Papahānaumokuākea Marine National Monument

RESEARCH Permit Application

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

ADDITIONAL IMPORTANT INFORMATION:

- Any or all of the information within this application may be posted to the Monument website informing the public on projects proposed to occur in the Monument.

- In addition to the permit application, the Applicant must either download the Monument Compliance Information Sheet from the Monument website OR request a hard copy from the Monument Permit Coordinator (contact information below). The Monument Compliance Information Sheet must be submitted to the Monument Permit Coordinator after initial application consultation.

- Issuance of a Monument permit is dependent upon the completion and review of the application and Compliance Information Sheet.

INCOMPLETE APPLICATIONS WILL NOT BE CONSIDERED

Send Permit Applications to:
Papahānaumokuākea Marine National Monument Permit Coordinator
6600 Kalaniana'ole Hwy. # 300
Honolulu, HI 96825
nwhipermit@noaa.gov
PHONE: (808) 397-2660 FAX: (808) 397-2662

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

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: Jeffrey C. Drazen
Affiliation: Dept. of Oceanography, University of Hawaii

Permit Category: Research
Proposed Activity Dates: June 1 - Nov 30th - specific dates of participation have not been determined, two cruises possible - 1 on Hiialakai and a late Fall cruise with HURL
Proposed Method of Entry (Vessel/Plane): Vessel
Proposed Locations: The specific locations of the activities are yet to be determined but they will occur in federal waters of the Monument at depths between 500 and 4000m.

Estimated number of individuals (including Applicant) to be covered under this permit:
5
Estimated number of days in the Monument: 30

Description of proposed activities: (complete these sentences):

a.) The proposed activity would…
characterize the large deep-sea scavenging fauna, its general habitat associations and its relationship to depth within the Monument.

b.) To accomplish this activity we would ….
deploy baited time lapse cameras and traps to the seafloor at various locations in the federal waters of the Monument.

c.) This activity would help the Monument by …
determining deep-sea community structure and habitat associations within the largest ecosystem in the Monument.

Other information or background:

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): AA

Title: Assistant Professor

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

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

Phone: [redacted]

Fax: [redacted]

Email: [redacted]

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

3. Affiliation (institution/agency/organization directly related to the proposed project):
University of Hawaii, Department of Oceanography

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):
John Yeh, Field Technician
C. Anela Choy, graduate student
Nicole Condon, graduate student
Jason Friedman, graduate student

Section B: Project Information

5a. Project location(s):

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

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

Location Description:
Specific locations of our instrument deployments will have to be determined based on weather and other operations occurring on the cruise. Exactly which cruise we will participate in has not been determined and this will limit the areas of the Monument in which we can work. So little is known of the deep-sea communities that virtually any location can provide study sites that will provide information of great benefit to the Monument. Regardless of island group our instrument deployment locations will be chosen based on their relatively gently sloping and sedimented terrain which will minimize the chances of impacts on deep-sea coral communities and will safeguard our instruments. All deployments will occur in the federal waters of the Monument.

5b. Check all applicable regulated activities proposed to be conducted in the Monument:
☒ Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving Monument resource
☐ Drilling into, dredging, or otherwise altering the submerged lands other than by anchoring a vessel; or constructing, placing, or abandoning any structure, material, or other matter on the submerged lands
☒ Anchoring a vessel
☐ Deserting a vessel aground, at anchor, or adrift
☐ Discharging or depositing any material or matter into the Monument
☐ Touching coral, living or dead
☐ Possessing fishing gear except when stowed and not available for immediate use during passage without interruption through the Monument
☒ Attracting any living Monument resource
☐ Sustenance fishing (Federal waters only, outside of Special Preservation Areas, Ecological Reserves and Special Management Areas)

☐ Subsistence fishing (State waters only)
☒ Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

