

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

May 23, 2014

Board of Land  
and Natural Resources  
Honolulu, Hawaii

Request for Authorization and Approval to Issue a Papahānaumokuākea Marine National Monument Research Permit to Dr. 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 applicants Dr. Carl Meyer, Assistant Researcher, Hawai‘i Institute of Marine Biology, University of Hawai‘i, pursuant to § 187A-6, Hawaii Revised Statutes (HRS), chapter 13-60.5, Hawaii Administrative Rules (HAR), and all other applicable laws and regulations.

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

- French Frigate Shoals
- Pearl and Hermes Atoll

The activities covered under this permit would occur between June 1, 2014 and May 31, 2015.

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) providing further specific insight into shark predation on endangered species (Hawaiian monk seal and black-footed albatross) at French Frigate Shoals (FFS), and (3) elucidating the role of deep reefs in the ecology of Monument predators. Information would assist in management activities by adding to the understanding of predator movements and habitat use in the Monument. The applicant is interested in answering questions pertaining to vertical movements (assisting in understanding ecosystem function), quantifying movements of Galapagos and tiger sharks at French Frigate Shoals, diet specialization, and dynamics between tiger sharks and fledgling albatross. Research would help gather more

information on prey specialization in predators, especially with respect to interactions with Galapagos sharks and Hawaiian monk seal and interactions with tiger sharks and fledgling albatross at French Frigate Shoals.

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-2014-005) during two research cruises on August 7 - 31, 2014 and September 6 - 30, 2014.

To fulfill these objectives, the applicants propose to:

1. Service twenty (20) underwater receivers that captured acoustic data from top predators tagged from 2008 to 2012 and determine how widely these animals have ranged and their movement patterns since the summer of 2013;
2. Deploy four (4) new receivers at a depth of 200 to 250 ft at FFS and Pearl and Hermes Atoll (PHR) (two (2) receivers per island);
3. Equip pressure-sensor acoustic transmitters to eighty (80) Galapagos shark and ulua (twenty (20) of each species at FFS and PHR) to monitor upslope-downslope movements between shallow and mesophotic habitats by abundant predators;
4. Equip forty (40) sharks (ten (10) sandbar sharks, ten (10) whitetip reef sharks, ten (10) grey sharks, and ten (10) blacktip sharks) with surgically-implanted conventional coded acoustic transmitters at FFS to monitor basic movement and habitat use in this area and build upon existing data;
5. Collect tissue (muscle and blood) samples would be collected from up to one hundred and fifty (150) sharks and fish (ulua, Galapagos sharks, and tiger sharks) at FFS and PHR via non-lethal biopsy for stable isotope and hormone analysis for insight into feeding locations and trophic position of predators. Sampling would take place during tagging activities; and
6. Collect tissue samples from two hundred (200) common reef fish. Fish would be collected from shallow (30 to 60 ft - forty (40) fish) and deep (150 to 200 ft - sixty (60) fish) locations at four (4) Monument sites at FFS and PHR to establish the chemical composition of prey species (Table 1).

Table 1: Proposed reef fish collection list.

Common name <sup>1</sup>	Scientific name	Number of fish collected	
		Shallow water <sup>2</sup>	Deep water
Manybar goatfish	<i>Parupeneus multifasciatus</i>	40	60
Milletseed butterflyfish	<i>Chaetodon miliaris</i>	40	60
Orange-check surgeonfish	<i>Acanthurus olivaceus</i>	40	60
Bluestriped butterflyfish	<i>Chaetodon fremblii</i>	40	60
Threespot chromis	<i>Chromis verater</i>	Not applicable	60
Yellowfin soldierfish	<i>Myripristis chryseres</i>	Not applicable	60

<sup>1</sup> 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.

<sup>2</sup> Shallow water sites would be selected that are directly inshore of deep water sites.

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 applicants 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
- Anchoring a vessel
- 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

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 2, 2014 and revised on April 25, 2014, giving the public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument's Public Notification Policy.

**Comments received from the scientific community are summarized as follows:**

Scientific reviews support the acceptance of this application.

