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
State of Hawaii
Honolulu, Hawaii

Request for Authorization and Approval to Issue a Papahānaumokuākea Marine National Monument Research Permit to Dr. Stephen Karl, Associate Researcher, University of Hawaii, Hawaii Institute of Marine Biology, for Access to State Waters to Conduct Coral Disease Research Activities and Fish Connectivity Studies

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. Stephen Karl, 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 research 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, Neva Shoal
- Pearl and Hermes Atoll
- Kure Atoll

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

The proposed activities are a renewal of work previously permitted and conducted in the Monument, and are a continuation of ongoing projects.

## INTENDED ACTIVITIES

The applicant proposes to conduct the following two activities in the PMNM. The first is to obtain samples of the coral species, *Acropora cytherea*, from reefs at French Frigate Shoals

(FFS), Maro Reef and Laysan Island for coral disease studies, and the second is to collect a limited number of near-shore reef fishes for continued genetic connectivity studies that will be conducted by Dr. Brian Bowen of HIMB.

Coral Sampling:
There is a very high incidence of growth anomalies (GAs) in *Acropora cytherea* (table corals) at French Frigate Shoals (FFS), and this disease has also been found at Maro Reef and Laysan Island, albeit in lower density. The applicant plans to compare healthy and diseased individual genotypes to determine if there is a genetic predisposition for the development of GAs, and if the diseased individuals are clones of a single individual or genetically unique. Previously, the applicant has mapped and genotyped all individuals of one species (*Pocillopora damicornis*) on specific patch reefs at French Frigate Shoals (FFS) and Pearl and Hermes Atoll (P&H). Analyses of coral genetic diversity at these reefs indicate a very high and unexpected degree of clonality, showing that most of the individuals at the reefs at FFS and P&H are clones of only a few individuals. If the *A. cytherea* at these reefs are clones, then the spread of the disease may be confined. However, if they are not clones, then more attention to how the disease is spreading would be required. If he yields specific genes associated with the disease, his results can then be used to assess the vulnerability of other *A. cytherea* colonies at other sites throughout the Monument.

To carry out this activity, samples (3 cm^2 pieces) would be collected from no more than 50 individual *Acropora cytherea* colonies at each of 5 reefs at each atoll (250 total samples per atoll). The applicant is proposing to collect healthy and diseased tissues from the same individuals as well as healthy tissue from individuals with no obvious signs of disease, and would be sharing samples with PMNM permit applicant, Dr. Greta Aeby (PMNM-2012-040) to minimize overall collections in PMNM.

The first activity would provide data to build upon previous monitoring efforts that would help characterize and understand the prevalence of disease within the monument. These activities are consistent with the terms of the Proclamation in that the activities would "further understanding of Monument resources and qualities," and would "assist in the conservation and management of the Monument." The proposed activities relate directly to the Monument Management Plan (MMP) and are described in the Marine Conservation Science (MCS) Action Plan, Activity MCS-1.2 – Continue monitoring of shallow-water coral reef ecosystems to protect ecological activity: "Quantitative surveys of coral would be conducted annually using methods comparable to or inter-calibrated with those of existing historical data sets. The results of these activities would better define resource baselines for comparisons in protection and management efforts" (PMNM MMP Vol. 1, p. 123).

Connectivity Studies:
The applicant's second objective is part of a multi-year project that aims to define the level of isolation between shallow and mesophotic ecosystems in the NW Hawaiian Archipelago. If these habitats are highly connected by larval dispersal, then any one of them can recover quickly from human or natural perturbation. If they are isolated, they have to recover without significant input from other islands and atolls.

To carry out this activity, the applicant would utilize SCUBA, nets, and pole spears to lethally sample 8 targeted species of nearshore reef fish (see Appendix 1, Item F-4a) from multiple locations in the monument (maximum number to be collected would be 1,178 specimens). *Note:* The applicant has agreed to withdraw the request in Appendix 1 for voucher specimens. These specimens would be transferred to the Toonen-Bowen lab at HIMB for genetic analysis.

This research is necessary to better characterize ecosystem function through species genetic connectivity between shallow and deep reefs. 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). This action specifies to "measure connectivity and genetic diversity of key species to enhance management decisions. Identification of genetic diversity and connectivity of reef fishes, such as those proposed, would enhance this understanding for PMNM managers.

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: 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 concerns were raised during the review process. The applicant's responses are noted below.

1. *With regards to GA, the applicant states, "One site, previously surveyed and monitored, has experienced a significant reduction in the density of A. cytherea due to colonies dying from this disease." Given that sites are generally visited only once each year, how can you know that the death of a colony was caused by GA and not some other factor?*

   The applicant states that the reviewer is right. He states that they do not know that the GA killed the corals, but that there was a strong correlation between the colonies that had GAs and the ones that died.

2. *Are Dr. Karl or Dr. Greta Aeby (permit #40) allowed to keep the samples that are not used/destroyed in the analysis (page 9)? The coral belongs to the Monument and should be returned.*

   The applicant reports that as with previous collections, the samples remain the property of the State of Hawaii, but for space and convenience reasons (i.e., the Monument lacks proper archiving space and systems) they are archived at HIMB. The applicant expresses that he is happy to relinquish them to the Monument or any appointed state designee.

