

Papahānaumokuākea Marine National Monument
RESEARCH Permit Application

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

ADDITIONAL IMPORTANT INFORMATION:

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

INCOMPLETE APPLICATIONS WILL NOT BE CONSIDERED

Send Permit Applications to:

Papahānaumokuākea Marine National Monument Permit Coordinator
6600 Kalaniana'ole Hwy. # 300
Honolulu, HI 96825

nwhipermit@noaa.gov

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

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

Papahānaumokuākea Marine National Monument Permit Application Cover Sheet

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

Summary Information

Applicant Name: David Hyrenbach

Affiliation: Hawaii Pacific University

Permit Category: Research

Proposed Activity Dates: January 1, 2016 - December 31, 2020

Proposed Method of Entry (Vessel/Plane): N.A.

Proposed Locations: Two sites are proposed: Midway Atoll and Tern Island, which are located along a North-South gradient of distance to the North Pacific Chlorophyll Front. While we seek samples from these sites, we do not request access to these sites.

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

3

Estimated number of days in the Monument: None requested

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...

Study the incidence and amount of plastic ingestion in eight locally-breeding seabird species and relate these patterns to geographic location (NWHI vs MHI), age classes (chicks vs adults), and life-history characteristics (foraging modes, trophic level, diet). Previously, we used samples collected from French Frigate Shoals between 2008 and 2012 to establish a multi-species baseline of plastic pollution, and to document plastic ingestion in 3 previously undocumented species, albeit with small sample sizes (red-footed booby, brown booby, red-tailed tropicbird).

To this end, we seek opportunistically collected specimens from the following 8 species at 2 sites: Wedge-tailed shearwater (*Puffinus pacificus*), Bulwer's petrel (*Bulweria bulweri*), Black-footed Albatross (*Phoebastria nigripes*), Laysan Albatross (*Phoebastria immutabilis*), Sooty Tern (*Onychoprion fuscatus*), Red-tailed Tropicbird (*Phaethon rubricauda*), Brown Booby (*Sula leucogaster*) and Red-footed Booby (*Sula sula*). This list of focal species was originally requested as part of permit 2010-027 (2011-2015).

While collections at French Frigate Shoals will likely not be feasible in the future, we would still like to include this site in our permit. Yet, we consider Midway Island as the main collection site.

Because the number of specimens and their age classes will vary from year to year, we request a 5-year permit that will allow us to sample any unusual mortality events.

b.) To accomplish this activity we would

We will work with refuge staff at two study sites (Midway Atoll and French Frigate Shoals) to collect deceased chicks and adults for necropsy and lab analysis. Specimens will be stored frozen and delivered to Honolulu. Specimens will be necropsied in the lab at Hawaii Pacific University and the stomach contents and tissue samples will be preserved for analysis of (for pollutants, diet and stable isotopes. These analyses will be performed in collaboration with the following researchers: Michelle Hester (Oikonos - NGO), Michael Fry (USFWS), Kyle Van Houtan (NOAA - PIFSC), Seth Newsome (University of New Mexico), Rei Yamashita (Tokyo University) and Denise Hardesty (CSIRO - Australia).

Specimen analyses will include: (i) stomach contents including diet and plastics, (ii) tissues for isotopic analyses (muscle, toe nails, feathers, liver), and (iii) specimen use in educational activities (e.g., graduate student research projects, undergraduate necropsy lab as part of Hawaii Pacific University seabird course) and distribution of the Bishop Museum for mounting and exhibition. Please note that Hyrenbach already has a special purpose possession / salvage permit from USFWS (MB -180283-0), valid through 03/31/2017 (Please see enclosed USFWS permit).

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

Developing a standardized baseline of plastic ingested by petrels at these two NWHI colonies, comparable to our ongoing study in the MHI (O'ahu). This information will be useful for future monitoring of seabird population status and health studies of petrel populations in the Monument, and will be applied to ongoing educational and outreach efforts to raise awareness about plastic pollution in the marine environment.

