortek A.S.), 2 multiparametric probes (YSI 600XLM Sonde) and an acoustic Doppler velocimeter (Vector Profiler, Nortek A.S.). Note that no ADV would be used this year.

the effects of global climate change on the ecosystems of the NWHI's. We would obtain high frequency time series (i.e. sampling rates of ~minutes) at different locations in the reef. These series would include temperature, salinity, pH and dissolved oxygen. Then we would perform cross-spectrum analyses among the different high frequency series and with available datasets from NOAA stations in the monument (available online). We would identify the relevant scales of variability in each site, and would relate changes in the slopes of these spectra with site characteristics and distance between stations. This would allow us to ascertain: 1) to which extent spaced sites are correlated, and 2) what are the frequencies at which these correlations are lost. This approach will improve our understanding of how regional changes in the frequency of storms may translate into changes in what individual organisms and reefs actually experience in different locations, and will help us design an improved environmental monitoring scheme. The data will also provide a means to determine which reefs are more resilient in terms of physical environment -- which reefs have more stable responses to larger scale fluctuations, which will provide managers with information about which reefs may be most likely to survive climate fluctuations.

The specific objectives identified for this project are:

- A) Collect high frequency data over a 1-2 month period:
 - a) Analyze this data to determine ranges of environmental variability and the correlation of variables along a reef.
- B) Compare these reef scale variations to those occurring at larger scales (buoy data and monitoring station data within the monument.
- C) Develop a model linking the two scales of data - that can be applied with further sensor data across the whole reef system.

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?

We would only be deploying sensors in off shore sites that are used by other teams - either CRED and or Donahue labs. Sensors would be deployed on existing structures (CRED) sites or on sand patches within the reef. The instruments to be deployed are small and only slightly negatively buoyant. To eliminate the risk of dislodging several weights would be attached independently to each probe, so that even if one were dislodged, the others would still be securing down the instruments. In case no existing structure is suitable for the attachment of the suite of sensors (i.e. the YSI sonde + the ADCP), these would be attached to a small rectangular wire platform and placed over a sandy spot (see figure 1B). Weights would be tied using stainless steel hose clamps. All sensors to be used in this study were successfully deployed last year for periods of up to 3 days using the exact same procedures outlined here.

Divers would use proper technique so that they do not come in contact with the reef. 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 resources of the Monument.

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. My team and I work closely with two community based groups on Oahu that are interested in restoring taro fields to sustainable taro production and the He'eia fishpond to a functioning fish pond for education and sustainable fish production. Through our work with these groups we have developed strong ties to social scientists working with these groups as well as some of the kapuna involved as leaders of the groups. We strive to work within the context of the groups who have the restoration vision and focus our research topics on those deemed important to the community. In our work in Papahānaumokuākea we will not disturb any archaeological sites on land or in the sea. We will not go onto land at anytime. Locations will be chosen so that no historical sites are disturbed. Also each participant will be required to participate in a Cultural Briefing prior to departure on the Hi'ialakai. Further each member of my team will be asked to reflect on the importance of the site they are being given the privilege to enter and will be asked to develop their own offering and spiritual reflection on the importance of Papahānaumokuākea. In respect for the importance of ritual we will gather on the ship deck for each person to offer his or her own vision for reflection.

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?

This type of research is directly mandated by the Proclamation, and is necessary to both maintain ecosystem integrity and provide for adaptive ecosystem management in the face of natural or anthropogenic disasters and global climate change.

1) There is limited information about natural high frequency variation in the physical environment. Variance in environmental parameters at frequencies between one day and several seconds, associated to important physical phenomena such as daily radiation patterns, tides, waves or turbulence, are not adequately resolved by current sampling strategy. This project will generate baseline information at such scales and provide new techniques to establish variability. Baseline information will allow us to develop information on present variability as a function of larger scale measures of variation so that the physical environment on different reefs can be predicted in the face of changing climate. This will allow managers to better predict outcomes of climate change and identify reefs or reef systems that are less likely to be affected and thus may be identified as special regions for protection.

