

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

June 12, 2015

Board of Land and Natural Resources
Honolulu, Hawai'i

Request for Authorization and Approval to Issue a Papahānaumokuākea Marine National Monument Research Permit to Dr. Carl Meyer, Hawai'i Institute of Marine Biology, University of Hawai'i, for Access to State Waters to Conduct Top Predator Feeding Habits and Movement 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 Applicant Dr. Carl Meyer, Hawai'i Institute of Marine Biology, University of Hawai'i, pursuant to § 187A-6, Hawai'i Revised Statutes (HRS), Chapter 13-60.5, Hawai'i Administrative Rules (HAR), and all other applicable laws and regulations.

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

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

The activities covered under this permit would occur between June 1, 2015 and May 31, 2016. The proposed activities are largely a continuation of work previously permitted and conducted in the Monument.

INTENDED ACTIVITIES

The proposed project would quantify movements and answer questions pertaining to the trophic ecology of top predators (sharks and large fishes) in the Monument, (1) improving the broad understanding of Monument ecology, (2) elucidating the role of deep reefs in the ecology of

Monument predators, (3) enhancing understanding of food web dynamics in the Monument, and (4) enhancing understanding of the drivers of marine herbivory in the Monument and elsewhere.

Information would assist in management activities by adding to the understanding of movement patterns and feeding habits of top predators and clarify relative contributions of herbivory and planktivory to Monument food webs that support these predators. The Applicant will also further investigate individual specialization in diet for sharks and ulua to provide managers with knowledge of how top predators influence the food webs. Additionally, the research will add to understanding of mesophotic deep reefs which are poorly-understood. Lastly, the research will provide insight into the potential drivers of the presence of herbivorous fishes in various mesophotic reefs in the Monument.

Research staff would enter the Monument and conduct activities from the NOAA ship HI'IALAKAI (separately permitted under permit number PMNM-2015-006).

To fulfill these objectives, the Applicant proposes to:

1. Download 24 underwater receivers currently stationed in the Monument to retrieve stored movement data from 267 top predators tagged with acoustic transmitters from 2008 to 2014.
2. Determine how widely these animals have ranged since Fall 2014 and identify their patterns of movement.
3. Equip up to 160 additional ulua and sharks (20 of each species at French Frigate Shoals, Pearl and Hermes, Midway, and Kure) with pressure-sensor acoustic transmitters detectable by our listening array. These tag deployments will enable us to further clarify movements between shallow and mesophotic habitats by abundant monument predators.
4. Equip up to 5 ulua and 5 Galapagos sharks at French Frigate Shoals, Pearl and Hermes, Midway, and Kure with accelerometers and digital camera data loggers to provide high resolution information on swimming patterns, habitat use and feeding.
5. Collect small samples of muscle tissue from predators (ulua, Galapagos sharks) for chemical analyses from French Frigate Shoals and Pearl and Hermes to provide insight into predator feeding habits and reproductive status (up to 160 predators in total will be sampled). A small, non-lethal biopsy will be taken from each predator during tagging activities. To establish the chemical composition of prey species, tissue samples will be collected from 240 reef fishes collected at shallow and deep locations at French Frigate Shoals, Pearl and Hermes, Midway, and Kure.
6. Lethally sample reef fishes from shallow and mesophotic reefs for four locations: French Frigate Shoals, Pearl and Hermes, Midway, and Kure (240 total). Digestive enzyme activity of 80 herbivorous individuals from among these 240 fishes will be quantified.
7. Algal collection: Algae will be sampled from shallow and mesophotic reefs at French Frigate Shoals, Pearl and Hermes, Midway, and Kure and analyzed for digestability. Collections would consist of a gallon ziplock bag of the most common algal species present per site. The Applicant

will quantify the levels of toxic chemicals in algae as well as nutrient/starch content.

Table 1: Proposed reef fish collection list.

Common name ¹	Scientific name	Number of fish collected
		Shallow water
Manybar goatfish	<i>Parupeneus multifasciatus</i>	40
Milletseed butterflyfish	<i>Chaetodon miliaris</i>	40
Bluestriped butterflyfish	<i>Chaetodon fremblii</i>	40
Yellowfin soldierfish	<i>Myripristis chryseres</i>	40
Orange-band surgeonfish	<i>Acanthurus olivaceus</i>	80

Methodologies remain the same as previous years. Predator handling and tagging activities would be carried out in accordance with the animal use protocols of the University of Hawai'i (protocol #05-053).

The activities proposed by the Applicant directly support the Monument Management Plan's priority management need 3.1 – Understanding and Interpreting the NWHI, 3.1.1 – Marine Science Action Plan, Activity MCS-1.5: Measure connectivity and genetic diversity of key species to enhance management decisions and 3.2 – Conserving Wildlife and Habitats, 3.2.1 – Threatened and Endangered Species Action Plan, Activity TES-1.6: Reduce shark predation on monk seals sharks known to kill and injure Hawaiian monk seals. MCS-1.5 emphasizes the importance of understanding connectivity and genetic diversity to effectively manage for changes in the environment and mitigate future threats (PMNM MMP Vol 1, p123, 2008). TES-1.6 emphasizes that more needs to be understood about shark abundance, prey preference, and seasonal movement patterns (PMNM MMP Vol 1, p163, 2008).

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

- Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving Monument resource
- Drilling into, dredging, or otherwise altering the submerged lands other than by anchoring a vessel; or constructing, placing, or abandoning any structure, material, or other matter on submerged lands
- Discharging or depositing any material or matter into the Monument
- Possessing fishing gear except when stowed and not available for immediate use during passage without interruption through the Monument
- Attracting any living Monument resources
- Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

REVIEW PROCESS

¹ Fish species are the four most common reef fish at shallow water sites and six most common reef fish species observed at deep water sites. Relative abundance was determined based on previous permitted trips to the Monument.

The permit application was sent out for review and comment to the following scientific and cultural entities: Hawai'i Division of Aquatic Resources, Hawai'i Division of Forestry and Wildlife, Papahānaumokuākea Marine National Monument (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO), United States Fish and Wildlife Service Hawaiian and Pacific Islands National Wildlife Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application has been posted on the Monument Web site since March 3, 2015, giving the public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument's Public Notification Policy.

Comments received from the scientific community are summarized as follows:

Questions:

None.

Comments:

1. The research team should review and adhere to the Boating and Diving Best Management Practice in place for the Monument.

Agreed and noted.

The following questions were raised:

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

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

Comments received from the public are summarized as follows:

No comments were received from the public on this application.

Additional reviews and permit history:

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

If so, please list or explain:

- The proposed activities are in compliance with the National Environmental Policy Act.
- The proposed activities are in compliance with the National Historic Preservation Act.
- An informal consultation pursuant to section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. §1531 *et seq.*) was conducted on 7 May 2014 with the National Marine Fisheries Service (NMFS) to analyze the effects of conducting fishing activities within the Monument on protected species and Hawaiian monk seal critical habitat. The consultation is valid through May 2018.
- 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 PAPAĪNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR. CARL MEYER, HAWAII INSTITUTE OF MARINE BIOLOGY, UNIVERSITY OF HAWAII, FOR ACCESS TO STATE WATERS TO CONDUCT TOP PREDATOR FEEDING HABITS AND MOVEMENT RESEARCH ACTIVITIES UNDER PERMIT PMNM-2015-020.”

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

- The Applicant was granted permits between 2008 through 2012 for similar work (PMNM-2008-027, PMNM-2009-009, PMNM-2009-036, PMNM-2009-037, PMNM-2010-019, PMNM-2011-018, PMNM-2012-050 and PMNM-2014-014.)
- Bud Antonelis was granted permit no. PMNM-2009-002 in 2009 for similar work.