Other information or background: This research is part of a study to characterize plastic ingestion by petrels and to understand the individual and population-level effects of this marine debris. More specifically, we are interested in studying the general origin (post-user / industrial) and the mechanisms (color preferences, association with natural prey) by which certain pieces are chosen at sea. While it is widely known that surface feeding tubenose seabirds (order Procellariiformes) ingest and feed floating plastic fragments at sea to their chicks, previous studies have not addressed geographic and species-specific differences in the types and amounts of ingested debris. By comparing the results from species breeding in the Monument and in the Main Hawaiian Islands and with specimens from fisheries bycatch (adult albatrosses), this study will start to test mechanistic hypotheses about the geographic and life-history factors influencing the plastic ingestion in North Pacific petrel populations.

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Hyrenbach, David

Title: Associate Professor of Oceanography

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

None. No field presence is required.

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: N/A

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

Hawaii Pacific University (<http://www.pelagicos.net>)

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):

Jessie Beck, Technician - necropsy / seabird ecology

Gwen Larrow, Technician - necropsy / seabird ecology

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 checked="" type="checkbox"/> Land-based	<input type="checkbox"/> Shallow water	<input 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 type="checkbox"/> Pearl and Hermes Atoll	<input type="checkbox"/> Land-based	<input type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Midway Atoll	<input checked="" type="checkbox"/> Land-based	<input type="checkbox"/> Shallow water	<input 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			

Ocean Based

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

Location Description:

French Frigate Shoals and Midway Atoll

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:*

Although it is known that petrels ingest marine debris at sea, most research on plastic ingestion has focused on albatross chicks due to availability of boluses for analysis (including squid beaks and platics). Yet, studies in other areas of the world (including the main Hawaiian Islands) have documented high levels of incidence and loads of plastic ingestion in a variety of surface-foraging and diving petrels (shearwaters, storm-petrels, gadfly petrels). Our previous research in Tern Island also documented plastic ingestion in sooty terns and red-footed / brown boobies. These results have revealed differences across size-classes, locations and species, which provide valuable insights into the ecology and susceptibility of seabirds to marine pollution.

By examining the plastic ingested by chicks / adults of the seabird species breeding in the Northwest Hawaiian Islands through necropsies, we will develop a baseline of the incidence and loads of this debris. In particular, we will combine the results of this project with analyses of diet and isotopic composition (indicative of trophic level), and with information on at-sea surveys. This multi-disciplinary approach will allow us to relate the amount and type of plastic ingested by these sympatrically-breeding petrels to life-history differences and to oceanographic conditions within their foraging grounds. Integrating these colony and at-sea perspectives will give managers an improved understanding of the colony-specific patterns of marine debris ingestion by petrels. This critical information will help develop protocols for monitoring trends in plastic ingestion rates across the Monument.

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?

Only dead chicks and adults will be collected by searching the seabird colonies on foot. Thus, we anticipate minimal disturbances to the birds. The specimens will be stored, along with basic information concerning the date / location / condition / likely cause of death.

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? By examining the incidence and type of plastic ingested by eight focal species, this research will provide valuable baseline data for ecosystem-level monitoring of these species in the Monument and for designing future hypothesis-driven studies relating plastic ingestion to the health and trends in these populations.

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.

The Monument contains the main breeding sites for the central Pacific populations of these species, making these critical sites for this research to take place. An important aspect of this study is the comparisons across among multiple colonies, required to investigate the influence of the regional oceanography. Thus, it is imperative that we study multiple replicate colonies to characterize the types and amounts of ingested plastic in the different areas of the Monument. In particular, testing the prediction of differences in plastic ingestion rates in colonies closer and farther from the North Pacific Chlorophyll Front (NPCF) will require samples from several sites spanning the latitudinal range of the Monument. Thus, we selected a northern site (Midway Atoll) and a central site (French Frigate Shoals) with the required logistical support (freezer space, vessel support) to conduct this study. Moreover, we will compare these samples with others obtained from the Main Hawaiian Islands.