As outlined above and below, our activities have no detectable effects that will diminish Monument resources, nor have any known indirect, secondary or cumulative effects on the ecosystem or resources therein. We will use existing structures or sand patches and will leave nothing behind after collection of our equipment by the Donahue lab on a subsequent cruise.

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.

1) To establish baseline information about the NWHI and models that will predict variability as a function of climate change it is essential that measurement be made within the monument. Research to understand physical variability among islands driven by larger scale processes must be done in the NWHI.

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

1) Given that our research requires very little interaction with the reef and uses either sand or existing structures for sensor attachment, it should have no adverse effects on the resources of the Monument, we believe that the end value of this research clearly outweighs that impact. It is essential that we begin to understand the range of physical variation that individual reefs systems experience as a function of larger spatial scale measures to make management decisions about impacts of global climate change on coral reefs within the monument.

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

The cruise length is shorter than ideal, and is certainly no longer than is necessary to accomplish the research goals outlined in this permit application. Ideally one could sample monthly to get a time-integrated signal of baseline physical parameters. However, deploying the sensor arrays for 1- 2 months will provide enough data to demonstrate the usefulness and importance of these types of measures to understanding the range of natural variability of reefs. This data will not only provide information on variability but also serve as a present day baseline on which to compare future environmental changes.

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

I have a PhD in Integrative Biology, and have published more than 40 research papers in peer-reviewed journals dealing specifically with the subject of nutrient dynamics and transport in systems. I also have extensive experience analyzing physical data in shallow reef systems. I will be responsible for the conduct of my team and the field PI on this project will be Oscar Guadayol, who has a Ph.D. in marine sciences and has been involved in a number of research cruises. He has extensive experience analyzing time series data and has published in this research area. Last year he led a team in the NWHI, and has been team lead for cruises in the Mediterranean. He is a research diver and has worked to develop the analysis for the variation in environments across reefs. Sherril Leon Soon will also work on the cruise. She is a Ph.D. candidate in oceanography and a certified research diver. She will be under the supervision of Dr. Guadayol.

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.

There are adequate finances in the Thomas lab and the PMNM-HIMB partnership to conduct and complete all the research outlined herein. We have additional funding through a start-up grant to Thomas. We have an established track record of completing and publishing the research.

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.

1) To achieve our goals of developing high frequency analysis of the physical environment on NWHI reefs for comparison to larger scale measures (buoys and other physical data available on the NWHI) we would deploy sensors for 1- 2 months in the same locations of other undergoing ecological monitoring projects, which will make retrieving easier and safer. The exact location and depth of the deployments would very much depend of the cruise plans for both the deploying and the subsequent retrieving cruise. The most likely site would be French Frigate Shoals, as it is the one where we expect to spend more time. We would deploy several small standalone sensors, at depths <60feet either attaching them to existing structures of the ongoing monitoring projects, or, if these structures are considered as unsteady, we would tie them to weights and leave them on sandy spots near the ongoing monitoring sites where they would be easy to be found but one of our team or anyone else. The ADCP and the multiparametric sonde would be placed on top of a heavy metallic frame (60X35X3cm), weighted with small diving weights (see figure 1B), and placed on a suitable spot on a bottom with no live cover. The instruments would be in place for just one to 2 months, but in the event that during the second cruise conditions do not allow their recovery by the Donahue lab team, they could be easily found and recovered during other cruises. Thus, the possibility of leaving any object for a longer period of time is minimal.

Data would be collected at frequencies on the scale of minutes. The use of small sensors is a safe and relatively cheap way to obtain measurements at frequencies otherwise unattainable. Furthermore, using *in situ* sensors have minimal impact and avoids the necessity of taking samples from the Monument. We will then compare these data with low frequency data obtained from meteorological and oceanographic buoys by using cross-spectral and cross correlation analyses to determine how local variability is represented by larger spatial and temporal scale measures.