3. *The etiology of this disease is not known. No reference is made in the application to using collection procedures (e.g., using separate sampling tools for different colonies) that minimize the risk of spreading the disease to unaffected colonies.*

   The applicant responds that standard PMNM sterilization procedures would be used to treat the tools and gear when moving from one atoll to another (i.e., disinfected tools with 1:32 bleach in freshwater). One diver would be collecting nothing but healthy tissue and a second nothing but GA tissue. Tools would be disinfected between dive sites.

4. *Please ensure sharing of samples with Dr. Aeby to avoid double sampling.*

   The applicant confirms that samples would be shared.

5. *Locations where the samples are collected should have a GPS waypoint assigned. This is for future reference for Monument managers and researchers. Multiple sampling activities at the same patch reefs may have a negative impact (cause stress) to the coral colonies present.*

   The applicant explains that since it is not always possible to know in advance the GPS coordinates for where the samples will be collected, collecting location information would be submitted after the cruise in the cruise report.

6. *Recommend that since these reefs are visited enough via cruises, that someone should perform a post-monitoring assessment (in 6 months to 1 year) to see if the removal of that many samples (250 per atoll) had a negative impact. If the colonies are already diseased/stressed, removing coral tissue and exposing the skeleton due to sampling activities, may have a cumulative negative impact on the health of those colonies.*

   The applicant explains that as with other species of coral that they have collected in the Monument, post-collecting surveys are done to assess if the activities may have had a negative effect. The surveys are visual and photographs compared between years. He states that they have never seen a negative effect of their activities. The applicant asks that it be noted that the amount of skeleton that would be exposed is less than what the coral would experience due to fish predation.

7. *Is there previous work or references to support that corals have a genetic predisposition to this disease or any other known diseases?*

   The applicant responds that this has not been done previously and that this is one of the novel parts of the research. The applicant asks that it be noted, however, that nearly all animals have some sort of immune system and it goes to reason that corals do as well.

8. *Will the applicant sterilize the bone cutters between their samples? What protocols will be used to prevent the contamination of healthy corals with diseased samples and/or prevent spreading the disease?*

   The applicant confirms that standard PMNM sterilization procedures would be used to treat the tools and other equipment each day and before moving to another atoll. One diver would be collecting nothing but healthy tissue and a second diver nothing but GA tissue. The shears would be wiped between samples and sheers used on GA tissue would not be used on healthy tissue. Even if coral lack an immune system, they will be also assaying if GA are affecting a single or multiple clones.

9. *NMFS request that request that the researcher ensure that sampling does not lead to lesions greater than 3 $cm^2$.*

   The applicant responds that samples larger than 3 cm2 would not be taken. They use the bone sheers because they provide the best method to accurately remove only the size of sample they intend to remove.

10. *NMFS emphasizes the need for the researchers to follow strict sterilization protocols, per the PMNM BMPs, in order to prevent spread of disease from a diseased coral to healthy one.*

    The applicant confirms that standard PMNM sterilization procedures would be used to treat the tools and gear when moving from one atoll to another (i.e., disinfected tools with 1:32 bleach in freshwater or 6.6% Lysol in water dilution, depending on material being disinfected). One diver would be collecting nothing but healthy tissue and a second diver nothing but GA tissue. Tools would be disinfected between dive sites.

11. *OHA request assurances that whenever possible the samples remain in Hawai'i, that if the samples can ever be returned to Papahānaumokuākea in a culturally appropriate way they will be, and that if they cannot, that the samples be destroyed and a certificate of destruction be provided to the Monument for our files.*

    The applicant responds that as with previous collections, the samples remain the property of the State of Hawaii, but for space and convenience reasons (i.e., the Monument lacks proper archiving space and systems) they are archived at HIMB. He states that he is happy to relinquish them to the Monument or any appointed state designee. The applicant further states that he views these samples as very precious and is aware of the magnitude of the act of collecting them and returning them to Oahu. He feels that all activity,

especially sampling, should be minimized for the good of the Monument. As such, he prefers to archive the samples in such a way that anyone can use them in the future for further investigations so that future sampling is unnecessary. Most of the samples will be destroyed in the process of extracting DNA, however, if it is preferred, he will destroy any remaining samples after analysis.

**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 Department has made an exemption determination for this permit in accordance with 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 PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO STEPHEN KARL, ASSOCIATE RESEARCHER, UNIVERSITY OF HAWAII, HAWAII INSTITUTE OF MARINE BIOLOGY, FOR ACCESS TO STATE WATERS TO CONDUCT CORAL DISEASE RESEARCH ACTIVITIES AND FISH CONNECTIVITY STUDIES UNDER PERMIT PMNM-2012-030").