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 proposed research will increase the Monument's knowledge about the incidence and amount of plastic ingestion in breeding seabirds, compared to those rates for species from the Main Hawaiian Islands. It will also determine geographic differences across colonies and relate these patterns to a broader ecological and oceanographic context using the available information from satellite-tracking studies and marine debris distributions. Furthermore, we will apply the results of this research to educate the public about the pervasive problem of marine debris, and its impacts on marine wildlife. It is our belief that these benefits will outweigh any adverse impacts on the resources and qualities of the Monument.

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

Due to the opportunistic nature of this sampling, the duration of the activity needs to span the entire breeding season of the seabirds, to ensure that deceased specimens are collected, whenever they become available. Moreover, multiple years will allow us to sample any unusual mortality events, when otherwise difficult-to-sample species will be available.

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

We will work with the Monument managers to determine the most effective approach. In principle, this is what we envision: the activity will require that the existing monitoring personnel at the study sites collect dead birds opportunistically, record basic specimen information (date, location, apparent cause of death), and store the bird in a freezer for eventual transportation back to Honolulu via ship or plane.

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.

We have been awarded yearly Marisla Foundation funding, and general support from Hawaii Pacific University (HPU) to fund this research project. Funds can be applied to offset the costs of transporting the samples back to Honolulu.

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 will cause minimal disruption to the Monument ecosystem because our study will require collection of dead chicks and adults from seabird colonies. Sample processing will be done off-site. The carcasses will be shipped to Oahu for analysis at Hawaii Pacific University.

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

N / A

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

The proposed method would result in minimal disturbance to seabird colonies as live birds would not be disturbed. The Monument's resources would not be strained by this project as this project will require no presence of project personnel at the study sites.

8. Procedures/Methods:

We will work with the managers of the two proposed field sites (French Frigate Shoals, Midway Atoll) to determine the most efficient way to collect the samples we are requesting.

Furthermore, we are prepared to discuss the ways that our resources can contribute to the management goals of the Monument. For instance, we could provide financial support for the current staff to perform the sample collection. Alternatively, we could deploy project personnel to collect these samples and to volunteer in other research / monitoring activities. We are aware that the resources available for research and the availability of transportation to / from the Monument change from year to year, and look forward to working with the appropriate co-trustees to develop a research plan that accomodates these limitations.

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:

Black-footed Albatross (only adults)

Wedge-tailed Shearwater (adults and chicks)

Sooty Tern (adults and chicks)

Brown Booby (adults and chicks)

Laysan Albatross (only adults)

Bulwer's Petrel (adults and chicks)

Red-tailed Tropicbird (adults and chicks)

Red-footed Booby (adults and chicks)

Scientific name:

Phoebastria nigripes & Phoebastria immutabilis
Puffinus pacificus
Bulweria bulweri
Onychoprion fuscatus
Phaethon rubricauda
Sula leucogaster & Sula sula

& size of specimens:

A large sample size is required to perform rigorous parametric statistical analyses of species-specific, site-specific and age-specific patterns. Thus, up to 25 adults and chicks of each of 8 species (except for the two albatrosses, where only adults are required because ample chicks have been analyzed in previous years) from two sites (Midway Atoll, French Frigate Shoals).

Nevertheless, we understand that only samples from one site (Midway Island) will likely be available, and that some species (like the wedge-tailed shearwaters) are not abundant at Midway. Thus, these figures are maximum values, and the number of specimens collected will be considerably lower.

While the actual number of samples collected opportunistically is impossible to anticipate, a sample size of up to 700 specimens is requested, over a five year period:

- 100 albatrosses: 25 birds * 2 species * 2 sites * 1 age_class (adults)
- 100 shearwaters: 25 birds * 1 species * 2 sites * 2 age_classes
- 100 petrels: 25 birds * 1 species * 2 sites * 2 age_classes
- 100 terns: 25 birds * 1 species * 2 sites * 2 age_classes
- 100 tropicbirds: 25 birds * 1 species * 2 sites * 2 age_classes
- 200 boobies: 25 birds * 2 species * 2 sites * 2 age_classes

Moreover, because only "high quality" specimens (fresh and unscavenged) will be used in this standardized monitoring study (tissue / diet samples), we anticipate smaller final sample sizes (20) for each age_class / species / site combination. The remainder of the samples will be used public outreach activities for educators and students and university-level education (see online products: <http://www.oikonos.org/education/>).