6 Purpose/Need/Scope ***State purpose of proposed activities:***
The majority of the NWHI monument has waters greater than 1000 meters deep, yet is practically unexplored. Exploration of Hawaii's deep waters began with the Albatross Expedition at the beginning of the 20th century. They visited Laysan Island and "Bird Island" and were able to conduct 5 tows at depths between 1000 and 3000 m. Even from this limited sampling they documented nearly 20 species new to the islands or to science entirely. The next phase of exploration of the Northwest Hawaiian Islands (NWHI) was prompted by the discovery of aggregations of commercially exploitable fishes on several North Pacific seamounts and deep banks. Work by fisheries scientists focused on pelagic armorhead resources located on the Hancock seamounts in relatively shallow depths from 100-500m. With the advent of submersibles and the establishment of the Hawaii Undersea Research Laboratory (HURL) the NWHI were investigated in an entirely new fashion. Most of the submersible dives and ROV explorations were conducted in the main islands but recent expeditions have conducted 20 dives at depths greater than 1000 meters and they represent the best sampling of bathyal depths in the NWHI to date. In summary a handful of deep trawls, submersible dives, and ROV transects have been conducted in the vast expanse of the NWHI. Depths below 1000m are hardly explored and depths below 2000 m not at all until our research began in 2007.

These deep regions comprise the majority of the waters in the NWHI and we propose to continue our investigations of them. We propose to characterize the bottom environment and associated scavenging communities between 500m and 4000m depths at various sites in the NWHI. Our tools are a baited time-lapse digital still camera which can be deployed to depths of 6000m and a small baited trap to capture actual specimens of the animals photographed. Details of the procedures are provided below. The photographs and specimens collected will allow us to generate species lists, assess diversity and community composition. Using a variety of statistical methods the camera data can also estimate the relative abundances of abundant scavenging fishes and invertebrates. By comparing deployments at different diverse locations in the NWHI we will be able to investigate the influence of location, habitat type, depth, temperature and current regime on these community parameters. By collection of actual specimens with the trap mooring not only can species identity be confirmed but material will be available for new species descriptions if any are found.

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 proposed activities are relatively non-invasive to the Monument deep-water resources, particularly in consideration of the potential gain in information. The proposed work employs moorings such that small ballast packages (~200lbs iron each) are left on the seafloor. This project will leave at most 5 ballasts per island or bank site in the Monument. It is inherently

dangerous to deploy the moorings on steep or rough terrain which are typically the areas inhabited by coral and sponge communities. Instead we will target relatively flat areas with gravel or mud bottoms. Such areas typically have sparse benthic communities of mobile animals (i.e. brittle stars, sea cucumbers) and are not as sensitive to the impact of anchors. In addition, the ballast is iron (old anchor chain links) which is non-toxic and will corrode and even be colonized by encrusting organisms over time. This activity will attract the living marine resources of the Monument but the system mimics naturally occurring parcels of carrion which attract and provide food for deep-sea scavengers.

The trapping component of the proposed sampling is also designed to minimize impacts compared to the scientific and management benefits. A small (1mx1mx0.5) mesh trap is employed and based on previous activities in the main Hawaiian Islands, a typical deployment catches 0-5 fish and several dozen scavenging crustaceans (amphipods, crabs and shrimp). These animals are sufficient to confirm photographic identification but are not large enough to impose significant mortality on populations.

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?
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c. Is there a practicable alternative to conducting the activity within the Monument? If not, explain why your activities must be conducted in the Monument.
There are no practical alternatives to characterizing the deep-sea communities. Early work employed trawls which are devastating to deep-sea habitats. Submarine or ROV work could be conducted but local units (HURL) can only operate to a depth of 2000m and at a prohibitive cost. The proposed activities must be conducted in the Monument so that its staff is aware of the marine living resources of the Monument's largest ecosystem.

d. How does the end value of the activity outweigh its adverse impacts on Monument cultural, natural and historic resources, qualities, and ecological integrity?
The product of the project will be a description of the deep-sea scavenging communities of the Monument, which is currently poorly described or not at all in very deep water. Thus this project fulfills the basic need of characterizing the Monuments marine living resources. These benefits outweigh the small impacts of leaving iron ballast behind and trapping small numbers (dozens) of deep-sea animals, neither of which will have lasting impacts on the ecological integrity of the Monument.

e. Explain how the duration of the activity is no longer than necessary to achieve its stated purpose.
The baited camera and traps are deployed on the seafloor for no more than 48 hours. Based on our preliminary data from last year, all taxa arrive to bait within this time frame. We would only leave the instruments on the seafloor for a longer duration if the other objectives of the cruise required the ship and prevented us from picking up our instrumentation.

f. Provide information demonstrating that you are qualified to conduct and complete the activity and mitigate any potential impacts resulting from its conduct.
I have been involved in deep-sea ecological and physiological research for 15 years. During that time I have deployed the proposed mooring as well as many other instrument packages, assessed the function and integrity of deep-sea ecosystems, and analyzed the potential impacts of fishing activities on deep-sea ecosystems. See CV which is attached.