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

- This applicant was granted permits DLNR/NWHI/06R009, PMNM-2007-042, PMNM-2008-030, and PMNM-2009-017, and PMNM-2010-025 to conduct similar work in 2006 through 2010.
- Additionally, Greta Aeby, from HIMB was issued a permit in 2011 to carry out similar coral disease work (PMNM-2011-020), and Dr. Brian Bowen of HIMB was issued permits DLNR/NWHI/06R004, PMNM-2007-032, PMNM-2008-046, PMNM-2009-044, and PMNM-2010-038, and PMNM-2011-025 to conduct similar work in 2006 through 2011 to conduct similar fish connectivity studies.

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

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

STAFF OPINION:

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

MONUMENT MANAGEMENT BOARD OPINION:

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

RECOMMENDATION:

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

1. That the Board declare that the actions which are anticipated to be undertaken under this permit will have little or no significant effect on the environment and is therefore exempt from the preparation of an environmental assessment.

2. Upon the finding and adoption of the department's analysis by the Board, that the Board delegate and authorize the Chairperson to sign the declaration of exemption for purposes of recordkeeping requirements of Chapter 343, HRS, and Chapter 11-200, HAR.

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

1. This permit is not to be used for nor does it authorize the sale of collected organisms. Under this permit, the authorized activities must be for noncommercial purposes not involving the use or sale of any organism, by-products, or materials collected within the Monument for obtaining patent or intellectual property rights.

2. The permittee may not convey, transfer, or distribute, in any fashion (including, but not limited to, selling, trading, giving, or loaning) any coral, live rock, or organism collected under this permit without the express written permission of the Co-Trustees.

3. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocols attached to this permit.

4. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.

5. Refueling of tenders and all small vessels must be done at the support ships and outside the confines of lagoons or near-shore waters in the State Marine Refuge

6. 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:** Stephen A. Karl
**Affiliation:** University of Hawaii, Manoa, Hawaii Institute of Marine Biology

**Permit Category:** Research
**Proposed Activity Dates:** 1 June 2012 - 1 October 2012
**Proposed Method of Entry (Vessel/Plane):** NOAA Ship HI`IALAKAI
**Proposed Locations:** French Frigate Shoals, Maro, and Laysan

**Estimated number of individuals (including Applicant) to be covered under this permit:**
4
**Estimated number of days in the Monument:** 29

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

a.) The proposed activity would…
sample Acropora cytherea colonies at each of 5 reefs at each Atoll (total 250 samples per Atoll). Tissue will be taken from healthy as well as diseased (i.e., individuals with growth anomolies) individuals. Healthy and diseased tissue will be collected from the same individual as well as healthy tissue from individuals with no obvious signs of disease.

b.) To accomplish this activity we would ….
sample 50 - 3 cm^3 nubbins using bone shears.

c.) This activity would help the Monument by …
improving our understanding of the underlying causes of growth anomalies in Acropora cytherea. Understanding the causes of the disease will allow managers to assay areas where A. cytherea may be at high risk for developing this disease and assess degree and areas of vulnerability.

**Other information or background:**

## Section A - Applicant Information

### 1. Applicant

Name (last, first, middle initial): Karl, Stephen A.

Title: Associate Researcher

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

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

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

**3. Affiliation (institution/agency/organization directly related to the proposed project):**
Hawaii Institute of Marine Biology, University of Hawaii, 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):**
Jonathan Whitney, research diver
Amanda Shore, research diver
Maya Walton, research diver

## Section B: Project Information

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

| | | Ocean Based | |
|---|---|---|---|
| ☐ Nihoa Island | ☐ Land-based | ☐ Shallow water | ☐ Deep water |
| ☐ Necker Island (Mokumanamana) | ☐ Land-based | ☐ Shallow water | ☐ Deep water |
| ☒ French Frigate Shoals | ☐ Land-based | ☒ Shallow water | ☐ Deep water |
| ☐ Gardner Pinnacles | ☐ Land-based | ☐ Shallow water | ☐ Deep water |
| ☒ Maro Reef | | | |
| ☒ Laysan Island | ☐ Land-based | ☒ Shallow water | ☐ Deep water |
| ☐ Lisianski Island, Neva Shoal | ☐ Land-based | ☐ Shallow water | ☐ Deep water |
| ☐ Pearl and Hermes Atoll | ☐ Land-based | ☐ Shallow water | ☐ Deep water |
| ☐ Midway Atoll | ☐ Land-based | ☐ Shallow water | ☐ Deep water |
| ☐ Kure Atoll | ☐ Land-based | ☐ Shallow water | ☐ Deep water |
| ☐ Other | | | |

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

Location Description:
Five patch reefs at each atoll where A. cytherea is found (exact location to be determined when on site).

**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:***

There are many threats to the persistence of coral reefs. A major one is disease. There are several diseases of coral and many of them result in rapid death of the coral colony. Very little is known about the causes of coral disease. Without a understanding of the causes of a disease there is no chance of devising a cure or to do a risk assessment. Colony growth anomalies (GA) are common in Acropora cytherea and primarily at French Frigate Shoals (FFS). We propose to sample healthy and diseased individuals and healthy and diseased tissue from diseased individuals to determin the degree to which GAs are a genetic disease. We will also sample individuals at Maro Reef and Laysan Island, if they are encountered. A. cytherea has been seen at these two Atolls previously.