The following questions were raised:

Questions:

- 1. What charter vessel will be used, and what type of Vessel Monitoring System (VMS) is it equipped with?**

*The applicant replies that they are removing this charter vessel component from the permit application. Access to the Monument will be via NOAA vessels.*

- 2. What is the likely cumulative impact of over 240 acoustic tags (presumably equipped with lithium batteries) eventually winding up on the ocean floor?**

*The applicant states that the impact is negligible. The devices are small (about the size of two AA batteries) and inert (they are potted solid in epoxy resin). On the ocean floor they would be functionally equivalent to a stone of the same size.*

- 3. What are the sizes (approximate dimensions and weight) of the concrete blocks used as anchors for the acoustically released receivers?**

*The applicant states that concrete blocks are the commercially-available, household variety. 8 in. x 8 in. x 16 in. Concrete DE Block (weight approx. 30lbs).*

- 4. How will the applicant ensure no damage to slow growing mesophotic scleractinian and antipatharian corals from deployment of the concrete blocks?**

*The applicant states that the probability of damaging coral is small given the small footprint of the concrete blocks, and the low number of deployments requested. These factors will also limit the potential scope of any impact resulting from deployments.*

- 5. Has there been any background research conducted on the cultural importance of all species involved with this study including sharks?**

*The applicant replies, yes. There is ongoing background research into the cultural importance of all species involved with this study. This research is conducted both by referring to existing published works (e.g. Margret Titcomb's "Native Use of Fish in Hawaii"), and talking to cultural practitioners.*

- 6. Was there any consultation with a Hawaiian cultural practitioner regarding PMNM, its importance, and how to respectfully conduct research?**

*The applicant states that over recent years they have had consultations with several Hawaiian cultural practitioners regarding PMNM, its importance, and how to respectfully conduct research. For example, in 2010 they participated in the Holo I Moana cultural cruise to Papahānaumokuākea. This cruise brought together Hawaiian*

*cultural practitioners with other Pacific Islanders and scientists. On this cruise they were able to take several Hawaiian cultural practitioners out into the field to observe and participate in their fieldwork.*

**7. What methods will be used to catch prey species fish?**

*The applicant states that reef fishes will be collected using pole spears in shallow waters and on mesophotic reefs.*

**8. Will SCUBA be used for collection?**

*The applicant states that SCUBA will be used for some of the fish collections*

**9. What are the size targets for each species and will they be above the L50 for each individual species?**

*The applicant replies that they are assuming this question refers to lethally-sampled reef fishes. They have very limited time on site for collection, so they collect the first target species observed regardless of size. The species selected for sampling are the most numerically-abundant fishes in the study areas (based on previous direct observations by divers at those sites). The numbers of lethal samples requested are extremely small relative to the total numbers of fish present and hence have negligible impact on reproductive demographics.*

**10. Will any precautions be taken to not target fish known to be spawning at the time of research? And if that is not known, can notes be made to determine if they are in fact spawning after fish are caught and sampled in order to better understand this?**

*The applicant states that they will not know the fishes spawning condition until after collection. Reproductive information will be one of the additional data sets collected from the lethally-sampled fishes (see also 11 below).*

**11. For lethally collected species, how will remains be disposed of? Will or can they be consumed?**

*The applicant replies that lethally collected species will be frozen and transported back to Oahu where they will be used for additional life-history studies (determining growth rates, size at maturity, fecundity) by other UH personnel.*

**12. How many trips into the Monument is the applicant planning over the course of the permit?**

*The applicant states that two trips are planned into the monument over the course of the permit.*

- 13. Will the temporary pole camera be deployed and removed during a single trip, or will it be deployed continuously over several trips?**

*The applicant states that they are removing this activity from the permit application.*

- 14. How will data be recovered from stomach data loggers if they are not regurgitated during the time the applicant is conducting activities at each site?**

*The applicant states that they have removed this component from the permit application.*

Comments:

- 1. Please reflect on how specifically this activity can be used to benefit the people of Hawaii and directly affect management efforts throughout the archipelago.**

*The applicant states that in broad terms this research provides a better understanding of how our reef ecosystems function. Specifically, they provide empirical information on how top predators interact with, and influence, their environment. These data provide both a better general understanding of how predators link habitats together, and also highly specific information on politically sensitive topics such as shark predation on monk seal pups. The facts help resource managers to make more informed decisions about how to manage our ocean resources.*

- 2. Please discuss possible outreach activities linked to the proposed research, and if possible, share outcomes at a future PMNM Cultural Working Group Meeting or other venue.**