The importance of this work is to provide a measure of present variability in environmental parameters and develop a predictive model of them based on larger scale measures. This work will provide managers information about how the physical environment at specific reefs will respond to long-term climate change. Deploying sensors at different spatial scales is the only way to develop these predictive models.

The vessel and Monument staff, aboard the NOAA vessel Hi'ialakai, will guide our choices of sites. We will avoid any sites that are identified as culturally significant, and focus our activities in regions that maximize the safety of the crew while ensuring that the proposed work will be

completed. All work will be conducted in shallow coastal sites. No access to land is necessary. The methods outlined herein are employed routinely in the Thomas lab and are appropriate to the proposed activities.

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

We will be using the NOAA vessel Hi'ialakai.

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

There are no other factors that would make the issuance of the permit inappropriate.

8. Procedures/Methods:

1) Sensors will be deployed using SCUBA on the reef system by attaching them to or near CRED sites. If attachment to the CRED structure is not possible we will deploy the sensors at sandy areas within the reef matrix. We have done this successfully in a reef system within Kaneohe Bay. Our deployment does not impact the reef as we do not attach anything to live reef. Our plan is to deploy sensors near at least one of the locations used by Dr. Megan Donahue for her research so that we can provide a collaborative framework for the data analysis. Sensors will be deployed, and then collected on the next cruise. Data will be analyzed using cross-correlation and cross-spectrum analyses and will be compared to off shore buoy data. Our work in the MHI and in the NWHI has resulted in 3 presentations at national meetings and is the core of three papers under development.

A sensor array will be deployed over one reef system to measure habitat variability (30 x 30 meters). Also a suite of sensors will measure variations in temperature, pH, dissolved oxygen, and water flow. The sensor array will be composed of small (<300mm x <25mm Ø) standalone sensors for oxygen (DO-1060, RBR), temperature (TR-1060P, RBR) and pH (WQL-pH pH Datalogger). The suite will include a multiparametric probe (YSI 600XLM Sonde), with in situ sensors for temperature, conductivity, pH and dissolved oxygen, and an acoustic Doppler current profiler (Aquadop Profiler, Nortek A.S.). The 2 instruments will be fixed to small weights that will be recovered along with the instrument, and will not be directly attached to the bottom. Sandy areas will be selected to deploy the instruments. The multiparametric sonde is 541mm x 49mm Ø. The ADCP is 628mm x 75mm Ø. These sensors will be deployed on the earliest cruise and collected on the following cruise by Donahue lab members.

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):

Whole Organism Partial Organism

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

No samples will be taken

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

• General site/location for collections:

• Is it an open or closed system? Open Closed

• Is there an outfall? Yes No

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

• Will organisms be released?

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

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

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

Scuba, sensors as outlined above.

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

None.

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

An array of sensors and a suite of sensors to measure variations in temperature, pH, dissolved oxygen, and water flow (Fig. 1). The sensor array will be composed of small (<300mm x <25mm Ø) standalone sensors for oxygen (DO-1060, RBR), temperature (TR-1060P, RBR) and pH (WQL-pH pH Datalogger). The suite will include a multiparametric probe (YSI 600XLM Sonde), with in situ sensors for temperature, conductivity, pH and dissolved oxygen, and an acoustic Doppler current profiler (Aquadop Profiler, Nortek A.S.). These sensors will be attached to blocks placed in the sand near reefs, not on reefs (see figure above).

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

Time series data will be analyzed as soon as sensors are collected. Guadayol has already developed analytical methods so we expect that analysis will be done within 6 months of the second cruise when the Donahue lab retrieves the sensors.