**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?

Our overriding goal is to provide scientific information to managers so that the Pahanaumokuakea Marine National Monument can be managed and protected based on policy grounded in sound science. Our divers are experienced in moving in and around coral and coral reefs so as to not cause damage. Each diver has been through intensive dive training and is a certified scientific diver with the American Association of Underwater Scientists. We have conducted similar activities before in the Monument and have assessed that they do not impact the reefs. All personnel will have attended cultural training classes to better understand and respect the cultural and spiritual importance of the Papahanaumokuakea Monument.

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?

In order to manage any ecosystem, fundamental information on how the systems works is necessary. For example, if some coral colonies are diseased and others are not, knowing if the diseased individuals are genetically predisposed to sickness will allow managers to accurately assess risk and to better determine priorities. The single, small coral samples (i.e., 3 cm^3) collected from colonies are smaller than the number and size usually removed by parrotfish and other coral-eating organisms. The monument is approximately 360,000 km^2 and FFS is approximately 800 km^2. There is about 13,500 km^2 of coral reef habitat in the Monument. Our sampling activities will be confined less than 15 patch reefs totaling approximately 0.019 Km^2 or 0.00014% of the coral reef habitat in the monument. Negative impacts on the reefs, atoll, and Monument are exceedingly small. The positive impacts of the results of our research are Monument-wide and wider.

c. Is there a practicable alternative to conducting the activity within the Monument? If not, explain why your activities must be conducted in the Monument.

There are no alternatives to conducting this activity within the monument. Our research is aimed at understanding the basis of GA that are commonly found at FFS. There is no practical alternative to doing this in the Monument because it is the reefs in the Monument that will need to be managed. For example, the same information from reefs in the main Hawaiian Islands is interesting, but there is no basis upon which to say that the reefs in the Monument are like the Main Hawaiian Island reefs or does it identify at risk reefs in the Monument. Given the vastly different ages and general makeup of reefs in the monument, it is likely that they are different than those in the Main Hawaiian Islands and elsewhere.

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 negative impacts that we might have are essentially non-existent. When we return to sites where we have worked in previous years there is no indication that we had ever been there before. The coral colonies that we have sampled appear normal and do not look different from ones in other areas that were not sampled. The data that we are collecting, however, will help managers to understand what role genetics plays in coral disease. The data that we are collecting will help managers understand if the extent of GA in A. cytherea found in the Monument is due to some individuals being genetically predisposed to disease. Knowing this connection will allow managers to assess the vulnerability of areas that currently do not have GA as well as the potential spread of GA where it does occur. The Papahanaumokuakea Monument is a sacred place in native Hawaiian culture, and coral, in particular, play a central role in the Hawaiian's understanding of how the world was created. As said in the first few lines of the Hawaiian creation chant, the Kumulipo: "Born was the male, born was the female, born was the coral polyp, from which the coral came forth." Stewardship of natural resources is a central theme in the relationship that Native Hawaiians have with the environment and, thus, there is no difference between a natural and cultural resource. Our research is very much in line with this practice. What we are doing will place stewardship practices on a foundation of knowledge and insight into how best to manage and protect coral reefs of the Papahanaumokuakea Monument. Just as Native Hawaiians learned when and where important food fish were spawning and then protected these times and areas, we will be learning fundamental aspects of the biology of coral reefs. This knowledge will then be used to protect and manage the resources of the Monument in the same way Native Hawaiian fishers (lawai'a) protected and managed resources of their ahupua'a.

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

It is anticipated that collecting samples will take a minimum of 3 and a maximum of 5 days at each Atoll. We are minimizing the number of divers (4) in the water at any time so as to minimize the possibility of impacting the reef. This then requires that we spend more time at the site. The ship is deployed for a specified amount of time (~29 days) so that all researchers can

complete their studies at the various atolls. Our research activities will only be done at French Frigate Shoals, Maro Reef, and Laysan, but we must stay onboard the ship until all cruise is completed.

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 been a certified SCUBA diver for 39 years. I have been an AAUS certified scientific diver for 33 years. My curriculum vita lists over 50 scientific publications on genetics and conservation. My Ph.D. is in genetics. I have conducted similar research in the monument five prior years. I have worked on a variety of ecological, genetic, and field projects dating back to 1979.

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.

Detailed budget information is available upon request from the Monument Permit Coordinators, and sufficient funding exists or will be obtained to complete the research outlined herein. This research is currently, or has been previously, funded by a combination of the following agency sources:
1) NWHIMNM-HIMB partnership
2) The University of Hawaii.

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.

