

**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:** Dr Jennifer Lavers

**Affiliation:** Institute for Marine & Antarctic Studies/Plastic Oceans Foundation

**Permit Category:** Research

**Proposed Activity Dates:** June 2012 - July 2013

**Proposed Method of Entry (Vessel/Plane):** Plane

**Proposed Locations:** Midway Island

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

1

**Estimated number of days in the Monument:** 10

**Description of proposed activities:** (complete these sentences):

a.) The proposed activity would...

Enable the applicant to collect feather samples from Midway Island seabirds (particularly Laysan Albatross) to be tested for trace metals (in relation to plastic load). This information will be analysed and presented in the Plastic Oceans documentary, and will also likely be published as part of a (newly established) research collaboration with Drs. Collin Eagles-Smith (USGS), Michael Fry (USFWS), and Alexander Bond (USASK).

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

Freshly dead, juvenile seabirds will be necropsied. Species covered under Dr Lavers' MBTA permit include Laysan Albatross (LAAL) and Bonin Petrels (BOPE). As LAAL are the primary target species, and the only species likely to be in great abundance (dead carcasses), the proposed sample size is 40 birds. BOPE will be 10 individuals or less.

Ten breast feathers will be collected from each bird for trace metal analysis using inductively coupled plasma mass spectrometry (ICP-MS). Plastic items recovered from inside the birds' stomachs will also be collected and sent to USGS in Oregon for trace metal analysis using FTIR spectroscopy.

Entrance into the PMNM and specifically Midway Atoll NWR would occur under an existing permit (Permittee Ruxton, Plastic Oceans Foundation). Samples will be retained by USFWS

staff on Midway Atoll, as authorised, and made available for analysis once all permits have been approved.

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

This research will contribute to the Monument through providing additional information on the impacts of plastic pollution, particularly the less visual impacts (ie. contaminants) that are more difficult to detect and quantify.

**Other information or background:**

Please see my [www.jenniferlavers.org/plastic-pollution](http://www.jenniferlavers.org/plastic-pollution)

Also see: Bond AL and Lavers JL. 2011. Contemporary trace element concentrations in Flesh-footed Shearwater (*Puffinus carneipes*) feathers from across their breeding range. Archives of Environmental Contamination and Toxicology 61: 318-326

**Section A - Applicant Information**

**1. Applicant**

Name (last, first, middle initial): Lavers, Jennifer L

Title: Dr

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

As above

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

[REDACTED]  
[REDACTED]  
[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):**

Institute for Marine & Antarctic Studies

Plastic Oceans Foundation

**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):**

Samples will be forwarded to the applicant by USFWS staff upon permit approval



**Section B: Project Information**

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

- |   |  |  |                                     |
|---|--|--|-------------------------------------|
| <input type="checkbox"/> Nihoa Island                 | <input type="checkbox"/> Land-based            | <b><u>Ocean Based</u></b>              |                                     |
| <input type="checkbox"/> Necker Island (Mokumanamana) | <input type="checkbox"/> Land-based            | <input type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> French Frigate Shoals        | <input 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:

Beaches and nesting ground for Albatross.

**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:***

Extensive research has been undertaken across the globe to investigate the consequences of plastic pollution for marine species. This is particularly true for Hawaii's albatross species with numerous papers published on the topic since 1962. However, these and other studies have focuses primarily on the origin and color of plastic items, with quantitative data on population-level impacts entirely lacking. Additionally, there has been much criticism of plastic pollution research to date as no study has established a direct link between the amount of plastic ingested, survival rates, or (in the case of this research), contamination levels. Until this link has been identified, and quantified, other causes of mortality can not be excluded and the nature of the pollution problem will remain poorly understood.

To address this critical data gap, this novel project will analyse contaminant levels in seabirds (using their feathers as a bioindicator of total body burden) in relation to the volume of plastic removed from inside the birds. The results will highlight the less visible, but equally damaging, consequences of plastic pollution. In doing so, they will contribute significantly to our understanding of what factors are influencing seabird population dynamics throughout Hawaii.

**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?

Sampling will be conducted in collaboration with FWS staff on Midway and will operate according to their guidance. The applicant will behave in a respectful manner and operate according to the guidelines set out for the protection of this historic, cultural and natural marine monument. Dr Lavers has prior experience working within the Monument, having conducted research on French Frigate Shoals seabirds during 2005/06.

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?

As only dead birds will be sampled on Midway Atoll, disturbance to the birds will be minimal (no live-animal handling is required). The amount of time spent in the colonies will also be minimal, as processing of carcasses will take place at the research station. The applicant will ensure appropriate distance is maintained from all sensitive habitats and species. This will be relatively straightforward since most of the carcasses will be collected from the periphery of the colony.

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.

Consultation with Hawaii State permit officers suggests that the number of freshly dead carcasses are extremely limited outside the Mounment. Enquiries have been made to the Bishop Museum, however indications are that very few (if any) specimens are available.