*The applicant states that they routinely present findings from my research at public fora in Hawaii and around the world. In addition their research is regularly covered by both local and international media, and described on my website.*

- 3. Please provide the specifications for the temporary camera you are proposing to use and provide more details on how the camera will be installed on East Island.**

*The applicant states that they are removing this activity from the permit application.*

- 4. In Section 5b (page 6) all islands and atolls are marked, although in other parts of the application only FFS, PHR and Midway are mentioned. Please clarify which islands/atolls you intend to go to and which activities you intend to conduct at each one.**

*The applicant states that they have restricted activities to FFS, PHR and Midway.*

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

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



General Conditions. All suggested special conditions have been vetted through the legal counsel of the Co-Trustee agencies (see Recommendation section).

MONUMENT MANAGEMENT BOARD OPINION

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

RECOMMENDATION:

That the Board authorize and approve a Research Permit to Dr. 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.

Respectfully submitted,



Frazer McGilvray  
Administrator

APPROVED FOR SUBMITTAL



WILLIAM J. AILA JR.  
Chairperson

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## **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](mailto: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.**

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## **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 2014  
**Proposed Method of Entry (Vessel/Plane):** NOAA Vessel Hiialaki  
**Proposed Locations:** French Frigate Shoals, Pearl & Hermes Reef, Midway

**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) provide further specific insight into shark predation on endangered species (Hawaiian monk seals and blackfoot albatross) at French Frigate Shoals Atoll, and (3) elucidate the role of deep reefs in the ecology of Monument predators.

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

Capture and equip top predators with electronic tags, 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 200 reef fishes (collected via 3-prong pole spear). These reference samples will be used to determine the trophic position and feeding location of predators.

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

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Our research will provide Monument managers with information on the movements patterns and feeding habitats of culturally and ecologically important top predators. We will continue to quantify the depths at which sharks and other large predators, such as ulua, routinely forage to determine where competitive overlap may exist between these species and Hawaiian monk seals. We will also be investigating individual specialization in diet for sharks at FFS, which may enable us to determine if there are some true 'monk seal' specialists. 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.

**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 200 of the most common reef fishes. 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.

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## **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  
James Anderson, Co-collaborator, Research Diver, Field Biologist  
Itsumi Nakamura, Co-collaborator, Research Diver, Field Biologist  
Mark Royer, Co-collaborator, Research Diver, Field Biologist  
Danny Coffey, Co-collaborator, Research Diver, Field Biologist  
TBD  
TBD  
TBD

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**Section B: Project Information**

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

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

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 20 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, and to extend mesophotic coverage by deploying two new receivers on reefs at 200-250 ft at FFS and Pearl & Hermes Reef (PHR).

**Reef fish collection**

Reef fishes will be collected using pole spears in shallow waters and on mesophotic reefs (depth 150-300ft) at FFS and PHR.

**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

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- 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. A major component of this work involves quantifying shark movements and feeding ecology at FFS to provide insight into predation on endangered species such as Hawaiian monk seals and albatross. This information will provide managers with a clearer understanding of the role of shark predation in population dynamics of endangered species in Monument waters. We have the following specific goals and objectives;

1. Download 20 underwater receivers currently stationed in the Monument to retrieve stored movement data from 240 top predators tagged with acoustic transmitters from 2008 to 2012.
2. Determine how widely these animals have ranged since Summer 2013 and identify their patterns of movement.
3. Deploy an additional four underwater receivers on mesophotic reefs (depth 200-250 ft). Two of these will be placed at FFS and two at P&H. Receivers will be attached to heavy weights and acoustic releases.
3. Equip up to 80 additional ulua and Galapagos sharks (20 of each species at FFS and PHR) with pressure-sensor acoustic transmitters detectable by our listening array. These tag deployments will enable us to obtain the first insights into 'upslope-downslope' movements between shallow and mesophotic habitats by abundant monument predators.
4. Equip up to 10 sandbar sharks, 10 whitetip reef sharks, 10 grey reef sharks and 10 blacktip sharks with surgically-implanted conventional coded acoustic transmitters at FFS. We already have preliminary movement data for these shark species in Monument waters, and these deployments will help to build a clearer understanding of their basic patterns of movement and habitat use at FFS.
5. Collect small samples of muscle and blood tissue from predators (ulua, galapagos sharks, tiger sharks) for chemical analyses (stable isotopes, hormones), from FFS and PHR to provide insight into predator feeding habits and reproductive status (up to 150 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 200 reef fishes collected at shallow and deep locations at FFS & PHR.