We are using standard field survey techniques that have proven successful both generally and specifically in the Monument. Sites within an Atoll will be chosen based on where Acropora cytherea is growing. Small scale sampling will be done at each reef. That is, 25 samples will be collected from individuals that are immediate neighbors. This will allow us to understand the degree of clonality in this species. The remainder of the samples will be collected haphazardly (i.e., collect, swim 3 kicks, collect again) from the rest of the reef. Separate reefs at an Atoll will be no closer than 25 meters, when possible. The genetic approaches have been previously proven appropriate and capable of uniquely identifying individuals and providing the type of data we need. Any negative impacts of our study are minimal and temporary and should not alter the Monument's cultural, natural and historic resources, qualities or ecological integrity. An average colony is about ~60 cm in diameter and we are sampling a piece that is no larger than a single bite from a parrotfish; which normally take several. This is an insignificant loss to the colony and the reef. The positive impacts of our study will help guide appropriate stewardship practices to preserve and manage the qualities and integrity of the Monument's cultural and natural and historic resources. Our data is necessary to provide a strong scientific understanding of coral reef ecosystem processes by which proper management protocols can be designed. These data also are invaluable in providing a baseline with which to monitor the success of management efforts.

i. Has your vessel has been outfitted with a mobile transceiver unit approved by OLE and complies with the requirements of Presidential Proclamation 8031?
Yes, we are using a NOAA ship supplied by the Monument.

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

I have fully complied with all previous permit requirements and have no past, current, or pending restrictions applicable to this permit. I have fully disclosed my intentions in this permit application. To my knowledge, there are no other factors that would make the issuance of a permit inappropriate.

**8. Procedures/Methods:**

In the NWHI, Acropora cytherea growth anomalies (GA) are common in some areas of French Frigate Shoals. One site, previously surveyed and monitored, has experienced a significant reduction in the density of A. cytherea due to colonies dying from this disease. Unfortunately, very little is known about this disease and nothing is known about its cause. We are going to investigate if this disease might be genetically based and similar to cancer in humans. To do this, we will collect small pieces of tissue from healthy and diseased tissue from a single, affected individuals and healthy tissue from a healthy individuals. We will do this primarily at FFS but will also collect A. cytherea at Maro Reef and Laysan, where it has been previously seen in low density. Over the past few years, significant advances in the technology of DNA sequencing (i.e., determining the order of the DNA building blocks in the genome) have resulted in genetic tools that allow easy, cost effective, and fast determination of the DNA code for an entire genome. We will use a version that will allow us to determine an individual's genotype at tens of thousands of genes. By doing this, we can compare the healthy and diseased tissue and healthy and diseased individuals genotypes to look for genes that may be associated with GA. Acropora cytherea can reproduce sexually or asexually by fragmentation. Very little is known about the degree of asexual reproduction in A. cytherea. We will also determine if the diseased individuals are clones of a single individual or genetically unique. If they are all clones, then the spread of the disease may be well confined and not a harbinger for whole-scale loss of A. cytherea from the Papahanaumokuakea Marine Monument. If they are not clones, then more attention to how the disease is spreading is needed. If we find specific genes that are associated with the disease, we can use this as a means to assess the vulnerability of other A. cytherea colonies at other sites throughout the Monument.

The NOAA vessel Hi'ialakai will be used as transport to the NWHI. At each site, divers will be taken to the reefs in an AMBAR Marine jet boat. The jet boat will be anchored in the sand near the reef or unanchored but maintaning station near the divers. No other areas will need to be accessed. No assistance from Monument staff will be needed to maintain equipment or collect data or samples.

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

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

Common name:
Table coral

Scientific name:
Acropora cytherea

# & size of specimens:
50 - 3 cm^3 pieces from each of 5 reefs at French Frigate Shoals, Maro Reef, and Laysan (maximum 250 total per Atoll).

Collection location:
Five reefs at French Frigate Shoals, Maro, and Laysan to be determined when on site and by availability.

☐ Whole Organism ☒ Partial Organism

**9b. What will be done with the specimens after the project has ended?**
Most of the sample will be destroyed in processing. Any samples that are not will be maintained, preserved, at HIMB.

**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?**

Preserved in Ethyl alcohol (MSDS attached) or salt saturated dimethylsulfoxide (MSDS attached).

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

HIMB and NOAA monument staff hold semiannual meeting and annual meetings with other agencies working in the monument so that research projects and resources available are widely known. HIMB researchers discuss potential areas of overlap informally and share samples whenever possible. Dr. Greta Aeby of HIMB will also be working with samples of Acropora cytherea for disease studies and I am the field PI for her permit application. We will not be doubly collecting Acropora cytherea but will be sharing samples when appropriate. That is, where she needs GA (or healthy) tissue, one collection will be made and she will receive half of the sample and I will retain the other.

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

Standard open-circuit SCUBA and snorkling equipment. Samples of coral will be collected with bone shears and placed into ziplock bags. On the ship, samples will be placed in plactic tubes filled with ethyl alcohol or salt saturated dimethyl sulfate.

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

**13. Describe any fixed installations and instrumentation proposed to be set in the Monument:**
None

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

Data analysis will start immediately after returning to the Hawaii Institute of Marine Biology. Publications of this and the related work should be available within the next two - three years.

**15. List all Applicants' publications directly related to the proposed project:**
Jokiel, P.L., K.S. Rodgers, S.A. Karl. Genetic structure of a reef coral population (Porites rus): comparison of grafting vs. molecular genetic technique. In preparation.

Gorospe, K.D., S.A. Karl. Genetic Relatedness Does Not Retain Spatial Pattern Across Multiple Spatial Scales: Dispersal and Colonization in the Coral, Pocillopora damicornis. Submitted 1/2012 PlosONE.

