

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: February 1, 2010 - May 31, 2010 (1 field season)

Proposed Method of Entry (Vessel/Plane): Plane

Proposed Locations: We seek access to two field sites (Midway Atoll & French Frigate Shoals). On the basis of the analysis of boluses and albatross chick necropsies (refer to submitted Monument permit) and advice from the refuge managers, we will conduct this research at one of these two sites.

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

3

Estimated number of days in the Monument: 4 months: 1 person for 4 months at one site (Midway Atoll or French Frigate Shoals) during 1 field season (2010)

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...

Quantify the amount (incidence, loads) and the types (plastic, Styrofoam, fishing line) of marine debris ingested by Black-footed and Laysan albatross. By integrating this information with similar data we are collecting from the Main Hawaiian Islands (Oahu and Kauai), we will test the hypothesis that colonies closer to the North Pacific Chlorophyll Transition Zone (a known area of marine debris concentration) are characterized by higher ingestion rates. We will apply these data to answer two management questions of relevance to the management of the Monument: (i) develop a baseline of plastic ingestion in these species to facilitate future monitoring of marine debris and population health impacts, and (ii) complete a field-based study to investigate the impacts of plastic ingestion in live albatross chicks using ultrasound imaging. Together these two studies will improve our ability to monitor plastic ingestion trends in North Pacific albatrosses, and will increase our understanding of the mechanisms linking surface marine debris with ingestion by these far-ranging predators.

b.) To accomplish this activity we would

We will work with refuge staff at one of two study sites (Midway Atoll or Tern Island) to monitor ingested marine debris in live Black-footed and Laysan albatross chicks repeatedly, to track changes in the loads and the fate of individually-marked individuals. We will use ultrasound imaging and metrics of body condition (body mass scaled to wing and tarsus length) to track the ingested plastic and body condition of albatross chicks over time. We will mark individual chicks with color markings (darvic bands or fish spaghetti tags), which we will remove at the end of the study. We will repeatedly weigh / scan these individually-marked chicks to assess their body condition and plastic loads. Chicks that die naturally during the course of the study will be necropsied to groundtruth the plastic loads in their stomachs and to collect tissue samples (muscle / liver / intestine / feathers / toe nails) for isotopic analyses of their diets and quantification of their pollutant loads. To assess the effects of repeated handling on these chicks, we will mark another control group of individuals, which will be weighed at the beginning and the end of the study. We will use the body condition and survivorship of these chicks to assess potential detrimental handling effects on the study individuals. We will work with the Monument to determine the appropriate sample sizes and time intervals between successive weighings / scans of the same individuals. Ideally, we would like to have a sample sizes large enough to allow us to follow 50 study and control chicks of each species for the duration of the study (2 months). Ultimately, we will determine these sample sizes by consulting with the refuge manager, on the basis of the expected chick mortality rates and ease of marking and re-locating the same chicks over time. The time intervals between successive weighings and scans will be a function of these sample sizes and the handling time. We anticipate requiring an initial sample size of ~ 200 Black-footed and ~ 200 Laysan albatross chicks.

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

Developing a standardized baseline of plastic ingested by albatross chicks at three NWHI colonies, comparable to other similar studies at two MHI sites (Oahu / Kauai). This information will be useful for future monitoring and health studies of albatross populations in the Monument, and will be applied to ongoing educational and outreach efforts to raise awareness about plastic pollution in the marine environment. In particular, please refer to enclosed permit application for ultrasound-based studies of plastic ingestion in albatross chicks.

Other information or background: This research is part of a study to characterize plastic ingestion by albatross and to understand the individual and population-level effects of this ingested plastic on albatross chicks. 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 multiple sites / species breeding in the Monument with colonies in the Main Hawaiian Islands, this study will start to test mechanistic hypotheses about the geographic and life-history factors influencing the plastic

ingestion in North Pacific albatross populations. Please refer to the enclosed permit application for non-destructive ultrasound-based monitoring of plastic ingestion in live albatross chicks.