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

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

STAFF OPINION

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

MONUMENT MANAGEMENT BOARD OPINION

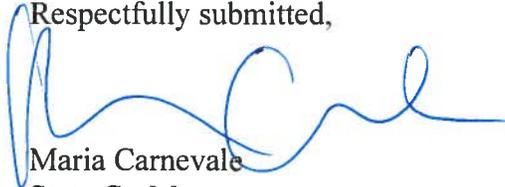
The MMB is of the opinion that the Applicant has met the findings of Presidential Proclamation 8031 and this activity may be conducted subject to completion of all compliance requirements. The MMB concurs with the special conditions recommended by PMNM staff.

RECOMMENDATION:

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

1. This permit is not to be used for nor does it authorize the sale of collected organisms. Under this permit, the authorized activities must be for noncommercial purposes not involving the use or sale of any organism, by-products, or materials collected within the Monument for obtaining patent or intellectual property rights.
2. The permittee may not convey, transfer, or distribute, in any fashion (including, but not limited to, selling, trading, giving, or loaning) any coral, live rock, or organism collected under this permit without the express written permission of the Co-Trustees.
3. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocols attached to this permit.
4. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.
5. Refueling of tenders and all small vessels must be done at the support ships and outside the confines of lagoons or near-shore waters in the State NWHI Marine Refuge.
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,



Maria Carnevale
State Co-Manager
Papahānaumokuākea Marine National Monument

APPROVED FOR SUBMITTAL



SUZANNE CASE
Chairperson

Papahānaumokuākea Marine National Monument
RESEARCH Permit Application

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

ADDITIONAL IMPORTANT INFORMATION:

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

INCOMPLETE APPLICATIONS WILL NOT BE CONSIDERED

Send Permit Applications to:
NOAA/Inouye Regional Center
NOS/ONMS/PMNM/Attn: Permit Coordinator
1845 Wasp Blvd, Building 176
Honolulu, HI 96818
nwhipermit@noaa.gov
PHONE: (808) 725-5800 FAX: (808) 455-3093

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: Carl G. Meyer

Affiliation: Hawaii Institute of Marine Biology

Permit Category: Research

Proposed Activity Dates: May 1st-Oct 30 2015

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

Proposed Locations: Necker, Nihoa, French Frigate Shoals, Gardner Pinnacles, Maro Reef, Lisianski, Laysan, Pearl & Hermes Reef, Midway, Kure

Estimated number of individuals (including Applicant) to be covered under this permit: 8

Estimated number of days in the Monument: 70

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...

Quantify the movements and trophic ecology of top predators (sharks and large fishes) in the Monument to: (1) improve our broad understanding of Monument ecology, (2) further elucidate the role of deep reefs in the ecology of Monument predators, and (3) enhance our understanding of food web dynamics in the Monument (4) enhance our understanding of the drivers of marine herbivory in the Monument and elsewhere.

b.) To accomplish this activity we would

Capture and equip top predators with electronic tags and small video cameras, and monitor their movements using acoustic receivers (deployed on the sea floor). Collect small, non-lethal tissue samples from top predators for chemical analysis to determine feeding habits. Collect reference isotopic samples from deep and shallow reefs by: (1) lethal sampling of up to 240 reef fishes (collected via 3-prong pole spear). These reference samples will be used to determine the trophic position and feeding location of predators, and clarify the foodweb baseline in Monument locations. (2) quantify digestive enzyme activity in herbivorous fishes along a latitudinal and vertical gradient. (3) assess digestability of algae between shallow and mesophotic reefs

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

Our research will provide Monument managers with information on the movements patterns and feeding habitats of culturally and ecologically important top predators, and clarify the relative contributions of herbivory and planktivory to Monument food webs supporting these predators. Our most recent published research suggests individual dietary specialization among predators, with individuals from the same species feeding on different prey types. We will be further investigating individual specialization in diet for sharks and ulua to provide managers with a more in-depth understanding of how top predators influence Monument food webs. We will also continue to provide new information on the importance of a poorly-understood habitat type (mesophotic deep reefs) in the Monument, to the ecology of top predators. Our research will also provide insight as to potential drivers of the presence of herbivorous fishes in the monument. Herbivores are abundant on some mesophotic reefs (e.g. FFS) but virtually absent on others (PHR), yet the reasons for these differences are unknown.

Other information or background:

Our research has minimal impact on monument resources. Sharks and other predators are captured, tagged and released at their capture locations. Our listening stations (acoustic receiver + moorings) are designed to have minimal substrate impact and leave nothing behind when they are removed. We are requesting to lethally sample no more than 240 individuals from the most common species of reef fishes.

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Meyer, Carl, G.

Title: Assistant Researcher

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

Carl Meyer

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

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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

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

University of Hawaii, Hawaii Institute of Marine Biology

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):

Yannis Papastamatiou, Co-collaborator, Research Diver, Field Biologist

Mark Royer, Co-collaborator, Research Diver, Field Biologist

Danny Coffey, Co-collaborator, Research Diver, Field Biologist

James Anderson, Co-collaborator, Research Diver, Field Biologist

TBD

TBD

TBD

Section B: Project Information

5a. Project location(s):

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

Ocean Based

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

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

Location Description:

Fishing/Tagging

Fish capture and tagging will be carried out from small vessels (launched from a mother ship) and will occur in the shallow waters around the Monument locations listed above.

Receiver Deployment and Recovery

A total of 24 receivers are currently deployed at 3 islands/atolls in the Monument (Appendix 1). Our goal is to service and redeploy these existing receivers to provide continued monitoring coverage within the Monument.

Reef fish collection

Up to 240 reef fishes will be collected using pole spears in shallow waters and on mesophotic reefs (depth 150-300ft) at FFS, PHR, MID, KUR.

Algal Collection

We will collect algal samples from mesophotic and shallow reefs at FFS, PHR, MID, KUR. We will fill one ziplock bag (1 gallon) on shallow and mesophotic reefs at each of those locations

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:*

(a) Purpose of proposed activities

The purpose of this research is to provide managers with empirical data on top predator movement patterns and feeding habitats in Monument waters. This information will provide managers with a clearer understanding of the role top predators play in food web dynamics in Monument waters. We have the following specific goals and objectives;

1. Download 24 underwater receivers currently stationed in the Monument to retrieve stored movement data from 267 top predators tagged with acoustic transmitters from 2008 to 2014.
2. Determine how widely these animals have ranged since Fall 2014 and identify their patterns of movement.
3. Equip up to 160 additional ulua and Galapagos sharks (20 of each species at FFS, PHR, MID, and KUR) with pressure-sensor acoustic transmitters detectable by our listening array. These tag deployments will enable us to further clarify ‘upslope-downslope’ movements between shallow and mesophotic habitats by abundant monument predators.
4. Equip up to 5 ulua and 5 Galapagos sharks at FFS/PHR/MID/KUR with tri-axial accelerometers and digital camera data loggers to provide high resolution information on swimming patterns, habitat use and feeding.
5. Collect small samples of muscle tissue from predators (ulua, galapagos sharks) for chemical analyses (stable isotopes), from FFS and PHR to provide insight into predator feeding habits and reproductive status (up to 160 predators in total will be sampled). A small, non-lethal biopsy will be taken from each predator during tagging activities. To establish the chemical composition of prey species, tissue samples will be collected from 240 reef fishes collected at shallow and deep locations at FFS, PHR, MID and KUR (see lethal collections below).
6. Lethally sample reef fishes from shallow and mesophotic reefs for four locations: FFS, PHR, MID, KUR (240 total). Digestive enzyme activity of 80 herbivorous individuals from among these 240 fishes will be quantified.
7. Algal collection: Algae will be sampled from shallow and mesophotic reefs at FFS, PHR, MID and KUR and analyzed for digestability. Collections would consist of a gallon ziplock bag of the most common algal species present per site. We will quantify the levels of toxic chemicals in algae as well as nutrient/starch content.