**(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, grey 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?

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). 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 we still know very little about their vertical movements. For example, we don't know to what depths abundant Monument predators such as ulua typically range, or whether they forage at both shallow and meso-photic depths, thus the trophic links between shallow and deep mesophotic reefs are poorly understood. 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 will utilize mesophotic reefs and may in fact be important vectors, transferring nutrients from shallow to deeper reefs. To expand on this work we need to a) expand our acoustic coverage of mesophotic reefs and b) see if these patterns are consistent at other islands and atolls of the NWHI.

In addition to providing a broad understanding of predator movements in Monument waters, we have also been quantifying movements of Galapagos and tiger sharks at FFS to provide specific insight into shark predation on Hawaiian monk seal pups at this location. The Hawaiian monk seal (*Monachus schauinslandi*) is critically endangered with approximately 1,200 seals remaining and the total population size projected to fall below 1000 within the next five years. Among the six primary breeding sites in the NWHI, French Frigate Shoals (FFS) has experienced the most dramatic decline, with beach counts at FFS declining 70% from 1989-2004 (Antonelis et al. 2006, Caretta et al., 2007). The main demographic factors in the decline have been poor juvenile survival (pup mortalities at FFS range from 15-69% of each annual cohort), exacerbated by lower reproductive rates as compared to other breeding sites in the NWHI (Harting et al. 2007). Shark predation is suspected to be the single greatest cause of mortality for pre-weaned Hawaiian monk seal pups at FFS, with a small number of persistent Galapagos sharks thought to be the primary culprits (although historically tiger sharks were considered the main predator of monk seals). However, most pup predation is not seen and questions remain about the numbers and species of sharks involved. To resolve these important questions we equipped Galapagos (N=89) and tiger sharks (N=54) at FFS with acoustic transmitters in 2008 and 2009, and deployed acoustic 'fences' of underwater receivers around monk seal pupping sites. We have subsequently shown that almost half of all tagged tiger sharks visited shallow habitats adjacent to monk seal sites compared to around 13 percent of Galapagos sharks. We also generated the first mark-recapture estimate of Galapagos shark population size at FFS (Dale et al. 2011), suggesting that around 668 individuals were present at FFS in summer 2009. Combining this population size estimate with our telemetry data, suggests some 88 individual Galapagos sharks visited shallow habitats adjacent to monk seal pupping sites at FFS between 2009 & 2011. We are currently analyzing these data to further determine whether Galapagos shark visits to monk seal pupping sites have predictable patterns.

An increasing amount of data is showing individual specialization in diet by top predators, where each individual may specialize on a particular prey item (e.g. Matich et al., 2011). This may be particularly important at FFS where it is hypothesized that a subset of Galapagos sharks have become monk seal pup specialists. We will investigate specialization by collecting muscle and blood samples from each predator and using them for stable isotope analysis. Blood (fast) and muscle (slow) have different tissue turn-over times and therefore represent diet over different time scales. Essentially muscle tissue provides an indication of what the predator has been eating over many months to years, while blood will be more indicative of diet from weeks to a few months. Combined, we can use these results to estimate the degree of specialization in diet (see Matich et al., 2011).

(c) Scope of proposed activities

We propose to recover, download and redeploy up to 20 receivers already stationed in Monument waters (see Appendix 1). This will enable us to recover another 12 months of predator movement data (summer 2013-summer 2014) 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 both PHR & FFS (i.e. 40 total ulua & 40 total Galapagos sharks). To detect these animals on deeper reefs we will deploy two underwater listening stations on mesophotic reefs at FFS and an additional two receivers on mesophotic reefs at PHR.

To quantify trophic ecology of predators, we will obtain muscle biopsies from all galapagos sharks and uluas captured (up to 90 total). We will obtain 4mL of blood from each predator. 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 200 reef fishes from among the most common species at 4 Monument sites. At FFS and PHR we will collect fishes from a mesophotic reef and a shallow water (30-60ft) comparison site. Forty individuals will be collected from each shallow site, and 60 individuals from each mesophotic site. Up to 10 individuals of each of the 4 most common reef fish species will be collected from shallow sites, and up to 10 individuals of each of the 6 most common reef fish species will be collected from mesophotic sites. Selecting samples from only the most abundant reef fish species reduces biological impact and is also scientifically valid as we aim to sample "prey species" that are likely to be the most abundant species present.