Section A - Applicant Information

1. Applicant

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

Title: Assistant Professor of Oceanography

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

Andrew Titmus

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):

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):

Andrew Titmus, Field Researcher

Pamela Michael, Field Researcher

Section B: Project Information

5a. Project location(s):

<input type="checkbox"/> Nihoa Island	<input type="checkbox"/> Land-based	<u>Ocean Based</u>	
<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			

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

Location Description:

Black-footed and Laysan Albatross colonies on 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 albatross ingest plastic particles at sea, the locations and distributions of these plastics are poorly understood. By examining the plastic ingested by albatross chicks / adults in the Northwest Hawaiian Islands through necropsies and bolus analysis, we will document the incidence / loads of this debris to albatross foraging ecology. In particular, we will combine the our project with the results from previous satellite tracking data studies and at-sea surveys. This multi-disciplinary approach will allow us to relate the amount and type of plastic ingested by these two sympatrically-breeding albatross to marine debris concentrations and to the oceanography within the foraging grounds where albatross are known to travel during the breeding season. Integrating these colony and at-sea perspectives will give managers an improved understanding of the colony-specific patterns of marine debris ingestion by albatross. This critical information will help develop a baseline 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 / adults and regurgitated boluses will be collected by searching the albatross colonies on foot. Additionally, live albatross chicks will be handled and examined using ultrasound imaging. However, each examination will last no longer than 10 minutes and will cause minimal disturbance to the bird. Thus, disturbances to the colonies will be minimal. We will provide all the necessary lab supplies and will return all the waste to Oahu. We will work with the Monument personnel at each site to determine how best to use funds and personnel.

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 of plastic ingested by albatross chicks over the breeding season, and relating the loads of ingested plastic to the condition and the fate of the individual birds, this study will test whether: (i) plastic loads vary over time, as chicks are fed the material by their parents and regurgitate boluses; (ii) the degree of plastic ingestion is correlated with the condition and the fate (survivorship) of the chicks; and (iii) ultrasound provides an accurate metric of plastic ingestion in albatross chicks. To validate the ultrasound scans, we will use necropsies to quantify the plastic ingested by those individually-masked chicks that die during the course of the study.

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 Black-footed and Laysan Albatrosses, making these critical sites for this research to take place. We will work with the Monument to select the most suitable study site (Midway Atoll or French Frigate Shoals), on the basis of the plastic ingestion rates documented through the analysis of boluses / necropsies (refer to submitted Monument permit from Hyrenbach), the expected albatross chick survivor rates, and the logistics involved in the field work.

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 albatross populations. 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.

We will work with the managers to determine the most effective approach to conduct our study. In principle, this is what we envision: a researcher from our project will spend 2 - 4 months at the study site to weigh / scan the chicks and to collect boluses and dead chicks. This researcher will process these samples for shipping back to Oahu for detailed analysis and will assist refuge staff as needed. We will work with the refuge manager at the study site to determine the best approach for collecting samples, this may entail additional time spent in the refuge by our researchers if the manager is low on personnel or resources.

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 one team member (Titmus) spend 2 - 4 months at one field site working with the albatross chicks, and conducting necropsies / collecting samples in the field. Hyrenbach (PI) and two graduate students (Titmus / Michael) have many years of experience working with seabirds, and have handled albatross adults and chicks in the past. Moreover, these investigators have experience with seabirds necropsies and the collection and preservation of tissue samples. Titmus will train with the use and interpretation of the imagery from a portable ultrasound device in the lab in Oahu, using specimens collected as part of Hyrenbach's salvage permit (see enclosed USFWS salvage permit), before going in the field.

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 two National Fish and Wildlife Foundation (NFWF) Marine Debris grants to fund the stated research project. The duration of these ongoing grants is June 1, 2010. Funds from these grants can be applied to both offset personnel costs of refuge staff already at the project sites and / or travel and accommodations for researchers from this project.

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 non-invasive diet sampling from boluses during the late chick rearing season for albatrosses. The potentially more disruptive part of our study entails the repeated weighing / scanning of individually-marked chicks using a portable ultrasound device. This handling will not cause harm to the albatross chicks as the examinations will be short (maximum 10 minutes) and are non invasive. Coupling gel for the ultrasound will be contained within latex in order to keep from fouling the chick's feathers. These activities will only require a minimal research presence in the field. In addition, the albatross colonies will be minimally disturbed during the collection of dead chicks and boluses, and the search for individually-marked chicks. In addition, a group of control birds will only be handled twice during the study (beginning / end) to assess their condition. This will allow us to determine whether the repeated handling and ultrasound scanning has a detrimental effect on the growth, condition, and survivorship of the chicks. Depending on the logistical limitations, basic necropsies can be done on site and samples (stomachs) shipped to Oahu for more detailed processing at Hawaii Pacific University (HPU). If the refuge has access to a freezer, sample processing will be done off-site. The carcasses and boluses will be shipped to Oahu and processed at HPU.

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 Albatross colonies as live birds would not be disturbed. The Monument's resources would not be strained by this project as this project will require a minimal presence at the study sites.