Baranets, V., Z.H. Forsman, and S.A. Karl. 2011. Microsatellite loci for the plate-and-pillar coral. Porites rus. Conservation Genetics Resources, 3:519-521.

Wiener, C.S., M.A.J. Rivera, R.J. Toonen, J.C. Leong, R.K. Kosaki, S.A. Karl, K. Keller, and H. Johnson. 2011. Creating Effective Partnerships in Ecosystem Based Management: A Culture of Science and Management. Journal of Marine Biology, 2011, doi:10.1155/2011/241610

Severance, EG and SA Karl. 2006. Contrasting population genetic structures of sympatric massspawning Caribbean corals. Marine Biology 150:57-68.

Severance, EG, AM Szmant, and SA Karl. 2004. Microsatellite loci isolated from the Caribbean coral, Montastraea annularis. Mol. Ecol. Note. 4:74-76.

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

## Appendix 1. Requested Collections for B.W. Bowen Amended on May 15, 2012

| Common name | Scientific name | No., Size, Locations |
|---|---|---|
| **Family Pomacentridae** | | |
| Hawaiian Sargeant | *Abudefduf abdominalis* | 27 all sizes Nihoa<br>9 all sizes Mokumanamana<br>0 all sizes French Frigate Shoals<br>29 all sizes Gardner Pinnacles<br>4 all sizes Maro Reef<br>1 all sizes Laysan<br>14 all sizes Lisianski<br>0 all sizes Pearl and Hermes<br>0 all sizes Midway<br>0 all sizes Kure |
| Indo-Pacific Sargeant | *Abudefduf vaigiensis* | 26 all sizes Nihoa<br>23 all sizes Mokumanamana<br>0 all sizes French Frigate Shoals<br>4 all sizes Gardner Pinnacles<br>30 all sizes Maro Reef<br>16 all sizes Laysan<br>30 all sizes Lisianski<br>0 all sizes Pearl and Hermes<br>0 all sizes Midway<br>29 all sizes Kure |
| Vanderbilt's Chromis | *Chromis vanderbilti* | 0 all sizes Nihoa<br>16 all sizes Mokumanamana<br>0 all sizes French Frigate Shoals<br>30 all sizes Gardner Pinnacles<br>30 all sizes Maro Reef<br>10 all sizes Laysan<br>30 all sizes Lisianski<br>0 all sizes Pearl and Hermes<br>8 all sizes Midway<br>0 all sizes Kure |
| Three-spot Chromis | *Chromis verater* | 0 all sizes Nihoa<br>30 all sizes Mokumanamana<br>0 all sizes French Frigate Shoals<br>18 all sizes Gardner Pinnacles<br>30 all sizes Maro Reef<br>30 all sizes Laysan<br>30 all sizes Lisianski<br>0 all sizes Pearl and Hermes<br>30 all sizes Midway<br>0 all sizes Kure |
| Hawaiian Chromis | *Chromis ovalis* | 0 all sizes Nihoa<br>0 all sizes Mokumanamana<br>0 all sizes French Frigate Shoals<br>0 all sizes Gardner Pinnacles<br>0 all sizes Maro Reef |

| | |
|---|---|
| | 0 all sizes Laysan |
| | 26 all sizes Lisianski |
| | 0 all sizes Pearl and Hermes |
| | 0 all sizes Midway |
| | 27 all sizes Kure |
| **Family Mullidae** | |
| Yellowstripe goatfish *Mulloidichthys flavolineatus* | 30 all sizes Nihoa |
| | 15 all sizes Mokumanamana |
| | 3 all sizes French Frigate Shoals |
| | 30 all sizes Gardner Pinnacles |
| | 21 all sizes Maro Reef |
| | 21 all sizes Laysan |
| | 30 all sizes Lisianski |
| | 0 all sizes Pearl and Hermes |
| | 0 all sizes Midway |
| | 0 all sizes Kure |
| Yellowfin goatfish *Mulloidichthys vanicolensis* | 22 all sizes Nihoa |
| | 22 all sizes Mokumanamana |
| | 0 all sizes French Frigate Shoals |
| | 18 all sizes Gardner Pinnacles |
| | 28 all sizes Maro Reef |
| | 24 all sizes Laysan |
| | 27 all sizes Lisianski |
| | 0 all sizes Pearl and Hermes |
| | 0 all sizes Midway |
| | 0 all sizes Kure |
| **Family Apogonidae** | |
| Iridescent cardinalfish *Pristiapogon kallopterus* | 30 all sizes Nihoa |
| | 30 all sizes Mokumanamana |
| | 30 all sizes French Frigate Shoals |
| | 30 all sizes Gardner Pinnacles |
| | 30 all sizes Maro Reef |
| | 30 all sizes Laysan |
| | 30 all sizes Lisianski |
| | 30 all sizes Pearl and Hermes |
| | 30 all sizes Midway |
| | 30 all sizes Kure |