Based on records from previous mesophotic dives, we have identified shortlists of fish species most commonly seen on mesophotic reefs at FFS (N=6) & PHR (N=6). We cannot be certain of the identity of the three most abundant species until divers are in situ on mesophotic reefs but they will be drawn from the following list;

FFS - Mesophotic fishes

Chromis verater  
Parupeneus multifasciatus  
Chaetodon miliaris  
Chaetodon fremblyi  
Myripristis chryseres  
Acanthurus olivaceous

PHR - Mesophotic fishes

Chromis verater  
Parupeneus multifasciatus  
Chaetodon miliaris  
Chaetodon fremblyi  
Myripristis chryseres  
Acanthurus olivaceous

We will collect the following species at shallow water sites;

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Parupeneus multifasciatus  
Chaetodon miliaris  
Chaetodon fremblii  
Acanthurus olivaceus

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).

**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 (200 fish total from 4 sites at 2 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, ultrasonic imaging and blood sampling. 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 200 reef fishes will be removed from the monument, but these will provide valuable data on a little-studied habitat that is an important component of the monument (mesophotic reefs). 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 rig 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 in sampling blood from sharks and 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. 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 rig 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). A very limited amount of lethal sampling (200 reef fishes total, maximum 10 fish per species per sample site) will be conducted at two atolls

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

We will use NOAA 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.

### **(a) Recovery and redeployment of underwater receivers**

Shallow (<30 m) deployments (see Appendix 2): 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 6 to 12 month intervals.

Deep (mesophotic >50m) deployments: We will deploy 4 underwater receivers at mesophotic sites at Pearl and Hermes Reef and French Frigate Shoals atoll. Side scan sonar mapping and depth sounders will be utilized to select flat, uncolonized habitat adjacent to ledges at depths of between 200-300ft. Receivers will be attached to weighted (with concrete block) moorings, and dropped to the sea floor so that they land on the flat habitat. 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 80 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 (other sharks, very occasional large ulua) 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) 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). We will use an 18 gauge needle to collect 4 mL of blood from the caudal vein of each animal. Of this, 3mL will be placed in a BD vacutainer vial and spun down in a field centrifuge to separate plasma from the other cellular material. The other 1 mL will be kept as a 'whole blood' sample. All samples will then be frozen.

(e) 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 200 reef fishes from FFS and PHR (1 shallow and 1 mesophotic site per atoll, 60 fish per mesophotic site, 40 fish per shallow site). We will sample up to 10 individuals from each of three 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. 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).

(f) 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  $^{15}\text{N}$  and  $^{13}\text{C}$  in each sample. Values are presented as ‰, relative to standards of V-PDB and atmospheric  $\text{N}_2$  for  $^{13}\text{C}$  and  $^{15}\text{N}$  respectively.

g) We are currently developing and refining protocols to determine reproductive status of female sharks from field ultrasound scans and blood hormone levels. Field ultrasound scans will be conducted while captured sharks are alongside the tagging boat and inverted in a state of tonic immobility. This provides easy access to the abdominal region containing the stomach and uteri. Scans are carried out using a portable veterinary ultrasound unit equipped with a convex probe. The probe is passed back and forth across the ventral surface of the shark in the area overlaying the stomach and uteri.

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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.

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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.**

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**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 3

Scientific name:

Please refer to Appendix 3

# & size of specimens:

Please refer to Appendix 3

Collection location:

Please refer to Appendix 3

Whole Organism  Partial Organism

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

The animal 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

• 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?**

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Muscle tissue & blood samples, 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.

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

Please refer to Appendix 4

**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 nine 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.

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Papahānaumokuākea Marine National Monument  
Permit Application - Research  
OMB Control # 0648-0548  
Page 23 of 23

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 – Carl Meyer – Acoustic Receiver Locations**

<b>Atoll</b>	<b>Location Description</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Depth (ft)</b>
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

## Carl Meyer – Papahānaumokuākea Predator Tagging

### Appendix 2 Shallow site (non-mesophotic) receiver installations in the Monument

We use Vemco VR2 underwater receivers for monitoring movements of transmitter-equipped predators. The VR2 consists of a hydrophone, receiver, ID detector, data logging memory, and battery all housed in a submersible plastic case.