8. Procedures/Methods:

We are flexible about the timing and the duration of the visits to the Monument, and 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, the project personnel deployed in the field could 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 accommodates 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:

Laysan Albatross

Black-footed Albatross

Scientific name:

Phoebastria immutabilis

Phoebastria nigripes

& size of specimens:

Up to 200 chicks of each species at one location, during one year (2010). Note: 100 chicks of each species will be 'experimental' (marked, and weighed / scanned repeatedly) and 100 chicks of each species will be 'controls' (marked, but weighed only twice). Maximum of 400 chicks.

Chick Necropsies: Up to 50 naturally deceased chicks of each species will be necropsied to obtain stomach contents and tissue samples. Anticipated sample size: 100 chicks.

Albatross boluses: 50 of each species at each location, during one years (2010).

Anticipated sample size: 100 boluses.

Collection location:

Albatross colonies at one site (Midway Atoll or 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 either on the Monument (following the directions of the Refuge managers) or in Oahu (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 copy.

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 and boluses collected from albatross 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 plane and / or NOAA ship to Honolulu as soon as possible after collection.

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

Our research team is currently collaborating with other investigators, and will share the boluses / samples for broader investigations of squid diet (Bill Walker, NOAA) and pollutants (Myra Finlestein, UCSC). Additionally, we have plans to collaborate with other ongoing studies of albatross boluses in Kure Atoll (Cynthia Vanderlip, State of Hawaii DLNR) and Guadalupe Island (Bill Henry, UCSC) by coordinating data collection / analyses to facilitate inter-colony comparisons. These collaborations will ensure broader use of the samples and will avoid redundancy and duplicated effort. Finally, we are collaborating with researchers involved in several related projects: (i) outreach and educational activities (Carol Keiper, Oikonos); (ii) satellite tracking studies of albatross movements from Tern Island (David Anderson, Wake Forest University) and Kure Atoll (Michelle Hester, Oikonos); (iii) ingestion of plastic debris by North Pacific seabirds (Hannah Nevins, Moss Landing Marine Labs) and at-sea surveys of marine debris in the North Pacific Ocean (Kara Lavender, Sea Education Association).

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

A portable ultrasound device will be required to conduct this research. Funds are budgeted to obtain this device, as well as the required field and lab supplies. If the Monument needs a freezer to store the tissue samples, we have some flexibility in the budget to cover these costs.

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

None. Samples will either be frozen or processed and stored dry on site.

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:

We envision a one year project with the following time-line:

- February - June 2010: Albatross chicks scanned / weighed at the field site. Dead albatross chicks and boluses collected opportunistically from the study site. (Midway Atoll or French Frigate Shoals) and transported to Honolulu.
- July - September 2010: Samples sorted and quantified at Hawaii Pacific University.
- October 2010 - November 2010: Complete analysis of data.
- December 2010: Results write-up. Submit ms for publication.

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

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

Hyrenbach, K.D. 2008. Applying Spatially-explicit Measures for Albatross Conservation, Pp. 118-120. In: De Roi, T., Jones, M., Fitter, J. (Eds). Albatross: their world, their ways. Firefly Books, Buffalo, NY.

Hyrenbach, K.D., Keiper, C., Allen, S.G., Anderson, D.J., and Ainley, D.G. 2006. Use of national marine sanctuaries by far-ranging predators: commuting flights to the California Current System by breeding Hawaiian albatrosses. *Fisheries Oceanography*, 15 (2): 95-103.

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>

Keiper, C.A., Hester, M.M., and Hyrenbach, K.D. 2005. Wonderous Ocean Wanderers in Our Own Front Yard. *Hydrosphere* 17: 1, 10-11. www.farallones.org/docs/albatross.pdf

Shaffer, S. Costa, D., Suryan, R., and Hyrenbach, D. 2004. Regional Summaries: North Pacific (section 4.1). In: Bird Life International. Global Procellariiform Tracking Workshop Report. Cambridge, Bird Life International. pp. 47-49.

Hyrenbach, K.D., and Dotson, R.C. 2003. Assessing the susceptibility of female Black-footed Albatross (*Phoebastria nigripes*) to longline fisheries during their post-breeding dispersal: an integrated approach. *Biological Conservation*, 112: 391-404.

Hyrenbach, K.D., Fernández, P, and Anderson, D.J. 2002. Oceanographic habitats of two sympatric North Pacific albatrosses during the breeding season. *Marine Ecology Progress Series*, 233: 283-301.

Hyrenbach, K.D., and Dotson, R.C. 2001. Post-breeding movements of a male Black-footed Albatross *Phoebastria nigripes*. *Marine Ornithology*, 29:23-26.

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