(b) Need for proposed activities

Top predators play an important role in many ecosystems and in Monument waters this role is filled by sharks (primarily tiger, galapagos, gray reef and whitetip reef sharks) and large teleost fishes (primarily ulua) (DeCrosta, Wetherbee et al. 1997, Friedlander & DeMartini 2002, Holzwarth et al. 2006, Papastamatiou et al., 2006). Science-based management of the marine top predators of the Hawaiian archipelago requires that we know whether key species are site-

attached to specific areas or, if not, how frequent and extensive are their movements. Since 2005 we have been using a combination of acoustic and satellite tags to quantify top predator movements in the Monument, and address three broad questions relevant to management zoning; (1) Do top predators move across open ocean between atolls?, (2) How extensive are their intra-atoll movements?, and (3) Do top predators exhibit predictable patterns of movement and habitat use? (4) Do predators influence the presence of herbivores on mesophotic reefs?

Using these technologies we have already made substantial progress in quantifying predator movement patterns in Monument waters and beyond (see Meyer et al. 2007a,b, Meyer et al. 2009, 2010, Papastamatiou et al. 2013, Papastamatiou et al. In Press). For example, we have shown that tiger sharks routinely swim between atolls, range along the entire Hawaiian archipelago and venture hundreds of miles beyond Monument boundaries into open-ocean. Mature female tiger sharks may travel from monument waters to the Main Hawaiian Islands for pupping during the fall (Papastamatiou et al. 2013). We also obtained the first empirical evidence that gray reef sharks swim across open-ocean between atolls. We have found other top predators (e.g. ulua, Galapagos sharks) are site-attached to individual atolls, but wide-ranging within their 'home' atoll (e.g., Meyer et al., 2007a,b, 2010). We discovered that ulua & uku have predictable patterns of movement, including diel habitat shifts and tidal & lunar rhythmicity (Meyer et al., 2007a,b). We also found that during summer full moons, ulua from all over French Frigate Shoals atoll converge on one particular location where they form large spawning aggregations (Meyer et al., 2007a).

Although we have already made substantial progress in quantifying predator movement patterns in Monument waters, important questions remain unanswered. We have gained considerable insight into the horizontal movements of Monument predators but are still in the process of elucidating their vertical movements. For example, our most recent research has revealed that both ulua and Galapagos sharks range between shallow and mesophotic habitats, but patterns of vertical behavior are highly variable between individuals of the same species. This variability in vertical movements is also reflected in the isotopic composition of predator tissues (Papastamatiou et al. In Press), suggesting possible individual specialization in diet and different foraging strategies and habitats within the same species at a single Monument location. These questions have important implications for understanding ecosystem function and resolving important management questions such as whether ulua are competing for food with critically endangered monk seals. Recent surveys of mesophotic reefs in the Monument suggest that these areas maybe important habitat for several life stages of reef fishes and invertebrates, highlighting the importance of understanding the links between mesophotic and shallow reefs. Our initial data from PHR suggest that predators utilize mesophotic reefs and may in fact be important vectors, transferring nutrients from shallow to deeper reefs (Papastamatiou et al. In Press). To expand on this work we need to see whether similar patterns exist at other islands and atolls of the NWHI. Our previous work has also suggested that predators only obtain 35% of their prey from mesophotic reefs. However, it has also been noticed that herbivorous fishes are found on mesophotic reefs of some atolls (e.g. FFS) but absent from others (PHR). It is unknown if this is due to the presence of predators and reduced shelter on mesophotic reefs or potentially physiological constraints on the herbivores. The drivers of herbivory are one of the pivotal

questions in ecology and we will take a unique perspective by studying the fishes along a latitudinal and more importantly, vertical, gradient.

(c) Scope of proposed activities

We propose to recover, download and redeploy up to 24 receivers already stationed in Monument waters (see Appendix 1). This will enable us to recover another 12 months of predator movement data (Fall 2014-Summer 2015) and to continue monitoring our transmitter-equipped predators in order to determine how their movement patterns vary over multi year time-scales. In order to quantify the vertical (depth) movements of ulua and Galapagos sharks, we propose implanting pressure-sensor acoustic transmitters (to quantify swimming depth) into 20 individuals from each species at PHR, FFS, MID & KUR (i.e. 80 total ulua & 80 total Galapagos sharks). To provide additional, high-resolution data on movement patterns, habitat use and feeding, we are also proposing to equip 5 Galapagos sharks and 5 ulua at FFS and/or PHR and/or MID and/or KUR with accelerometer-digital camera data loggers.

To quantify trophic ecology of predators, we will obtain muscle biopsies from all galapagos sharks and uluas captured (up to 160 total). We will analyze the isotopic content of muscle tissue to determine carbon:nitrogen ratios, which will provide insight into the trophic levels of these animals and where they are foraging. To ground truth carbon values, we will also collect a total of up to 240 reef fishes from among the most common species at 4 Monument atolls. At FFS, PHR, MID and KUR we will collect fishes from a mesophotic reef and a shallow water (30-60ft) comparison site. We will select shallow water collection sites that are directly inshore from the mesophotic collection sites. Experienced collectors will use three-prong spears to capture reef fishes at both shallow and mesophotic sites;

Mesophotic fish collectors

Randy Kosaki
Yannis Papastamatiou
TBD
TBD

Shallow fish collectors

Randy Kosaki
Yannis Papastamatiou
Mark Royer
Carl Meyer
TBD
TBD

For each atoll, we aim to collect the same species at both deep and shallow reefs. Note that to minimize temporal variation in isotope signatures, tissue samples from predators/reef fish need to be collected at the same time (i.e. we cannot use tissues from frozen specimens collected in previous years).

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

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

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

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

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

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

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

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

The Findings are as follows:

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

The activity will be conducted with adequate safeguards for the resources and ecological integrity of the Monument. For top predators we use non-lethal catch and release, and telemetry techniques that have minimal impact on the resources and ecological integrity of the Monument. Some reef fishes will be lethally sampled, but only at very low numbers per site (no more than 10 individuals per species), and overall (240 fish total from 8 sites at 4 atolls). We will also share specimens with other researchers for genetic analysis and life history characterization so that lethally-sampled fishes are fully utilized. This project is a continuing effort to quantify top predator movements and feeding ecology throughout the NWHI for the purpose of informing management. Principal Investigator Carl Meyer has previously consulted with William Aila about the cultural implications of this research. Mr Aila is very familiar with our research, having both observed and assisted us during shark tagging activities conducted at French Frigate Shoals in June 2010. This provided a valuable opportunity for Carl Meyer to discuss at length with Mr Aila the challenges associated with balancing cultural concerns against the need for directed management of Monument resources, including the gathering of scientific knowledge.

b. How will the activity be conducted in a manner compatible with the management direction of this proclamation, considering the extent to which the conduct of the activity may diminish or enhance Monument cultural, natural and historic resources, qualities, and ecological integrity, any indirect, secondary, or cumulative effects of the activity, and the duration of such effects?