**Opportunistic sampling of new species**

The 2012 Hiialakai cruise in September (pending funding) will include deep diving (> 130 feet) with trimix scuba technology and possibly close-circuit rebreathers. In these circumstances we wish to collect specimens of new fish and invertebrate species, for genetic characterization, taxonomic description, and vouchering in the Bishop Museum. These collections will allow us to characterize the biodiversity of the Monument, and will only be made in cases where species are sufficiently abundant (encounter rate of 5+ per hour) to sustain collections without adverse impact. Encounters with rarer species will be documented with photo-vouchers.

| | |
|---|---|
| New species | A maximum of five specimens/species at each island or atoll |

# 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):** Stephen A. Karl - Diver, collector HIMB,
**Jonathan Whitney -** diver, collector, HIMB,
Sherril Leon Soon - diver, collector, HIMB,
Jacquilyn Troller - diver, collector, HIMB,

**2. Specific Site Location(s): (Attach copies of specific collection locations):** French Frigate Shoals, Maro, and Laysan

**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.** noner

**4. Funding sources (Attach copies of your budget, specific to proposed activities under this permit and include funding sources. See instructions for more information):** Detailed budget information is available upon request from the Monument Permit Coordinators, and sufficient funding exists or will be obtained to complete the research outlined herein. This research is currently, or has been previously, funded by a combination of the following agency sources: 1) NWHIMNM-HIMB partnership, 2) The University of Hawaii.

**5. Time frame:**
Activity start: 5 July 2012
Activity completion: 25 July 2012

Dates actively inside the Monument:
From: 6 July 2012
To: 24 July 2012

Describe any limiting factors in declaring specific dates of the proposed activity at the time of application: Exact dates are ultimately determined by captain of the ship Hi'alakai.

Personnel schedule in the Monument: Stephen A. Karl: all locations all times
Jonathan Whitney: all locations all times.
Sherril Leon Soon: all locations all times.
Jacquilyn Troller: all locations all times.
Final schedule is still pending but the ship generally stops at most of the atoll for 2 – 5 days usually with a day or two transit between atolls.

**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:**

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

☒ Vessel
☐ Aircraft

Provide Vessel and Aircraft information: NOAA ship HI'IALAKAI

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

☐ Rodent free, Date:
☐ Tender vessel, Date:
☐ Ballast water, Date:
☐ Gear/equipment, Date:
☐ Hull inspection, Date:

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

Captain's name:
IMO#:
Vessel ID#:
Flag:
Vessel type:
Call sign:
Embarkation port:
Last port vessel will have been at prior to this embarkation:
Length:
Gross tonnage:
Total ballast water capacity volume (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: These are determined by the CO of the NOAA ship Hi'alakai

## 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

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

GUY KAULUKUKUI
FIRST DEPUTY

WILLIAM M. TAM
DEPUTY DIRECTOR - WATER

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

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

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

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. STEPHEN KARL, ASSOCIATE RESEARCHER, UNIVERSITY OF HAWAII, HAWAII INSTITUTE OF MARINE BIOLOGY, FOR ACCESS TO STATE WATERS TO CONDUCT CORAL DISEASE RESEARCH ACTIVITIES AND FISH CONNECTIVITY STUDIES UNDER PERMIT PMNM-2012-030.

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. Stephen Karl, Associate Researcher, University of Hawaii, Hawaii Institute of Marine Biology, for Access to State Waters to Conduct Coral Disease Research Activities and Fish Connectivity Studies.

Permit Number: PMNM-2012-030

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

There are two proposed activities by this applicant. The first is an effort to better characterize coral diversity within the reefs and improve our understanding of the underlying causes of diseases in corals, as coral diversity which have direct bearingon reef health and robustness. Small samples of *Acropora cytherea* would be collected primarily from reefs at French Frigate Shoals, where the incidence of growth anomalies (GAs) in this species is highest, but the applicant also proposes to collect at Maro Reef and Laysan Island.

The second activity would address the level of isolation between deep and shallow reef ecosystems across the NW Hawaiian Archipelago. The Applicant proposes to collect specimens of a targeted group of 8 species of nearshore reef fishes for genetic connectivity studies that will be carried out by the Toonen-Bowen lab at the Hawaii Institute of Marine Biology. This work has large implications for understanding how these ecosystems would recover from natural or anthropogenic perturbations.

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 includes a strategy to research, characterize and monitor marine ecosystems.