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.
This research is currently funded by the Monument office.

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.
Our methods are some of the few available to study deep-sea ecosystems. As stated above they are relatively inexpensive and relatively non-invasive compared to the alternatives. Our mooring methods allow us to efficiently and relatively non-invasively study deep-sea communities.

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 sail aboard either the NOAA vessel Hi'iialikai or the HURL vessel, the KOK. I believe that both are outfitted but I am not certain about the HURL vessel.

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

8. Procedures/Methods:

Deep-sea time lapse camera

The camera system is deployed as a mooring from the ship (please see Figures 1 and 2 in attached pdf document). It weighs ~500 lbs in air and requires a crane or A-frame for deployment. It is dropped free from the ship to descend to the target location (~100lbs negatively buoyant). Due to low animal densities in the deep-ocean, the camera is baited to attract the local scavenging community. The camera takes images every 2 minutes for ~24 hours. The bottom type, time of arrival, numbers, sizes and identities of animals, are taken from the imagery (Figure 3). From this information we can calculate relative abundances, community composition, and diversity. At a prescribed time an acoustic command is given from the ship that releases the anchor from the system (dual Benthos acoustic releases) which floats back up to the surface for recovery. Recovery is aided by a large fluorescent flag, radio directional beacon (RDF) and a strobe in case of nighttime recovery. We propose two to four deployments at each island or bank visited on the research cruise between 500 and 4000m.

Deep-sea trap sampling

We anticipate that many of the animals observed in the camera will be new records for Hawaii and could even be new to science. Thus to augment this sampling we propose to deploy a small baited trap (1mx1mx0.5m) in a similar mooring fashion. The trap will capture a subset of the scavenging community and provide us with physical specimens for confirmation of photographic identification, vouchers and perhaps new species descriptions. Tissue samples from collected animals will be frozen for isotopic measurements and preservation of material for DNA analysis. Carcasses will be preserved in 5% formalin. We propose two deployments at each island or bank between 500 and 4000m.

Diving and/or snorkeling activities may be required to test our camera instruments in shallow water (troubleshoot field of view and focus issues etc.).

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:

common name	scientific name	#	size (cm)
fishes			
flatnose codling	Antimora microlepis	5	40-80
abyssal rattail	Coryphaenoides armatus	5	50-100
longfin rattail	Coryphaenoides longifilis	5	40-80
bighead rattail	Coryphaenoides rudis	5	30-100
cusk-eels	Apagesoma sp?	5	25-100

cutthroat eel	Synaphobranchus affinis	15	35-75
cuthroat eel	Histiobranchus bathybius?	5	30-80
parasitic eel	Simenchelys parasitica	5	15-50
deep-sea conger eel	Uroconger guttulatus	5	30-150
giant hagfish	Eptatrepus carlhubbsi	5	30-120

invertebrates

shrimp	Acanthephyra sp.	15	5-15
shrimp	Aristeopenaus sp.	10	8-20
shrimp	Heterocarpus sp.	20	2-10
octopus	Enteroctopus new sp.	2	50-120
giant Lysianassid	Eurthyenes gryllus	25	1-7
scavenging amphipods	Lysianassid amphipods (species unknown)	300	0.1-1
king crab	Lithodes nintokuae	5	30-60
king crab	Neolithodes new sp.	5	30-60
crab	Cancer macropthalmus	5	10-30
crab	Ceramaster bowersi	5	10-20
decorator crab	Paramola sp.	2	30-80

Scientific name:

& size of specimens:

Collection location:
various - see methods description above

☒ Whole Organism ☐ Partial Organism

9b. What will be done with the specimens after the project has ended?
Tissue samples will have been used in laboratory assays (stable isotopes). Carcasses will be archived at UH and various Museum collections (i.e. Bishop Museum).

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

• General site/location for collections:
n/a

• 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?
n/a

10. If applicable, how will the collected samples or specimens be transported out of the Monument?
All samples will be carried out of the monument via vessel (Hi'ialakai). Tissues will be frozen and carcasses will be preserved in 5% formalin

11. Describe collaborative activities to share samples, reduce duplicative sampling, or duplicative research:
I have been speaking with other deep-sea scientists at the University of Hawaii. We have formed a discussion group and plan on working together in the future as well as sharing past data. These scientists include Dr. Craig Smith, Dr. Kevin Weng, Dr. Rhian Waller, Dr. Chris Kelley, Dr. John Smith and Dr. Les Watling. I will be collaborating directly with Dr. Chris Kelley and Dr. John Smith (both with HURL) on a submersible cruise this Fall thus I will be sharing my data on species identities to enhance community assessments from the sub.