The proposed activities will have minimal impact on the resources of the region. The top predator tracking & sampling research consists of non-lethal catch and release, telemetry monitoring, autonomous data-logging and tissue sampling. A limited amount of lethal sampling (240 reef fishes total, 10 per species per sample site) will be conducted at four atolls. This research is being conducted in concert with the priorities listed in Monument research plan for

the Monument. The scientific knowledge provided by these activities will help managers to better understand the role of sharks and other top predators in Monument ecology

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

There is no practicable alternative to conducting activities in the Monument. We are addressing questions that are directly relevant to management of Monument resources (we are quantifying movement patterns & feeding ecology of top predators throughout the Monument), hence the study must be carried out within the Monument.

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

The management value of data produced by our research activities outweighs the minor, transient impacts on Monument resources. The methods and procedures that we are proposing will have minimal impacts on Monument resources, qualities, and ecological integrity. No predators will be removed from the Monument and we have empirical data showing that tagged predators resume normal patterns of behavior soon after release (e.g., Meyer et. al. 2007a,b, 2009, 2010). Up to 240 reef fishes will be removed from the monument, but these will provide valuable data on a little-studied habitat (mesophotic reefs) that is an important component of the Monument ecosystem. Our receivers are stationed on uncolonized habitats, and removal will leave no evidence of their presence in shallow habitats (see Appendix 2), and leave only a small end weight in mesophotic habitats. The scientific knowledge provided by these activities will help managers to better understand the role of sharks and other top predators in the Monument ecosystem.

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

The actual fieldwork component of this research involves the minimum time required to reach the desired sample size of sharks and fishes based on historical catch rates. The monitoring of long-term predator movements is done remotely using small receivers left in situ year-round. The multi-year overall time frame of our proposed activities is consistent with our objectives of quantifying long-term movement patterns of predators in Monument waters. Long-term studies are essential for identifying seasonal movements and determining how movement patterns vary over multi year time-scales.

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

The principle investigator has more than 20 years of experience conducting this type of research (see attached CV for details) and is well qualified to conduct and complete the activity and mitigate any potential impacts resulting from its conduct. All personnel included in this permit application have extensive experience conducting research in wildlife refuges, and in the proposed research techniques. Yannis Papastamatiou has extensive experience performing stable isotope analysis on fish tissues. The Stable Isotope Laboratory at the University of Hawaii Manoa will assist in analysis of samples, under the guidance of Dr Brian Popp. Digestive

enzyme assays and algae digestibility analysis will be performed by Dr Donovan German at University California Irvine. This is a continuance of a multi-year project.

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. Our research will be supported by resources from University of Hawaii, and University of St. Andrews (Scotland). These resources will be adequate to conduct and complete the proposed activities and mitigate any potential impacts resulting from its conduct.

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.

The methods and procedures that we are proposing are ideal for achieving our goals with minimal impacts to Monument resources, qualities, and ecological integrity. The use of passive monitoring techniques (self-contained acoustic receivers) means that we need relatively little human access to the Monument in order to achieve continuous, year-round monitoring of predator movements. Our shallow site receivers are stationed on uncolonized habitats, and removal will leave no evidence of their presence (see Appendix 2). Mesophotic receivers leave a small end-weight behind on recovery. No top predators will be removed from the Monument as a result of our research, and we have empirical data showing that tagged predators resume normal patterns of behavior soon after release (e.g., Meyer et. al. 2007a,b, 2010). Our datalogging (accelerometer-camera) techniques will provide novel insight into predator behavior via brief (days), temporary attachment of datalogging packages that release from predators automatically, float to the surface and are recovered via a homing beacon. A very limited amount of lethal sampling (240 reef fishes total, maximum 10 fish per species per sample site) will be conducted at four atolls

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

We will use a combination of NOAA and private charter vessels equipped with appropriate mobile transceiver units

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

We have met all requirements of previously issued permits for research work in PMNM. There are no other factors that would make the issuance of a permit for our proposed activities inappropriate.

8. Procedures/Methods:

Activities will be carried out from small boats launched from a mother ship. Servicing of receivers will be done by snorkelers and SCUBA divers, and from small boats via an acoustic release system. Our chosen long-term monitoring method (remote acoustic monitoring) is ideal for quantifying animal movements in remote, environmentally-sensitive locations because it has minimal environmental impact and requires only occasional, brief access by researchers to individual study sites, yet provides continuous monitoring of animal movements at those sites.

Shorter term datalogging involves temporary attachment of small devices to study species. The devices release automatically at a pre-determined time and are found and recovered via a homing beacon. We have previously used this datalogging technique successfully in Monument waters.

(a) Recovery and redeployment of underwater receivers

Shallow (<30 m) deployments: We will continue to use a temporary receiver mooring system that has previously been empirically demonstrated to successfully withstand seasonal high surf. Moorings, installed by snorkelers or SCUBA divers will consist of sand screws in areas of soft sediment, and chain around uncolonized substrate in hard bottom areas (live substrates will be avoided). We will completely remove these moorings when acoustic monitoring is completed (receivers will be in place for at least 2 years). The receivers will be anchored to the moorings and suspended 1-4 m above the ocean floor. The receivers will identify and record the presence of any acoustic transmitters within range (up to 500 m). The transmitter number, time of arrival and departure and the date will be recorded and stored until the data are downloaded from the receivers to a computer. The receivers have a battery life of approximately 15 months and will be serviced at 12 month intervals.

Deep (mesophotic >50m) deployments: We will recover and redeploy 6 underwater receivers at existing mesophotic sites at Pearl and Hermes Reef and French Frigate Shoals atoll. Receivers will be attached to weighted (with concrete block) moorings, and dropped to the sea floor so that they land on flat, uncolonized habitat (determined via echosounding). The moorings will incorporate an acoustic release to allow for surface recovery. Use of an acoustic release means the end weights and lower 30cm of the mooring (chain, polypro and twine) are sacrificial and will be left in situ when the receivers are recovered. As with shallow units, the mesophotic zone receivers will be suspended 4 m above the ocean floor and will be serviced at 12 month intervals.

(b) Data retrieval, reduction and analysis.

We will download receivers currently deployed in Monument waters (Appendix 1). Data downloading consists of interfacing the receiver to a computer via a wireless 'bluetooth' connection, and can be accomplished in the field. Preliminary data reduction and analyses will commence after downloading.

(c) Deployment of acoustic transmitters

We will implant acoustic transmitters into up to 160 sharks and fishes captured in monument waters. Our predator handling & tagging activities will be carried out in accordance with the animal use protocols of the University of Hawaii (protocol #05-053). Ulua will be captured by trolling (using an artificial lure) and handlining (using a single baited hook) from a small skiff. Sharks will be captured by handlining (using a single baited hook) from a small skiff and using a bottom-set, 10 hook shark line. Captured sharks and ulua will be brought alongside the skiff, tail-roped and inverted to initiate tonic immobility for transmitter implantation. We will implant coded acoustic transmitters (V16 & V16P, 16 mm diameter, 90 mm long, Vemco, Halifax, Nova Scotia) into the body cavities of each predator through a small incision in the abdominal wall (Holland et al., 1999; Meyer & Honebrink 2005, Meyer et al. 2007a,b, 2010). The incision will then be sutured closed, blood will be drawn from the caudal vein, a small tissue sample will be

taken from the dorsal musculature (see also below), the hook removed and the predator released. This entire handling process can be completed in less than 10 minutes. Every fish captured and equipped with an acoustic tag will also receive an external dart tag.

Previous reviews of the above capture procedures have prompted a series of questions about potential impacts on other species. To provide additional information we have included these questions and our responses;

1. What kind of by-catch is likely to occur?

Trolling by-catch includes reef-associated piscivores attracted to artificial lures, primarily uku (*Aprion virescens*). Baited handlines and sharklines very rarely catch anything other than target species. Any non-target species are released.