Activities to support understanding and interpreting the NWHI are addressed in the Monument Management Plan Environmental Assessment (December 2008) which resulted in a FONSI. This EA summarizes that understanding the genetic diversity of species groups and how these populations change could be helpful to forecast, prepare for and mediate potential threats to populations within the Monument (PMNM MMP Vol. 2, p.171). Activities to determine the coral genetic diversity and connectivity of reef fishes in the Monument, 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 collection of coral samples and the sampling and subsequent genetic and taxonomic study of reef fishes, 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 genetic study of patterns of reef fish, 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 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 first activity involving coral genetic diversity analysis would build upon work previously conducted by the applicant. Specifically, examining genetic diversity in areas that have been found to have high degrees of genetic clonality, and furthering this research by examining the underlying cause of a disease that is prevalent in these areas of the Monument. The applicant has been granted permits by the State since 2006 for ongoing research and monitoring that aims to assess the degree of genetic variation present in coral reefs in the Monument. Only one previous study looking at the genetic fingerprint of individual coral on a reef has been undertaken to date. The sampling technique used is non-lethal and does not impact the ecological integrity of the coral reef ecosystem. A small biopsy is removed that heals in a matter of weeks and is significantly less impactful than natural predation on these organisms. For the second objective, involving fish connectivity studies, the Toonen-Bowen lab at HIMB has been conducting this type of work in the State Marine Refuge since its inception, with no deleterious effects being noted. With this in mind, significant cumulative impacts are not anticipated as a result of these activities, and numerous safeguards further ensure that the potentially sensitive environment of the project area will not be significantly affected. All activities will be conducted in a manner compatible with the management direction of the Monument Proclamation in that the activities do not diminish monument resources, qualities, and ecological integrity, or have any indirect, secondary, cultural, or cumulative effects. The joint permit review process did not reveal any anticipated indirect or cumulative impacts, nor did it raise any cultural concerns, that would occur as a result of these activities.

These activities would be conducted from the NOAA Ship HI'IALAKAI (PMNM-2012-009) during its July cruise. The fish connectivity studies would also be conducted during the September cruise, under field PI Dr. Randall Kosaki. The following tables list additional activities that are anticipated to take place on these cruises pending approval of permit applications.

**Table 1. Concurrent Projects Aboard NOAA SHIP HI'IALAKAI During the July Cruise.**

| 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-2012-032 Thomas (proposed) | The proposed action is to allow deployment of environmental data sensors. | All locations |
| PMNM-2012-041 Winn-Kahng (proposed) | The proposed action is to allow water sampling collection activities. | All locations |

One other proposed activity includes collections of the same coral species, *Acropora cytherea,* as is proposed by this Applicant for growth anomaly studies. However, the samples of growth anomalies that would be collected during the proposed activities would be shared between the two applicants and Dr. Greta Aeby (PMNM-2012-40) would only be collecting additional samples from this species if colonies with White Syndrome are found, which is an entirely different disease. Dr. Karl would collect the growth anomaly samples for genetic analysis (the present permit application) and a small portion of these same samples would be shared with Dr. Aeby for zooxanthellae clade analysis in Dr. Rob Toonen's lab at the Hawaii Institute of Marine Biology.

One additional proposed activity, by Dr. Carl Meyer (PMNM-2011-018), includes collections of reef fishes during this time span and needs to be considered when reviewing this Applicant's proposed collections. One shallow reef fish species (*Chromis verater*) is proposed to be collected by both Meyer and the applicant. However, Meyer and Karl have requested to collect this species from different locals, so again no sampling overlap is present. Specifically, Meyer proposes collection reef fishes at Pearl and Hermes Atoll and French Frigate Shoals, whereas Karl will not be collecting this species at these locales (see Appendix 1, Item F-4a) – thus no overlapping collections are proposed.

None of the other activities proposed during this research cruise involve the collection of corals or of the targeted reef fish species that are 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. | All locations |
| PMNM-2012-001 Co-Trustee | The proposed action is to facilitate the needs of the monk seal field camp | 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 coral disease monitoring and collections or fish collections that are being proposed.

**Table 3. Concurrent Projects Aboard NOAA SHIP HI'IALAKAI During the September Cruise.**

| Permit | Purpose and Scope | Location |
|---|---|---|
| PMNM-2012-009 NOAA Ship HI'IALAKAI | The permit allows NOAA Ship HI'IALAKAI entry into PMNM. Personnel aboard the vessel will be permitted under separate permits. | All locations |
| PMNM-2012-025 Kosaki (proposed) | The proposed action is to use conventional and technical SCUBA to survey biodiversity of NWHI deep reefs and the presence/absence of alien species. | All locations |

| Permit | Purpose and Scope | Location |
|---|---|---|
| PMNM-2012-020 Anthony (proposed) | The proposed action is to videotape animals and cultural sites for a cultural briefing video. | All locations |
| PMNM-2012-033 Bowen (proposed) | The proposed action is to collect shallow reef fish, plus mesophotic reef fish, invertebrates and one plant species for genetic surveys. | All locations |
| PMNM-2012-028 Lemus (proposed) | The proposed action is to allow interviews with research scientists during the course of their field work, and filming of both the natural resources under study and the scientists conducting the studies to develop multimedia resources for distance learning. | All locations |
| PMNM-2012-041 Winn and Kahng (proposed) | The proposed action is to allow water sampling activities. | All locations |
| PMNM-2012-029 Lammers | The proposed action is to allow deployment of acoustic recording equipment. | All locations |

During the September cruise, there is one other activity which would also be collecting reef fishes, and needs to be considered when reviewing this applicant's proposed collections. Dr. Brian Bowen (PMNM-2012-033) intends to collect shallow and mesophotic reef fishes. However, while these activities are permitted separately, the collections that Dr. Kosaki would be making are for the genetic connectivity studies done in Dr. Bowen's lab and are for species that would not be collected by Dr. Bowen under his permit. Therefore, the collections by these applicants would not overlap.

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 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.

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