Regardless of the time to publication, the results from these studies are made available to Monument managers as quickly as possible through the brown-bag luncheons, semi-annual reports, and semi-annual mini symposium during which all researchers involved in this project present the most current findings from their ongoing research to the broader management community. We also reach the NGO community and general public each year with presentations at the Hawaii Conservation Conference, Hanauma Bay seminar series, and other education and outreach venues. In sum, these efforts ensure that research results are provided to the Monument co-trustees almost as quickly as they become available, and made available to the greater management community within no more than 6 months of the data being collected.

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

Badgley B.D., Thomas F.I.M. and V.J. Harwood 2010 The Effects of Submerged Aquatic Vegetation on the Persistence of Environmental Populations of *Enterococcus* spp. in Outdoor Mesocosms. *Environmental Microbiology* 12: 1271-1281.

Berdalet, E., Peters, F., Koumandou, V., Roldán, C., Guadayol, Ò., Estrada, M. 2007. Species-specific physiological response of dinoflagellates to quantified small-scale turbulence. *Journal of Phycology* 43 (5), 965–977.

Bolli, L., Llaveria, G., Garcés, E., Guadayol, Ò., van Lenning, K., Peters, F., Berdalet, E. 2007. Modulation of ecdysal cyst and toxin dynamics of two *Alexandrium* (Dinophyceae) species under small-scale turbulence. *Biogeosciences* 4: 559-567.

Guadayol, Ò., Peters, F., Marrasé, C., Gasol, J.M., Roldán, C., Berdalet, E., Massana, R., Sabata, A. 2009. Episodic meteorological and nutrient load events as drivers of coastal ecosystem dynamics: a time series analysis. *Marine Ecology Progress Series* 381: 139-151.

Guadayol, Ò., Peters, F., Stiansen, J.E., Marrasé, C., Lohrmann, A. 2009. Evaluation of oscillating grids and orbital shakers as means to generate isotropic and homogeneous small-scale turbulence in laboratory enclosures commonly used in plankton studies. *Limnology and Oceanography: Methods* 7:287-303.

Guadayol, Ò., Peters, F. 2006. Analysis of wind events in a coastal area: a tool for assessing turbulence variability for studies on plankton. *Scientia Marina* 70: 9-20.

Masaló, I., Guadayol, Ò., Peters, F., Oca, J. 2008. Analysis of sedimentation and resuspension processes of aquaculture biosolids using an oscillating grid. *Aquacultural Engineering*. *Aquacultural Engineering*. 38: 135-144. 2010 Honorable Mention Paper Award of the 2010 Aquaculture Engineering Society Awards.

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): Óscar Guadayol (Field PI, Diver); Sherril Leon Soon (Graduate Assistant, Backup diver); Scott Godwin (Diver); Nyssa Silbiger (Graduate Student, Diver)

2. Specific Site Location(s): (Attach copies of specific collection locations): Based on current tentative cruise plans, we will deploy sensors in French Frigate Shoals, near or at existing monitoring structures (CRED) and sites.

| | | | | |
|-----|-----|-------------|--------------|----|
| FFS | H6 | 23.88048529 | -166.2730727 | 28 |
| FFS | 21 | 23.84694519 | -166.3269911 | 40 |
| FFS | R46 | 23.76932046 | -166.2618196 | 27 |
| FFS | 12 | 23.63830604 | -166.1800664 | 33 |
| FFS | 34 | 23.6280284 | -166.1353977 | 31 |

If possible we will deploy a single sensor suite of temp, O2 and pH. At any other island as determined by cruise logistics. These potential sites are