2. How can by-catch be minimized or mitigated?

Non-target fishes captured by trolling are immediately released. If by-catch becomes more than occasional then trolling is ceased in that area.

3. Are lines an entanglement hazard for seals? What mitigation measures are taken?

No. Handlines (baited and trolled) are manned constantly. We have not been approached by seals while using these methods. We have never had any seal interactions with bottom-set shark lines. These are heavy gauge lines with heavy end-weights and large surface floats, resulting in a 'taut' deployment, greatly reducing entanglement risks. As an added precaution we constantly monitor any such lines set within 1 km of seal haul-out sites.

4. Has there been any seabird interaction with the fishing gear?

Seabirds are sporadically attracted by trolling activities. Fishing is ceased and lines retrieved whenever birds show interest in the fishing gear. By taking these precautions we have avoided any physical interactions between birds and trolling gear.

(d) Deployment and recovery of accelerometer-digital camera dataloggers

Shark and ulua capture methods for accelerometer deployment methods are identical to those described in item (c) above. Each datalogger package will consist of a tri-axial accelerometer (W1000L-PD3GT, 22 mm in diameter, 123 mm in length, 90 g in air; Little Leonardo Co., Tokyo, Japan) and a digital camera (DSL380-VDT, 22 mm in diameter, 132 mm in length, 83 g in air; Little Leonardo Co., Tokyo, Japan), attached to a float equipped with a VHF transmitter and timed release mechanism (see picture - Appendix 3).

Accelerometers record swimming speed, depth, temperature (at 1 s intervals), and tri-axial acceleration (at 1/32 s intervals, 32 Hz). Digital video cameras capture 8h hours of duty-cycled

footage (i.e. the 8h can be spread across several days of deployment), and record depth and temperature at 1 sec intervals. Total device weights in air are 311g, and their buoyancies are offset by 76 g in sea water. The accelerometer package will be attached to the left or right pectoral fin of each shark by cable ties secured through two small holes drilled through the fin (see picture - Appendix 3). The devices will be attached to the second dorsal fin of each ulua using cable ties secured through small holes through the superficial dorsal musculature below the dorsal fins. After 24-48 h, a pre-programmed release timer will release the cable tie and allow the instruments to detach and float to the surface, where they will be located using the VHF transmitter and retrieved. Nothing is left attached to the animal.

(e) Collection of tissue biopsies from predators

Predator capture methods for tissue biopsy collections are identical to those described in item (c) above. We will collect small muscle biopsies from all predators captured. This involves making a small incision in the skin and using a biopsy tip to remove approximately 0.5 cc of muscle. These samples will be collected while predators are restrained for tagging. Tissue samples will be transferred to small plastic vials, frozen and transported back to Honolulu for laboratory analyses (stable isotope content).

(f) Collection of tissue biopsies from prey species

To obtain reference 'signatures' of chemical composition of potential prey (smaller reef fishes), we will lethally collect a total of 240 reef fishes from FFS, PHR, MID and KUR (1 shallow and 1 mesophotic site per atoll). We will sample up to 10 individuals per target species at each site. At each atoll, one site will consist of a mesophotic reef and the other an adjacent shallow reef (30-60ft range). Muscle tissue will be obtained from each species for stable isotope analysis. Digestive tracts will be sent to Dr Donovan German at UC Irvine. We will also send the remains of specimens to Drs. Brian Bowen and Eric Franklin for genetic and life history analysis. The latter are collecting specimens to quantify genetic connectivity between Monument locations and between mesophotic and shallow reef sites. Note that to minimize temporal variation in isotope signatures, tissue samples from predators/reef fish/algae need to be collected at the same time (i.e. we cannot use tissues from frozen specimens collected in previous years).

(g) Chemical analyses of tissue samples

Stable isotopes: The composition of heavy isotopes in an animal's tissues reflects that of its food, and the isotopic signature of the primary producers in the ecosystem. The $^{15}\text{N} : ^{14}\text{N}$ ratio is an indicator of a predator's trophic position in the food web, while the $^{13}\text{C} : ^{12}\text{C}$ ratio highlights the source of carbon for the primary producers at the base of the food chain from which the predator is feeding (e.g. coastal or pelagic, France 1995, Post 2002). Samples will be frozen until they are processed at the stable isotope laboratory at the University of Hawaii at Manoa. Samples are dried in a 60 °C drying oven for at least 48 h or until the sample are completely dried out, and then ground into a fine powder and weighed out into micro sampling dishes. We will use a carbon-nitrogen analyzer (Finnigan ConFlo II/Delta-Plus, Bremen, Germany) to determine the relative concentration of heavy ^{15}N and ^{13}C in each sample. Values are presented as ‰, relative to standards of V-PDB and atmospheric N_2 for ^{13}C and ^{15}N respectively.

(f) algal samples will be sent to Dr Donovan German at UC Irvine where they will be analyzed for natural toxins and starch content (as indicator of nutrient value).

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Holzwarth SR, DeMartini EE, Zgliczynski BJ, Laughlin JL (2006) Sharks and jacks in the Northwestern Hawaiian Islands from towed-diver surveys 2000-2003. *Atoll Research Bulletin* 543: 257-280.

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Meyer CG and R Honebrink (2005) Retention of surgically implanted transmitters by bluefin trevally (*Caranx melampygus*). Implications for long-term movement studies. *Transactions of the American Fisheries Society*. 134:602-606.

Meyer CG, Holland KN, Papastamatiou YP. 2007a. Seasonal and diel movements of giant trevally (*Caranx ignobilis*) at remote Hawaiian atolls: implications for the design of Marine Protected Areas. *Marine Ecology Progress Series*. 333: 13-25.

Meyer CG, Papastamatiou YP, Holland KN. 2007b. Seasonal, diel and tidal movements of green jobfish (*Aprion virescens*, Lutjanidae) at remote Hawaiian atolls: Implications for Marine Protected Area design. *Marine Biology*. 151: 2133-2143.

Meyer CG, Clark TB, Papastamatiou YP, Whitney NM, Holland KN. 2009. Long-term movements of tiger sharks (*Galeocerdo cuvier*) in Hawaii. *Marine Ecology Progress Series*. 381: 223–235.

Meyer CG, Papastamatiou YP, Holland KN. 2010. A multiple instrument approach to quantifying the movement patterns and habitat use of Tiger (*Galeocerdo cuvier*) and Galapagos sharks (*Carcharhinus galapagensis*) at French Frigate Shoals, Hawaii. *Marine Biology*. 157:1857–1868. DOI: 10.1007/s00227-010-1457-x

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Papastamatiou YP, Wetherbee BM, Lowe CG, Crow GC. 2006. Distribution and diet of four species of carcharhinid shark in the Hawaiian Islands: evidence for resource partitioning and competitive exclusion. *Marine Ecology Progress Series* 320: 239-251

Papastamatiou YP, Meyer CG, Carvalho F, Dale JJ, Hutchinson MR, et al. 2013. Telemetry and random walk models reveal complex patterns of partial migration in a large marine predator. *Ecology* 94: 2595-2606. doi: 10.1890/12-2014.1.

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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:

Please refer to Appendix 4

Scientific name:

Please refer to Appendix 4

& size of specimens:

Please refer to Appendix 4

Collection location:

Shallow and mesophotic reefs around FFS, PHR, MID, KUR

Whole Organism Partial Organism

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

Fish tissue samples will be utilized for stable isotope analysis. Remains of reef fishes will be passed on to researchers studying genetic conductivity and life history characteristics in the monument.