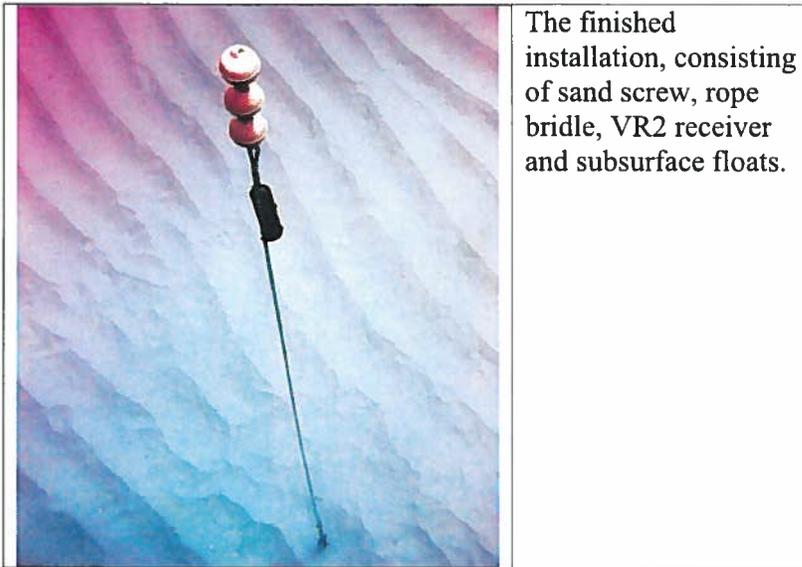


Vemco VR2 Receiver

Each receiver is mounted on a mooring consisting of an anchor (either a sand screw, or chain around uncolonized hard substrate), rope bridle and subsurface floats.

	<p>We use 4 ft steel sand screws which are literally screwed into the sand, leaving an eye loop exposed. This is the point of attachment for the rope bridle.</p>
	<p>Anti-chafing gear (heavy duty hose) protects the rope bridle at point of contact with the sand screw eye loop. We splice the rope bridle to the sand screw <i>in situ</i>.</p>

## Carl Meyer – Papahānaumokuākea Predator Tagging



We use the sand screw installation whenever possible. In hard-bottom areas we use chain around natural arches in lieu of sand screws (the other components are identical).

We service these installations every 6-12 months, at which time we completely replace all mooring components (anchors, rope bridles, floats), and download and re-battery the receivers.

We plan to maintain these installations for the duration of the acoustic monitoring research (at least 2 years). We will remove these installations on completion of the research. Removal is straightforward, takes less than 10 minutes per installation and leaves nothing behind.

Appendix 3 Carl Meyer – Details of tissue sample collections

Common Name	Scientific Name	# & Size of specimens	Collection location
Tiger shark	<i>Galeocerdo cuvier</i>	20 x 4 ml blood	FFS
Galapagos shark	<i>Carcharhinus galapagensis</i>	45 x 0.5cc muscle tissue	FFS, PHR
Galapagos shark	<i>Carcharhinus galapagensis</i>	45 x 4 ml blood	FFS, PHR
Sandbar shark	<i>Carcharhinus plumbeus</i>	10 x 0.5cc muscle tissue	FFS
Sandbar shark	<i>Carcharhinus plumbeus</i>	10 x 4 ml blood	FFS
Grey reef shark	<i>Carcharhinus amblyrhincos</i>	10 x 0.5cc muscle tissue	FFS
Grey reef shark	<i>Carcharhinus plumbeus</i>	10 x 4 ml blood	FFS
Blacktip shark	<i>Carcharhinus limbatus</i>	10 x 0.5cc muscle tissue	FFS
Blacktip shark	<i>Carcharhinus limbatus</i>	10 x 4 ml blood	FFS
Whitetip reef shark	<i>Triaenodon obesus</i>	10 x 0.5cc muscle tissue	FFS
Whitetip reef shark	<i>Triaenodon obesus</i>	10 x 4 ml blood	FFS
Ulua	<i>Caranx ignobilis</i>	45 x 0.5cc muscle tissue	FFS, PHR
Manybar goatfish	<i>Parupeneus multifasciatus</i>	40 x entire fish*	FFS, PHR
Milletseed butterflyfish	<i>Chaetodon miliaris</i>	40 x entire fish*	FFS, PHR
Orange-cheek surgeonfish	<i>Acanthurus olivaceus</i>	40 x entire fish*	FFS, PHR
Bluestriped butterflyfish	<i>Chaetodon fremblii</i>	40 x entire fish*	FFS, PHR
Threespot Chromis	<i>Chromis verater</i>	20 x entire fish*	FFS, PHR
Yellowfin Soldierfish	<i>Myripristis chryseres</i>	20 x entire fish*	FFS, PHR