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

Four breast feathers will be taken (sampled) from each dead bird. Feathers were chosen for this study because they provide the simplest and most effective method for assessing trace metal contamination. Sample collection (plucking) and storage/transport (dry) is straightforward and analysis using ICP-MS is reliable (repeatable across years and labs) and cost-effective.

Analysis of the feathers will provide information on trace metal contamination that results from the ingestion of plastic. Trace metals (eg. mercury and arsenic) have been linked to morbidity and mortality in seabirds. While less visible and graphic than stomach perforations due to plastic, chronic or actue exposure to toxins potentially poses an even greater threat to seabird populations due to their persistence in the tissues of the birds well beyond the chick stage.

Consequently, there is an urgent need to include trace metal data when assessing the scale of the plastic problem for Midway Atoll seabirds.

As the birds sampled for this project are already dead, I do not expect there to be any adverse impacts of this research.

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

Midway Island - minimum stay is 10 days (based on aircraft availability; 18-28 June 2012).

Beyond this time, samples, if available, will be collected by approved USFWS staff based on the Island.

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 worked on seabirds for more than a decade (PhD in Marine Biology; CV attached), including on French Frigate Shoals during 2005/06 and in other highly sensitive, protected areas including World Heritage listed Lord Howe Island.

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.

Dr Lavers has secured funding for her travel to Midway Island through private donors.

Analytical costs are being covered by this same donation and also through a collaborative grant proposal with USGS

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 use of seabird feathers as an indicator of total body burden (heavy metal contamination) is well established in the scientific literature. It is, by far, the quickest method for sampling in birds and lends itself to storage and transport (no ethanol required). Thus, by utilising feathers, the sampling regime will ensure minimal disturbance to the Monument. In addition, but making use



of animals that have died, the information gathered on cause of death will contribute to the long-term survival of seabird populations within the Monument.

ICP-MS is a widely used and cost-effective technique for assessing trace metal concentrations in a wide range of tissue types, including feathers. It has been utilised on seabirds around the globe with a high degree of success (see Bond and Lavers 2011 below). The standards used during analysis are constant across labs and countries, enabling comparisons across species and locations.

FTIR has been used to assess trace metal concentrations in a range of plastic items. Neutron Activation Analysis (NAA) can also be used, however it is comparatively expensive and few facilities have the necessary equipment (USGS in Oregon has FTIR facilities).

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

Will be using FWS chartered flight to access Midway Atoll

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

Activities will be undertaken only as described above. Most, if not all, activities will be conducted with the assistance of the Refuge Managert.

## **8. Procedures/Methods:**

Samples will be collected from freshly dead seabirds found on Midway Atoll.

Four breast feathers will be collected from each bird by plucking and placed in sterile plastic bags.

Plastic items will be removed from the stomach and gizzard during necropsy. Plastic samples are washed with warm water, air-dried, and placed in sterile plastic bags

**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, Bonin Petrel

Scientific name:

Phoebastria immutabilis, Pterodroma hypoleuca

# & size of specimens:

40 freshly dead juvenile Laysan Albatross (4 breast feathers per bird & plastic from stomach).  
Total of 160 feathers.

10 freshly dead juvenile Bonin Petrels (4 breast feathers per bird & plastic from stomach). Total  
of 40 feathers.

Collection location:  
Midway Atoll

Whole Organism  Partial Organism

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

Samples will be destroyed during the analysis process (ICP-MS). Any remaining feathers will  
be returned to the collection site.

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

N/A

• 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?**

AMARISSA?

Feather samples will be shipped, under permit, to CREAT Labs in Newfoundland, Canada in  
late-2012.

Plastic samples will be shipped to Australia for processing (count, weigh, sort), then to USGS in  
Oregon for FTIR analysis in early-2013.

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

This project has been developed in collaboration with Drs. Collin Eagles-Smith (USGS) and Michael Fry (USFWS). Dr. Alexander Bond (University of Saskatchewan) is also involved due to his knowledge of heavy metals and close links with CREAT Labs in Newfoundland.

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

N/A, samples will be shipped dry

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

N/A, none used

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

N/A, no equipment installed

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

Preliminary sorting and sample preparation: Sept-Dec 2012

Quantitative analysis (ICP-MS & FTIR): March-June 2013

Write-up: July-Aug 2013

Submit for publication: Sept 2013

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

Bond AL and Lavers JL. 2011. Contemporary trace element concentrations in Flesh-footed Shearwater (*Puffinus carneipes*) feathers from across their breeding range. *Archives of Environmental Contamination and Toxicology* 61: 318-326

Papers resulting from Dr Lavers research on French Frigate Shoals during 2006:

Bond AL, McClelland GTW, Lavers JL, Jones IL, and Kyser TK. 2010. Stable isotopes reveal community patterns in seabird feeding ecology in the Northwestern Hawaiian Islands. *Waterbirds* 33: 50-58.

McClelland GTW, Jones IL, Lavers JL, and Saito F. 2008. Breeding biology of Tristram's Storm-petrel at French Frigate Shoals and Laysan Island, Northwest Hawaiian Islands. *Marine Ornithology* 36: 177-184

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.

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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