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

• General site/location for collections:

Shallow and mesophotic reefs at FFS and PHR, MID and KUR

• Is it an open or closed system? Open Closed

N/A

• Is there an outfall? Yes No

N/A

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

N/A

• Will organisms be released?

Predators = yes - see procedures section above.

Prey items = no. Reef fishes will be sacrificed.

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

Muscle tissue and whole reef fishes will be stored frozen for transport out of the Monument.

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

We will share all reef fish specimens with researchers studying genetic conductivity in the monument (Dr Brian Bowen) and life history characteristics of reef fishes (Eric Franklin). These data will be used in collaboration with other proposed projects. Brian Popp (UH-SOEST) will be

using stable isotopes to determine if there is a difference in signal between shallow and deep counterparts, which will be required if we are to determine if predators are foraging on deep reefs. Fish digestive tracts, and algae samples will be sent to Dr Donovan German at UC Irvine

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

Please refer to Appendices 2 and 3

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

N/A

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

Please refer to Appendix 2

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

Analyses, interpretation and publication of data are ongoing. We already have ten papers derived from our PMNM studies published in international peer-reviewed journals.

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

Meyer CG, Papastamatiou YP, Holland KN. 2007. Seasonal, diel and tidal movements of green jobfish (*Aprion virescens*, Lutjanidae) at remote Hawaiian atolls: Implications for Marine Protected Area design. *Marine Biology*. 151: 2133-2143.

Meyer CG, Holland KN, Papastamatiou YP. 2007. Seasonal and diel movements of giant trevally (*Caranx ignobilis*) at remote Hawaiian atolls: implications for the design of Marine Protected Areas. *Marine Ecology Progress Series*. 333: 13-25.

Meyer C.G., T.B. Clark, Y.P. Papastamatiou, N.M. Whitney, & K.N. Holland. (2009). Long-term movements of tiger sharks (*Galeocerdo cuvier*) in Hawaii. *Marine Ecology Progress Series*. 381: 223-235.

Meyer CG, Papastamatiou YP, Holland KN (2010). A multiple instrument approach to quantifying the movement patterns and habitat use of tiger and Galapagos sharks at French Frigate Shoals, Hawaii. *Marine Biology* 157: 1857-1868

Papastamatiou YP, Friedlander AM, Caselle JE, Lowe CG. 2010. Long term movement patterns and trophic ecology of blacktip reef sharks (*Carcharhinus melanopterus*) at Palmyra Atoll. *Journal of Experimental Marine Biology and Ecology* 386: 94-102

Papastamatiou YP, Cartamil DP, Lowe CG, Meyer CG, Wetherbee, BM, Holland KN. 2011. Scales of orientation, directed walks, and movement path structure in sharks. *Journal of Animal Ecology*. In Press.

Dale JJ, Stankus AM, Burns MS, Meyer CG. 2011. The Shark Assemblage at French Frigate Shoals Atoll, Hawai'i: Species Composition, Abundance and Habitat Use. PLoS ONE. In Press.

Nakamura I, Watanabe YY, Papastamatiou YP, Sato K, Meyer CG. 2011. Yo-yo vertical movements suggest a foraging strategy for tiger sharks *Galeocerdo cuvier*. Marine Ecology Progress Series. In Press.

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Meyer C, O'Malley J, Papastamatiou Y, Dale J, Hutchinson M, Anderson J, Royer M, Holland K. 2014. Growth and maximum size of tiger sharks (*Galeocerdo cuvier*) in Hawaii. PLoS One 9:e84799

Papastamatiou YP, Meyer C., Carlvaho F., Dale J., Hutchinson M., Holland K. 2013. Telemetry and random walk models reveal complex patterns of partial migration in a marine predator. Ecology. 94: 2595-2606

Papastamatiou YP, Meyer CG, Kosaki RK, Natalie J. Wallsgrove NJ, Popp BN. In Press. Movements and foraging of predators associated with mesophotic reefs and their potential for linking ecological habitats. Marine Ecology Progress Series.

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:

NOAA/Inouye Regional Center
NOS/ONMS/PMNM/Attn: Permit Coordinator
1845 Wasp Blvd, Building 176
Honolulu, HI 96818
FAX: (808) 455-3093

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 4 – Carl Meyer – Details of reef fish collections (lethal)

Common name: Manybar goatfish
Species name: *Parupeneus multifasciatus*
Total Number Requested: 40
Size Range (cm Total Length): 10-25
Collection Locations: FFS and PHR

Common name: Milletseed butterfly fish
Species name: *Chaetodon miliaris*
Total Number Requested: 40
Size Range (cm Total Length): 5-20
Collection Locations: FFS and PHR

Common name: Bluestriped butterflyfish
Species name: *Chaetodon fremblii*
Total Number Requested: 40
Size Range (cm Total Length): 5-20
Collection Locations: FFS and PHR

Common name: Yellowfin soldierfish
Species name: *Myripristis chryseres*
Total Number Requested: 40
Size Range (cm Total Length): 10-20
Collection Locations: FFS and PHR

Common name: Orange band surgeon fish
Species name: *Acanthurus olivaceus*
Total Number Requested: 80
Size Range (cm Total Length): 15-45
Collection Locations: FFS, PHR, MID and KUR

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): Yannis Papastamatiou, Co-collaborator, Research Diver, Field Biologist

James Anderson, Co-collaborator, Research Diver, Field Biologist

Mark Royer, Co-collaborator, Research Diver, Field Biologist

Danny Coffey, Co-collaborator, Research Diver, Field Biologist

TBD, Field PI, Research Diver, Field Biologist

TBD, Research Diver, Field Biologist

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

Atoll	Location Description	Latitude	Longitude	Depth (ft)
FFS	Rapture Reef	23.63509	-166.18570	85
FFS	Gins	23.72615	-166.16967	37
FFS	SE of La Perouse	23.74926	-166.21773	70
FFS	East Island	23.78686	-166.20709	10
FFS	NE of La Perouse	23.80545	-166.26106	72
FFS	Round & Mullet	23.82747	-166.22857	10
FFS	Tern Island	23.86664	-166.28820	10
FFS	Trig Island	23.86945	-166.24158	15
FFS	North of Trig	23.88609	-166.22641	150
FFS	South mesophotic reef	23.63882	-166.25135	165
Midway	Frigate Point	28.19117	-177.39450	30
Midway	Fish Hole	28.19742	-177.36272	40
Midway	North Barrier Reef	28.28610	-177.36212	90
PHR	SW Corner	27.75290	-175.94805	50
PHR	SE Channel	27.78702	-175.83623	30
PHR	Main Channel -West Side	27.79092	-175.86300	35
PHR	West Spur and Groove	27.80215	-176.01095	100
PHR	NE Side	27.90115	-175.72205	65
PHR	NW Side	27.91095	-175.90890	85
PHR	West side mesophotic reef	27.76206	-175.98315	200

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. Not applicable

4. Funding sources (Attach copies of your budget, specific to proposed activities under this permit and include funding sources. See instructions for more information): Activities are covered by funds provided by a Memorandum of Agreement between University of Hawaii and NOAA

5. Time frame:

Activity start: 2015

Activity completion: 2016

Dates actively inside the Monument:

From: TBD

To: TBD

Describe any limiting factors in declaring specific dates of the proposed activity at the time of application: None known at this time

Personnel schedule in the Monument: TBD

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 Hiialakai

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: [please contact NOAA ship Hiialakai](#)
- Tender vessel, Date: [please contact NOAA ship Hiialakai](#)
- Ballast water, Date: [please contact NOAA ship Hiialakai](#)
- Gear/equipment, Date: [please contact NOAA ship Hiialakai](#)
- Hull inspection, Date: [please contact NOAA ship Hiialakai](#)