\* To reduce impact, we will sample individuals of only the 3 most abundant species present at the FFS & PHR mesophotic sites. We cannot predict with certainty what these species will be until we reach specific dive sites, hence we include this list of 6 species derived from previous surveys of mesophotic reef fauna.

## 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
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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: 2014

Activity completion: 2016

Dates actively inside the Monument:

From: August 8, 2014

To: Aug 28, 2014

From: Sept 6, 2014

To: Sept 30, 2014

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:

Date	PORT	ACTIVITY	DISTANCE
	Pearl Harbor		
7-Aug		Science Party on-board 0700, DEPART for French Frigate Shoals (FFS)	490 nm, 54 hrs
8-Aug		Transit	
9-Aug	FFS	Transit to FFS, ARRIVE PM	
10-Aug	FFS	Full day dive ops	
11-Aug	FFS	Full day dive ops	
12-Aug	FFS	Full day dive ops, DEPART for Pearl and Hermes Reef (PHR)	600 nm, 60 hrs
13-Aug		Transit	
14-Aug		Transit	
15-Aug	PHR	ARRIVE PHR in PM	

16-Aug	PHR	Full day dive ops	
17-Aug	PHR	Full day dive ops	
18-Aug	PHR	Full day dive ops, DEPART for Midway (MID)	78 nm, 8 hrs
19-Aug	MID	ARRIVE MID, Full da dive ops	
20-Aug	MID	Full day dive ops	
21-Aug	MID	Full day dive ops, DEPART for Lisianski Island (LIS) in PM	300 nm, 33 hrs
22-Aug		Transit	
23-Aug	LIS	ARRIVE LIS, Full day dive ops	
24-Aug	LIS	Full day dive ops	
25-Aug	LIS	Full day dive ops	928 nm, 103 hr:
26-Aug	LIS	Full day dive ops, DEPART for PH	
27-Aug		Transit	
28-Aug		Transit	
29-Aug		Transit	
30-Aug		Transit	
	Pearl		
31-Aug	Harbor	ARRIVE PEARL HARBOR in AM	

Sept 6-30 schedule to be determined

**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:**

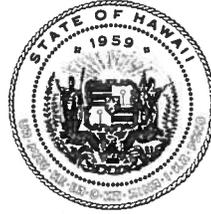
**12. Room and board requirements on island:**

**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

NEIL ABERCROMBIE  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621  
HONOLULU, HAWAII 96809

May 23, 2014

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

JESSE K. SOUKI  
FIRST DEPUTY

WILLIAM M. TAM  
DEPUTY DIRECTOR - WATER

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

TO: Division of Aquatic Resources File

THROUGH: William J. Aila Jr., Chairperson 

FROM: Frazer McGilvray   
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. 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 UNDER PERMIT PMNM-2014-014.

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, Assistant Researcher, 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.

Permit Number: PMNM-2014-014

Project Description:

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

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) providing further specific insight into shark predation on endangered species (Hawaiian monk seal and black-footed albatross) at French Frigate Shoals (FFS), and (3) elucidating the role of deep reefs in the ecology of Monument predators. Information would assist in management activities by adding to the understanding of predator movements and

habitat use in the Monument. Proposed activities are a continuation of previous work permitted 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-2014-005) during two research cruises on August 7 - 31, 2014 and September 6 - 30, 2014.