We recognize that the number of collected chicks and adults may be considerably lower than this target for some species (albatrosses, wedge-tailed shearwater); yet this sample size may be feasible for other species (boobies, tropicbirds, terns). We will report yearly collectyions and will notify the Monument once the desired sample sizes have been reached.

Collection location:

Seabird colonies on Midway Atoll and French Frigate Shoals

Whole Organism Partial Organism

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

Specimens will be disposed of in O'ahu (through a commercial service, available at Sea Life Park). Some parts will be collected and archived for use in a teaching collection, under auspices of USFWS salvage and special use permit to Dr. David Hyrenbach. Please refer to enclosed pdf.

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

Specimens will be collected after natural death

- General site/location for collections:

Dead birds collected from colonies

- 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?

Specimens will be transported by ship or plane to Honoulu as soon as possible after collection.

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

We will compare these samples with results from our ongoing study of plastic ingestion and diet of Wedge-tailed Shearwaters in O'ahu, and with previous studies of albatross / storm-petrel plastic ingestion / diet from Midway Atoll & French Frigate Shoals, using samples collected under the auspices of permits PMNM-2009-034 and PMNM-2010-027. Moreover, our research team is currently collaborating with other investigators, and will share the samples for broader investigations of stable isotopes, diet, pollutants, and plastic ingestion. These collaborations will ensure broader use of the samples and will avoid redundancy and duplicated effort.

Finally, to enhance the research application of these data, we are collaborating with researchers involved in several related projects: (i) outreach and educational activities (Michelle Hester, Oikonos); (ii) ingestion of plastic debris by North Pacific seabirds off California and Alaska (Michelle Hester, Oikonos), (iii) diet (Kyle Van Houtan, NOAA& Seth Newsome, University of New Mexico) and (iii) persistent pollutants in marine food webs (Michael Ffry USFWS, Rei Yamashita, Tokyo University, Denise Hardesty, CSIRO).

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

No specialized gear is required for this project, beyond freezer space for storing / transporting the specimens.

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

None are required.

Samples will be frozen.

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

None.

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

* Yearly Schedule:

January - July: Dead petrel chicks and adults collected opportunistically from two sites (Midway Atoll and French Frigate Shoals) and transported to Honolulu.

July: Specimens transported to O'ahu.

July - September: Specimens necropsied at Hawaii Pacific University.

Sept. - Oct.: Isotopic / pollutant analyses of tissues. Analysis of plastic and diet samples.

Nov. - Dec.: Summary of yearly results. Reporting of yearly results (January of following year).

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

Nevins, H., Keiper, C., Hyrenbach, D., Stock, J., Hester, M., and Harvey, J. 2005. Seabirds as Indicators and Ambassadors to Teach about Marine Plastic Pollution. Rivers to Sea Conference Proceedings Available online at: <http://conference.plasticdebris.org/whitepapers.html>

Hyrenbach, D., Nevins, H., Hester, M., Keiper, C., Webb, S., and Harvey, J. 2009. Seabirds Indicate Plastic Pollution in the Marine Environment. In: Marine Debris in Alaska. Alaska Sea Grant, Anchorage, AK.

Hyrenbach, K.D., Hester, M.M., Johnson, J., Lyday, S., Bingham, S., & Pawloski, J. 2013. First evidence of plastic ingestion by white-tailed tropicbirds from O'ahu. *Marine Ornithology* 41: 167-169.

Nilsen, F., Hyrenbach, K.D., Fang, J., & Jensen, B. 2014. Use of indicator chemicals to characterize the plastic fragments ingested by Laysan albatross. *Marine Pollution Bulletin*, 87: 230-236.

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