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:
NOAA ship Hiialakai carries up to 6 skiffs, 2 have inboard diesel engines, the remainder have 4-stroke outboard gasoline engines

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

DAVID Y. IGE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

June 12, 2015

TO: Division of Aquatic Resources File

THROUGH: Suzanne Case, Chairperson

FROM: Maria Carnevale
Papahānaumokuākea Marine National Monument

DECLARATION OF EXEMPTION FROM THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT UNDER THE AUTHORITY OF CHAPTER 343, HRS AND CHAPTER 11-200 HAR, FOR PAPAHA NAUMOKU AKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR. CARL MEYER, HAWAII INSTITUTE OF MARINE BIOLOGY, UNIVERSITY OF HAWAII, FOR ACCESS TO STATE WATERS TO CONDUCT TOP PREDATOR FEEDING HABITS AND MOVEMENT RESEARCH ACTIVITIES UNDER PERMIT PMNM-2015-020

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. Carl Meyer, Hawaii Institute of Marine Biology, University of Hawaii, for Access to State Waters to Conduct Top Predator Feeding Habits and Movement Research Activities.

Permit Number: PMNM-2015-020

Project Description:

The research permit, as described below, would allow entry and activities to occur in Papahānaumokuākea Marine National Monument, including the NWHI State waters from June 1, 2015 through May 31, 2016. Proposed activities are a continuation of previous work permitted in the Monument.

The proposed project would quantify movements and answer questions pertaining to the trophic ecology of top predators (sharks and large fishes) in the Monument, (1) improving the broad understanding of Monument ecology, (2) elucidating the role of deep reefs in the ecology of Monument predators, (3) enhancing understanding of food web dynamics in the Monument, and (4) enhancing understanding of the drivers of marine herbivory in the Monument and elsewhere.

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

KEKOA KALUHIWA
FIRST DEPUTY

W. ROY HARDY
DEPUTY DIRECTOR - WATER

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

Information would assist in management activities by adding to the understanding movement patterns and feeding habits of top predators and clarify relative contributions of herbivory and planktivory to Monument food webs supports these predators. The Applicant will also further investigate individual specialization in diet for sharks and ulua to provide managers with knowledge of how top predators influence the food webs. Additionally, the research will add to understanding of mesophotic deep reefs which are poorly-understood. Lastly, the research will provide insight into the potential drivers of the presence of herbivorous fishes in various mesophotic reefs in the Monument.

Up to eight (8) research staff would enter the Monument and conduct activities from the NOAA ship HI'IALAKAI (separately permitted under permit number PMNM-2015-006).

Activities will be carried out from small boats launched from a mother ship. Servicing of receivers will be done by snorkelers and SCUBA divers, and from small boats via an acoustic release system. The chosen long-term monitoring method (remote acoustic monitoring) is ideal for quantifying animal movements in remote, environmentally-sensitive locations because it has minimal environmental impact and requires only occasional, brief access by researchers to individual study sites, yet provides continuous monitoring of animal movements at those sites. Additionally, short-term data logging involves temporary attachment of small devices to study species. The devices release automatically at a pre-determined time and are found and recovered via a homing beacon. The Applicant has previously used this data logging technique successfully in Monument waters.

(a) Recovery and redeployment of underwater receivers

Shallow deployments (<30 m): The Applicant will continue to use a temporary receiver mooring system that has previously been empirically demonstrated to successfully withstand seasonal high surf. Moorings, installed by snorkelers or SCUBA divers will consist of sand screws in areas of soft sediment, and chain around uncolonized substrate in hard bottom areas (live substrates will be avoided). Removal of the moorings will occur when acoustic monitoring is completed (receivers will be in place for at least 2 years). The receivers will be anchored to the moorings and suspended 1-4m above the ocean floor. The receivers will identify and record the presence of any acoustic transmitters within range (up to 500 m). The transmitter number, time of arrival and departure and the date will be recorded and stored until the data are downloaded from the receivers to a computer. The receivers have a battery life of approximately 15 months and will be serviced at 12 month intervals.

Deep deployments (mesophotic >50m): The Applicant will recover and redeploy 6 underwater receivers at Pearl and Hermes reef and French Frigate Shoals. Receivers will be attached to weighted (with concrete block) moorings, and dropped to the sea floor so that they land on flat, uncolonized habitat (determined via echosounding). The moorings will incorporate an acoustic release to allow for surface recovery. Use of an acoustic release means the end weights and lower 30cm of the mooring (chain, polypro and twine) are sacrificial and will be left in situ when the receivers are recovered. As with shallow units, the mesophotic zone receivers will be suspended 4m above the ocean floor and will be serviced at 12 month intervals.

(b) Data retrieval, reduction and analysis: The Applicant will download receivers currently deployed in Monument waters. Data downloading consists of interfacing the receiver to a computer via a wireless bluetooth connection, and can be accomplished in the field.

(c) Deployment of acoustic transmitters The Applicant will implant acoustic transmitters into up to 160 sharks and fishes captured in Monument waters. Predator handling & tagging activities will be carried out in accordance with the animal use protocols of the University of Hawai'i (protocol #05-053). Ulua will be captured by trolling (using an artificial lure) and handlining (using a single baited hook) from a small skiff. Sharks will be captured by handlining (using a single baited hook) from a small skiff and using a bottom-set, 10 hook shark line. Captured sharks and ulua will be brought alongside the skiff, tail-roped and inverted to initiate tonic immobility for transmitter implantation. Coded acoustic transmitters will be implanted into the body cavities of each predator through a small incision in the abdominal wall. The incision will then be sutured closed, blood will be drawn from the caudal vein, a small tissue sample will be taken from the dorsal musculature, the hook removed and the predator released. This entire handling process can be completed in less than 10 minutes. Every fish captured and equipped with an acoustic tag will also receive an external dart tag.

The Applicant follow animal use protocols established by the University of Hawai'i. Researchers have been instructed to follow cultural protocols in past approved permits.

The proposed activities are in direct support of the Monument Management Plan's priority management needs 3.1 – Understanding and Interpreting the NWHI, 3.1.1 – Marine Science Action Plan, Activity MCS-1.5: Measure connectivity and genetic diversity of key species to enhance management decisions. This action plan specifies to “measure connectivity and genetic diversity of key species to enhance management decisions” (Activity MCS-1.5, PMNM MMP Vol 1, p. 123). Also, 3.2 – Conserving Wildlife and Habitats, 3.2.1 – Threatened and Endangered Species Action Plan, Activity TES-1.6: Reduce shark predation on monk seals sharks known to kill and injure Hawaiian monk seals. Activities to support marine conservation science, including biodiversity and genetic diversity surveys such as those to be carried out by the permittee, are also addressed in the Monument Management Plan (MMP) Environmental Assessment (EA) (FONSI, December 2008). This EA summarizes that connectivity and genetic studies of key species would be helpful in forecasting, preparing, and mediating potential threats to populations (PMNM MMP Vol 2, p. 171, 2008). Also, this EA recognizes that monitoring predation of sharks on Hawaiian monk seals would be beneficial to recovery efforts of Hawaiian monk seals (PMNM MMP Vol 2, p176, 2008).

Consulted Parties:

The permit application was sent out for review and comment to the following scientific and cultural entities: Hawai'i Division of Aquatic Resources, Hawai'i Division of Forestry and Wildlife, Papahānaumokuākea Marine National Monument (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO), United States Fish and Wildlife Service Hawaiian and Pacific Islands National Wildlife Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application has been posted on the Monument Web site since March 3, 2015, giving the

public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument's Public Notification Policy.