| | | |
|------------------------|------------------|----------------|
| Kure Atoll | -178.19706492000 | 28.55825235580 |
| Kure Atoll | -178.19623585400 | 28.29958375730 |
| Kure Atoll | -178.45987884800 | 28.29958375730 |
| Kure Atoll | -178.46070791400 | 28.55742328970 |
| Midway Atoll | -177.19638223300 | 28.37419969920 |
| Midway Atoll | -177.19721129900 | 28.13377055310 |
| Midway Atoll | -177.52800864100 | 28.13459961920 |
| Midway Atoll | -177.52800864100 | 28.37419969920 |
| Pearl and Hermes Atoll | -176.08850981800 | 28.04643025580 |
| Pearl and Hermes Atoll | -175.63289162600 | 28.04539944540 |
| Pearl and Hermes Atoll | -175.63289162600 | 27.70729363750 |
| Pearl and Hermes Atoll | -176.08954062900 | 27.70626282710 |
| Lisianski Island | -173.67292570900 | 26.25150771120 |
| Lisianski Island | -173.67292570900 | 25.83942708400 |
| Lisianski Island | -174.23095155800 | 25.83942708400 |
| Lisianski Island | -174.23095155800 | 26.25150771120 |
| Laysan Island | -171.47900122300 | 25.96027179830 |
| Laysan Island | -171.47725234300 | 25.65596666490 |
| Laysan Island | -171.97918092500 | 25.65771554490 |
| Laysan Island | -171.97918092500 | 25.96202067840 |
| Maro Reef | -170.18133220600 | 25.69968866680 |
| Maro Reef | -170.17958332600 | 25.21524888540 |

| | | |
|-------------------|------------------|----------------|
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| Maro Reef | -171.00505472200 | 25.69968866680 |
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| Gardner Pinnacles | -167.75087047400 | 24.34878019150 |
| Gardner Pinnacles | -168.36221811900 | 24.35132747340 |
| Gardner Pinnacles | -168.36476540100 | 25.26070709440 |

3. Other permits (list and attach documentation of all other related Federal or State permits): None

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): Guadayol Roig is a postdoc with Dr. Flo Thomas funded by the NWHI-HIMB partnership. All the sensors to be deployed, as well most of the ancillary equipment has already been acquired, so no additional funding is needed.

5. Time frame: Tentative cruise plans indicate the following dates.

Activity start: July 5, 2012

Activity completion: July 31, 2013

Dates actively inside the Monument:

From: July 5, 2012

To: August 24, 2012: date sensors are removed

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

Our limitations are only those associated with cruise panning that are outside of our control. Our specific dates will be determined by cruise logistics.

Personnel schedule in the Monument: Guadayol Roig and Godwin will be in the monument on the R/V Hi'ialakai, currently scheduled for July 5-25, 2012. Leon Soon will be the backup diver for this cruise. Nyssa Silbiger will be recovering the instruments during the next R/V Hi'ialakai cruise, August 1-24.

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 divers are requested to carry DAN insurance in addition to UH workers compensation that will cover any diving related injury or an accident that occurs while on a diving research cruise.

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

- Vessel
 Aircraft

Provide Vessel and Aircraft information: NOAA R/V 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:

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

NEIL ABERCROMBIE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF AQUATIC RESOURCES
1151 PUNCHBOWL STREET, ROOM 330
HONOLULU, HAWAII 96813

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


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LAND
STATE PARKS

June 8, 2012

TO: Division of Aquatic Resources File

THROUGH: William J. Aila, Jr., Chairperson 

FROM: Guy Kaulukukui, First Deputy and Acting Administrator 
Division of Aquatic Resources

SUBJECT:

DECLARATION OF EXEMPTION FROM THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT
UNDER THE AUTHORITY OF CHAPTER 343, HRS, AND CHAPTER 11-200, HAR, FOR
PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR. FLORENCE
THOMAS, ASSOCIATE RESEARCHER, UNIVERSITY OF HAWAII, HAWAII INSTITUTE OF MARINE
BIOLOGY, FOR ACCESS TO STATE WATERS TO CONDUCT CORAL REEF ENVIRONMENTAL
ASSESSMENT AND MONITORING RESEARCH ACTIVITIES
UNDER PERMIT PMNM-2012-032.