12a. List all specialized gear and materials to be used in this activity:
(2) - time lapse camera systems
(2) - wire mesh cage traps
(4) - spar buoys (collapsible)
Benthos acoustic deck box
(4) - Benthos acoustic releases
quick release for dropping camera
block on A-frame
capstan
grappling hooks

12b. List all Hazardous Materials you propose to take to and use within the Monument:
Formalin - Formaldehyde 37 Wt % solution ACS
1 gallon
hazard classes (NFPA ratings: scale 0-4) - health = 3, fire = 2, reactivity = 2
Formaldehyde will be stored in a plastic bin to contain inadvertent spills and under the fume hood aboard ship. The solution will be used to preserve animals captured in the trap sampling. Samples will be preserved in specimen jars and sealed with tape for transport out of the Monument. All formaldehyde will be removed from the Monument at the end of the cruise. MSDS sheet is attached.

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

14. Provide a time line for sample analysis, data analysis, write-up and publication of information:
Image analysis and specimen identification will be completed by Dec 2010 with data analysis occurring by Feb 2010. The results will be written up and submitted for publication by the end of May 2010.

15. List all Applicants' publications directly related to the proposed project:
Yeh, J., and J. C. Drazen. 2009. Depth zonation and bathymetric trends of deep-sea megafaunal scavengers of the Hawaiian Islands. Deep Sea Res. I 56: 251-266.

Drazen, J. C. 2008. Energetics of grenadier fishes, p. 203-223. In A. M. Orlov and T. Iwamoto [eds.], Grenadiers of the World Oceans: Biology, Stock assessment, and Fisheries. American Fisheries Society.

Drazen, J. C., B. N. Popp, C. A. Choy, T. Clemente, L. G. De Forest, and K. L. Smith. 2008. Bypassing the abyssal benthic food-web: macrourid diet in the eastern North Pacific inferred from stomach content and stable isotopes analyses. Limnol. Oceanogr. 53: 2644-2654.

J. P. Barry and Drazen, J. C. (2007). Response of deep-sea scavengers to mild hypercapnia and the odor from a dead grenadier. Marine Ecology Progress Series 350: 193-207.

Drazen, J. C. and B. A. Seibel (2007). Depth-related trends in metabolism of benthic and benthopelagic deep-sea fish. Limnology and Oceanography 52(5): 2306-2316

Seibel, B. A. and J. C. Drazen (2007). The rate of metabolism in marine animals: Environmental constraints, ecological demands and energetic opportunities. Philosophical Transactions of the Royal Society of London B, 362:2061-2078.

Drazen, J. C. (2007). Depth related trends in proximate composition of benthic and benthopelagic fishes. Deep-Sea Research I 54: 203-219.

Drazen, J. C., K. R. Reisenbichler, and B. H. Robison (2007). A comparison of assimilation efficiencies between shallow and deep living fishes. Marine Biology 151(4): 1551-1558.

Stein, D. L., J. C. Drazen, K. L. Schlining, L. Kuhnz, and J. P. Barry (2006). Distribution, behavior, and photographic identification of liparid fishes in Monterey Bay. Journal of Fish Biology 69: 970-986.

Smith, C. R., J. C. Drazen, and S. Mincks (2006) Deep-sea biodiversity and biogeography: perspectives from the abyss. Proceedings of the workshop on Mining of Cobalt Rich

Ferromanganese Crusts and Polymetallic Sulphides - Technological and Economic Considerations. International Seabed Authority, Kingston, Jamaica.

Drazen, J. C. and B. H. Robison (2004). Direct observations of the association between a deep-sea fish and a giant scyphomedusa. Marine and Freshwater Behaviour and Physiology 37(3): 209-214.

Drazen, J. C., S. K. Goffredi, B. Schlining, and D. S. Stakes (2003). Aggregations of egg brooding deep-sea fish and cephalopods on the Gorda Escarpment: a reproductive hotspot. Biological Bulletin 205: 1-7.

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