Exemption Determination:

After reviewing HAR § 11-200-8, including the criteria used to determine significance under HAR § 11-200-12, DLNR has concluded that the activities under this permit would have minimal or no significant effect on the environment and that issuance of the permit is categorically exempt from the requirement to prepare an environmental assessment based on the following analysis:

1. All activities associated with this permit; including the tagging of the subject sharks and fishes, collection of tissue biopsies, and recovery and redeployment of underwater acoustic receivers; have been evaluated as a single action. As a preliminary matter, multiple or phased actions, such as when a group of actions are part of a larger undertaking, or when an individual project is precedent to or represents a commitment to a larger project, must be grouped together and evaluated as a single action. HAR § 11-200-7. This permit may involve an activity that is precedent to a later planned activity, i.e. the future recovery of underwater acoustic receivers and containing predator movement data; 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. HAR §11-200-8.A.5. exempts the class of actions which involve "basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource." The proposed predator feeding and tagging study activities here appear to fall squarely under the exemption class #5, exempt item #3 as described under the Division of Forestry and Wildlife exemption list published on June 12, 2008. This exemption class has been interpreted to include "affixing transmitters, markers to wild animals to record movement longevity", such as those being proposed. As discussed below, no significant disturbance to any environmental resource is anticipated in the tagging of top predators, recovery of instrumental deployment, to monitor predator movements, or collection of potential prey items including reef fish. Thus, so long as the below considerations are met, an exemption class should include the action now contemplated.

To safeguard Monument resources the Applicant would abide by the following PMNM Best Management Practices (BMPs) while conducting the aforementioned activities within the PMNM: Best Management Practices for Boat Operations and Diving Activities (BMP #004); General Storage and Transport Protocols for Collected Samples (BMP #006); Seabird Protocols Necessary for Conducting Trolling Research and Monitoring (BMP #008); Marine Wildlife Viewing Guidelines (BMP #010); and Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment (BMP #011). With respect to predator capture using trolling and handlining, if any non-target species are capture, they would be released. If bycatch becomes more than occasional, then trolling would cease in that area. To minimize fishing line entanglement

with seals or seabirds, handlines would be constantly manned. Fishing would cease and lines retrieved whenever birds show an interest in fishing gear.

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

Proposed activities would be a continuation of activities permitted in the Monument between 2008 to 2014. Similar predator tagging and feeding activities have also been permitted and performed within the NWHI. Past permitted projects including similar collections and techniques have shown no adverse impacts. With that mind, significant cumulative impacts are not anticipated as a result of this activity, and numerous safeguards further ensure that the potential sensitive environment of the project area will not be significantly affected. All activities will be conducted in a manner compatible with the management direction of the Monument Proclamation in that the activities do not diminish Monument resources, qualities, and ecological integrity, or have any indirect, secondary, cultural, or cumulative effects. The joint permit review process did not reveal any anticipated indirect or cumulative impacts that would occur as a result of these activities.

These activities would be conducted from the NOAA ship HI‘IALAKAI (separately permitted under permit no. PMNM-2015-006). Interactions with sharks at FFS are also anticipated with monk seal recovery activities for Parrish-Garrett proposed permit no. PMNM-2015-009 conducted from the NOAA monk seal field camp. The operation of the field camp, and associated monitoring activities, are covered under the Manager’s permit PMNM-2015-001. Activities covered under Parrish-Garrett’s proposed permit would start in May 2015, possibly coinciding with activities under this proposed permit. However, in the past, Meyer has spent less than seven days a season at FFS. There are no other known proposed projects that would be undertaken with respect to sharks at FFS during this time. See Tables 1-6 for other projects taking place in the Monument throughout Summer 2015.

Table 1: Concurrent projects aboard NOAA Ship HI‘IALAKAI.

Permit	Purpose and scope	Location
PMNM-2015-006 Simon HI‘IALAKAI (approved)	This permit allows the NOAA Ship HI‘IALAKAI entry into the Monument. Personnel aboard the vessel would be permitted under separate permits	All locations

Permit	Purpose and scope	Location
PMNM-2015-001 Co-Trustee (approved)	This permit allows monk seal field camp operations	Kure Atoll, Midway Atoll, French Frigate Shoals
PMNM-2014-009 Parrish-Garrett (proposed)	The proposed action would involve the selective removal of up to 20 Galapagos sharks from French Frigate Shoals to mitigate predation on Hawaiian monk seals	French Frigate Shoals
PMNM-2015-013 Couch (proposed)	This proposed action would be to assess health and community structure of corals on shallow-water reefs	All locations
PMNM-2015-012 Godwin (proposed)	This proposed action would be conduct to Pacific Reef Assessment and Monitoring Program	All locations
PMNM-2015-016 Wall (proposed)	This proposed action would be to document the coral bleaching of shallow-water reefs	All locations
PMNM-2015-015 Gleason (proposed)	This proposed action would conduct maritime heritage monitoring and surveying activities	All locations
PMNM-2015-019 Littnan (proposed)	This proposed action would be to conduct monitors and surveys of various areas using an Unmanned Aerial System (UAS)	Laysan, Lisianski, Pearl and Hermes, Midway

Table 2. Concurrent projects aboard the SEARCHER

Permit	Purpose and scope	Location
PMNM-2015-017 Springer (proposed)	This proposed action would be to conduct intertidal biodiversity studies using traditional ecological knowledge	Nihoa, Mokumanamana, French Frigate Shoals, Gardner Pinnacles
PMNM-2015-026 Bird-Toonen (proposed)	This proposed action entails conducting intertidal biodiversity activities	Nihoa, Mokumanamana, French Frigate Shoals, Gardner Pinnacles

Table 3. Concurrent projects aboard the OKEANOS

Permit	Purpose and scope	Location
PMNM-2015-025 Wetzler (proposed)	This proposed action would provide platform support for various PMNM permitted projects aboard the OKEANOS	All locations

PMNM-2015-018 Elliott (proposed)	This permit would conduct bathymetric mapping activities	Nihoa, Mokumanamana, French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan, Lisianski and Pearl and Hermes
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Table 4. Concurrent project aboard the HIKIANALIA

Permit	Purpose and scope	Location
PMNM-2015-021 Thompson (proposed)	This proposed permit would provide opportunities for apprentice navigators to practice traditional wayfinding	Nihoa, Mokumanamana, French Frigate Shoals, Gardner Pinnacles

Table 5. Concurrent project aboard the MAKANI'OLU

Permit	Purpose and scope	Location
PMNM-2015-021 Kikilo'i (proposed)	This proposed permit would conduct cultural archaeological research activities	Nihoa, Mokumanamana

Table 6: Concurrent projects about NOAA ship SETTE.

Permit	Purpose and scope	Location
PMNM-2015-004 Koes SETTE (approved)	This permit allows the NOAA SETTE entry into the Monument. Personnel aboard the vessel would be permitted under separate permits	All locations
PMNM-2015-001 Co-Trustee (approved)	This permit allows monk seal field camp operations	French Frigate Shoals, Lisianski Island, Pearl and Hermes, Midway, Kure

The Applicant has been conducting top predator research activities for many years with no cumulative impacts noted. Though the potential permits may occur in the same area, each project differs logistically and targets interaction with different resources. Therefore, since no significant cumulative impacts or significant impacts with respect to any particularly sensitive aspect of the project area are anticipated, the categorical exemptions identified above should remain applicable.

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

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

Suzanne Case
Board of Land and Natural Resources

Date