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. Florence Thomas, Associate Researcher, University of Hawaii, Hawaii Institute of Marine Biology, for Access to State Waters to Conduct Coral Reef Environmental Assessment and Monitoring Research Activities

Permit Number: PMNM-2012-032

Project Description:

The research permit application, as described below, would allow entry and activities to occur in Papahānaumokuākea Marine National Monument (Monument), including the NWHI State waters from July 1, 2012 through June 30, 2013.

The Applicant proposes to deploy *in situ* environmental sensors to measure and habitat variability at ecologically-relevant temporal and spatial scales at two atoll systems. The purpose of these collections is to understand how coral reefs in the NWHI will experience changes in physical parameters caused by global climate change. To carry out these activities, the applicant

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proposes to use SCUBA to deploy six (6) sensor packages. All packages would be deployed at depths of less than 60 feet, and would not be on or near live coral. The applicant intends to attach the sensors near or to existing CRED sites, but is prepared to use weights and leave them on sandy areas if necessary. Exact locations would be dependent on cruise logistics and would be chosen under the guidance of NOAA Chief Scientists or qualified Monument staff present. The applicant also hopes to deploy sensors near one of the locations used by Dr. Megan Donahue (PMNM-2012-033) for her research to provide the collaborative framework for her bioerosion work. Sensors would be deployed for 1-2 months and then would be retrieved during a subsequent NOAA ship HI'IALAKAI cruise by the Donahue team.

The proposed activities are in direct support of the Monument Management Plan's priority management need 3.1 – Understanding and Interpreting the NWHI (through action plan 3.1.1 – Marine Conservation Science). This action plan calls for further understanding of "functional linkages of marine organisms and their habitats" and also notes that monitoring data can help scientists understand causes of change. Activities to support this understanding such as the environmental assessment research to be carried out by the permittee are also addressed in the Monument Management Plan Environmental Assessment (December 2008) which resulted in a FONSI. This EA summarizes that measuring connectivity could be helpful to forecast, prepare for and mediate potential threats to populations within the Monument (PMNM MMP Vol. 2, p.171). Measurements of environmental parameters to understand habitat variability in marine natural systems, such as those proposed, would enhance this understanding.

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 April 16th, 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 § 11-200-(8), HAR, including the criteria used to determine significance under § 11-200-12, HAR, 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 the deployment of environmental sensors, 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. § 11-200-7, HAR. Since this permit involves an activity that is precedent to a later planned activity, i.e. the continuation of environmental monitoring activities

and assessment, the categorical exemption determination here will treat all planned activities as a single action.

2. The Exemption Class for Scientific Research with no Serious or Major Environmental Disturbance Appears to Apply. Chapter 343, HRS, and § 11-200-8, HAR, provide for a list of classes of actions exempt from environmental assessment requirements. §11-200-8(A)(5), HAR, exempts the class of actions which involve “basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource.” This exemption class has been interpreted to include “surveys, censuses, inventories, studies, photographing, recording, sampling, collection, culture and captive propagation of aquatic biota”, such as those being proposed.

The proposed data collection activities here appear to fall squarely under the exemption class #5, exempt item #5 as described under the former Fish and Game Division exemption list published in January 19, 1976. As discussed below, no significant disturbance to any environmental resource is anticipated in the sampling of Monument resources. Thus, so long as the below considerations are met, an exemption class should include the action now contemplated.

3. Cumulative Impacts of Actions in the Same Place and Impacts with Respect to the Potentially Particularly Sensitive Environment Will Not be Significant. Even where a categorical exemption appears to include a proposed action, the action cannot be declared exempt if “the cumulative impact of planned successive actions in the same place, over time, is significant, or when an action that is normally insignificant in its impact on the environment may be significant in a particularly sensitive environment.” § 11-200-8(B), HAR. 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. § 11-200-12, HAR. Examples of actions which commonly have a significant effect on the environment are listed under § 11-200-12, HAR.