To accomplish the goals and objectives the applicant would:

1. Service, recover, and redeploy receivers using snorkeling and/or SCUBA from small boats deployed from the HI'IALAKAI using an acoustic release system. Dives would range between 0 to 30 m (0 to 90 ft) (shallow water) and 50 to 91 m (150 to 200 ft) (deep water). Shallow water receiver moorings would consist of temporary sand screws in areas of soft sediment and a temporary chain around uncolonized substrate in hard bottom areas. Deep water moorings would consist of a weighted concrete block plus an acoustic release to allow for surface recovery. Receivers would then be chained to the mooring, suspending 4 m above the mooring, and would be in place for two (2) years, though they require servicing every year. When receivers are recovered, deep water moorings would remain in the environment.
2. Data retrieval would consist of wireless Bluetooth interface connection in the field.
3. Deployment and/or recovery of acoustic transmitters, accelerometer-digital camera dataloggers, and predator tissue samples would consist of the following: Ulua would be captured by trolling, using an artificial lure, and handlining, using a single baited hook from a small skiff. Sharks would be captured by handlining, using a single baited hook, from a small skiff and using a bottom-set, ten (10) hook shark line. Captured sharks and ulua would be brought alongside the skiff, tail-roped, and inverted to initiate tonic immobility for transmitter implantation. Acoustic transmitters would be inserted into a small incision in the abdominal wall of each animal. The animal would also receive a dart tag. After suturing the incision the hook would be removed and the animal released. Accelerometer dataloggers would be attached to the left or right pectoral fin of each shark by cable ties. The accelerometers would be attached on the dorsal fins and would release in 24 to 48 hours via a pre-programmed release timer. Stomach loggers would be inserted using a tube inserted into the mouth and down the oesophagus. Tissue biopsies would be taken while the animal is restrained for tagging. Tissue samples would be transferred into small plastic vials and frozen for transport back to Honolulu to the laboratory. Collection of fish tissue samples would consist of sampling muscle tissue for stable isotope analysis. Sample remains would be shared with Drs. Brian Bowen and Eric Franklin, Hawai'i Institute of Marine Biology, University of Hawai'i, for genetic and life history analysis. Samples would also be shared with Dr. Brian Popp, School of Ocean and Earth Science Technology, University of Hawai'i, for stable isotope analysis.

Researchers would follow animal use protocols established by the University of Hawaii. They 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: 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 2, 2014 and revised on April 25, 2014, giving the public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument's Public Notification Policy.

Exemption Determination:

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

1. All activities associated with this permit; including 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 a activities permitted in the Monument every year from 2008 to 2012. 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. No adverse impacts are expected from the proposed activities. 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-2014-005) (Table 1). Interactions with sharks at FFS are also anticipated with monk seal recovery activities for Parrish-Van Atta's proposed permit no. PMNM-2014-023 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-2014-001. Activities covered under Parrish-Van Atta's proposed permit would be conducted from June through September 2014, possibly coinciding with activities under this proposed permit. 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.

Table 1: Concurrent projects aboard NOAA Ship HI'IALAKAI in August and September.

Permit	Purpose and scope	Location
PMNM-2014-005 Ellis-Simon HI'IALAKAI (approved)	This permit allows the NOAA Ship HI'IALAKAI entry into the Monument. Personnel aboard the vessel would be permitted under separate permits	All locations
PMNM-2014-001 Co-Trustee (approved)	This permit allows monk seal field camp operations with activities from June - September 2014.	Kure Atoll, Midway Atoll, French Frigate Shoals
PMNM-2014-023 Parrish-Van Atta (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 with activities from June to September 2014.	French Frigate Shoals
PMNM-2014-012 Couch (proposed)	This proposed action would be to assess health and community structure of corals on shallow-water reefs with activities from August 7 – 31, 2014	All locations
PMNM-2014-024 Donahue (proposed)	This proposed action would be to evaluate coral reef bioerosion in the NWHI from August 7 – 31, 2014.	All locations
PMNM-2014-025 Donahue (proposed)	This proposed action would be to characterize <i>Pocillopora meandrina</i> (POME) colony fish and invertebrate communities from August 7 – 31, 2014.	All locations
PMNM-2014-018 Godwin (proposed)	This proposed action would be conduct Pacific Reef Assessment and Monitoring Program activities from August 7 – 31, 2014	All locations

<b>Permit</b>	<b>Purpose and scope</b>	<b>Location</b>
PMNM-2014-015 Kosaki (proposed)	This proposed action would be to document the biodiversity of deep reefs using conventional and technical SCUBA diving technology from September 6 – 30, 2014.	All locations

Since no significant cumulative impacts or significant impacts with respect to any particularly sensitive aspect of the project area are anticipated, the categorical exemptions identified above should remain applicable.

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

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

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

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Date