The project involves data collection by environmental sensors and a comparison of this information with ocean buoy data. In 2011, similar sensors were deployed under the Donahue permit (PMNM-2011-032), and indicated small-scale variations in microhabitats and resulted in the development of cross-spectral analysis of data using data in the Main Hawaiian Islands, similar as to what proposed by the applicant for the NWHI. No other projects have attempted to measure habitat parameters at ecologically relevant spatial scales in the NWHI. With this in mind, no significant impacts are anticipated as a result of the proposed collection techniques. All activities will be conducted in a manner compatible with the management direction of the Monument Proclamation in that the activities do not diminish monument resources, qualities, and ecological integrity, or have any indirect, secondary, cultural, or cumulative effects. The joint permit review process did not reveal any anticipated indirect or cumulative impacts, nor did it raise any cultural concerns, that would occur as a result of these activities.

The proposed activities would be conducted from the NOAA Ship HI'IALAKAI (PMNM-2012-009) during its July cruise. The following table lists additional activities that are anticipated to take place on this cruise pending approval of permit applications.

Table 1. Concurrent Projects Aboard NOAA SHIP HI'IALAKAI.

| Permit | Purpose and Scope | Location |
|---|--|-----------------|
| PMNM-2012-009 Ellis | The permit allows NOAA Ship HI'IALAKAI entry into PMNM. Personnel aboard the vessel will be permitted under separate permits. | All locations |
| PMNM-2011-018 Meyer | This permit allows collection of reef fish and tagging of top predators as well as acoustic receiver deployment. | All locations |
| PMNM-2012-036 Gleason (proposed) | The proposed action is to allow maritime heritage site survey and monitoring activities and collection of a single artifact from the Two Brothers shipwreck. | All locations |
| PMNM-2012-035 Godwin (proposed) | The proposed action is to allow alien marine invertebrate voucher specimen collections and monitoring. | All locations |
| PMNM-2012-040 Aeby (proposed) | The proposed action is to allow coral disease monitoring and research activities. | All locations |
| PMNM-2012-030 Karl (proposed) | The proposed action is to allow coral disease research activities and fish connectivity studies. | All locations |
| PMNM-2012-041 Winn-Kahng (proposed) | The proposed action is to allow water sampling collection activities. | All locations |

This is the only proposed activity that involves the deployment of environmental sensors near reef systems. Therefore, none of the other activities will overlap with those proposed by the applicant.

Table 2. Concurrent projects aboard NOAA SHIP OSCAR ELTON SETTE.

| Permit | Purpose and Scope | Location |
|--------------------------|--|---|
| PMNM-2012-008 Dreflak | The permit allows NOAA Ship OSCAR ELTON SETTE entry into PMNM. Personnel aboard the vessel will be permitted under separate permits. | Nihoa, Mokumanamana, FFS, Laysan, Lisianski, Pearl and Hermes, Kure |

| Permit | Purpose and Scope | Location |
|--|---|---------------|
| PMNM-2012-001 Co-Trustee | The proposed action is to facilitate the needs of the monk seal field camp, marine debris work, and gear transport for the Google-PMNM Educational project. | All locations |
| PMNM-2012-013 Parrish/ Van Atta (proposed) | The proposed action is conduct selected removal of predatory sharks from Hawaiian monk seal pupping sites at French Frigate Shoals. | FFS |

The NOAA Ship OSCAR ELTON SETTE (PMNM-2012-008) may also be in the Monument during the timeframe of the July cruise. However, none of the activities on this cruise overlap with the environmental monitoring and assessment activities that are being proposed.

The culmination of these permits, and their disparate activities, occurring throughout the Monument over a 4-week period, is not anticipated to have significant cumulative impacts. Since no significant cumulative impacts or significant impacts with respect to any particularly sensitive aspect of the project area are anticipated, the categorical exemptions identified above should remain applicable.

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

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

WILLIAM J. AILA, JR.
Chairperson, Board of Land and Natural Resources

Date

