

**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:  
NOAA/Inouye Regional Center  
NOS/ONMS/PMNM/Attn: Permit Coordinator  
1845 Wasp Blvd, Building 176  
Honolulu, HI 96818  
nwhipermit@noaa.gov  
PHONE: (808) 725-5800 FAX: (808) 455-3093

**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:** Fanny Cusset

**Affiliation:** Littoral, Environment and Societies (LIENSs), La Rochelle University, La Rochelle (France)

**Permit Category:** Research

**Proposed Activity Dates:** During the breeding season of sooty terns (April-September 2021)

**Proposed Method of Entry (Vessel/Plane):** None

**Proposed Locations:** Midway Atoll (priority 1) and other potential sites (if possible): Nihoa Island, Laysan Island, French Frigate Shoals, Pearl and Hermes Atolls- precise location at the discretion of the Monument staff.

**Estimated number of individuals (including Applicant) to be covered under this permit:** 2

**Estimated number of days in the Monument:** None

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

a.) The proposed activity would...

... use sooty terns (*Onychoprion fuscatus*) as bioindicator of mercury (Hg) contamination of the intertropical region. More specifically, we want to document the spatial variations of Hg in the Pacific Ocean. To do so, sooty tern feathers will be collected on their breeding colony on the three proposed sites by the Monument staff, as part of their wildlife monitoring program. (Cf. Project outline in 'Other information or background' below)

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

... collect a limited number of feathers per bird. Specifically, we would need cover feathers (i.e. breast) collected on sooty terns nesting on the six proposed sites in 2021. Feathers should be sampled on both breeding adults (n=30) and chicks (n=30), in order to compare global (annual) and local (seasonal) contamination, respectively (Cf. Project outline in 'Other information or background' below). A minimum of 5 individuals is required for potential/additional sites (i.e. all except Midway Atoll).

c.) This activity would help the Monument by ...  
... providing valuable information on levels, hotspots and coldspots of Hg contamination in the Pacific Ocean, on both global and local scale. Thus, results will help identifying potential risks to coastal communities that rely on marine food resources in tropical regions and will provide additional information for wildlife conservation and management policy on PMNM sites and its surrounding waters.

**Other information or background:**

**Project outline:**

Mercury (Hg) is a very toxic metal and its impact on Human health is a major concern. On the global scale, the amount of Hg released in the environment has steadily increased since the Industrial Revolution. Since Hg is primarily emitted in the atmosphere by both natural and human sources, it disperses all over the globe before it deposits in all ecosystems. Consequently, even remote oceanic areas are affected by this global pollutant. Once into the sea, Hg is transformed into methyl-Hg, which bioaccumulates in marine organisms (concentrations increase over time in their tissues) and biomagnifies in the food chains (concentrations increase at each trophic level) up to top predators, resulting in elevated concentrations in top predators such as seabirds. Methyl-Hg is highly toxic and can impair reproduction, behavior and survival of predators with consequences on their population.

Seabirds are relevant bioindicators of Hg contamination in the Ocean. With their high position in marine food webs and their relatively long lifespan, they are highly exposed to Hg. Because they integrate and reflect the contamination of the entire food chain on which they rely, their study provides information about contamination of lower trophic levels. In contrast to temperate and polar regions, seabirds from the tropical areas have been poorly used to document temporal and spatial trends of Hg. However, tropical regions (i) have experienced an increase of oxygen depleted areas, which are favourable to the formation of the toxic methyl-Hg; and (ii) concentrate most countries where artisanal and small-scale gold mining occurs, known as the largest sector of Hg emissions, accounting for more than 35% of total global anthropogenic emissions of Hg.

In this context, **the aim of this project is to use sooty terns as bioindicator of Hg contamination of the intertropical region.** More specifically, we want to document the spatial variations of Hg in the tropical ecosystems across ocean basins. Overall, only a very limited number of studies have directly quantified Hg in tropical seabirds, and to the best of our knowledge, the present project will be the first to map Hg contamination worldwide.

To do so, we will use bird feathers, as they constitute a Hg storing tissue, and hence a relevant proxy of Hg body burden in seabirds. Specifically, we would need cover feathers, preferentially from the breast, collected on sooty terns nesting on Midway Atoll, Nihoa Island, Laysan Island, Frigate Shoals, Pearl and Hermes Atolls in 2021. Feathers should be sampled on both breeding adults and chicks, in order to compare global (annual) and local (seasonal) contamination, respectively. Samples must be placed in individual plastic or paper bags (e.g., envelope) clearly

identifying the individual to allow their easy identification and shipment. On each individual, a few cover feathers (5-10) will be used for Hg analyses (with Advanced Mercury Analysers), which will be coupled with stable isotope analyses to investigate the role of trophic ecology in bird Hg contamination. These samples from PMNM sites are highly valuable, since they would complement our overall sample set that includes several colonies across the Pacific Ocean, thus allowing a global picture of Hg contamination in tropical oceans.

**Potential impacts of the proposed research:**

Since sooty terns at PMNM sites are routinely monitored, feather sampling required for this project would not cause any additional handling or damage than is usually required for the monitoring program. Only a limited number of feathers will be collected on each individual, in order to minimise any disturbance as much as possible. This limited number is the minimum required for proper chemical analyses and scientific relevance.

## **Section A - Applicant Information**

### **1. Applicant**

Name (last, first, middle initial): [Cusset, Fanny](#)

Title: [PhD Student](#)

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

[Fanny Cusset](#)

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

[REDACTED]

[REDACTED]

Phone:

[REDACTED]

Fax: [None](#)

Email:

[REDACTED]

For students, major professor's name, telephone and email address: [Paco Bustamante \(LIENSs, La Rochelle University\)](#), [REDACTED]

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

[Littoral Environnement et Sociétés \(LIENSs\) - UMR 7266, La Rochelle University \(France\)](#)

#### **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):**

[Personnel of the U.S. Fish and Wildlife Service involved in the sample collection on site \(TBD\).](#)

**Section B: Project Information**

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

<input checked="" type="checkbox"/> Nihoa Island	<input checked="" 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 checked="" type="checkbox"/> Laysan Island	<input checked="" type="checkbox"/> Land-based	<input type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input type="checkbox"/> Lisianski Island, Neva Shoal	<input type="checkbox"/> Land-based	<input type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Pearl and Hermes Atoll	<input checked="" 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: Shallow water is defined by water less than 100 meters in depth.

Remaining ashore on any island or atoll (with the exception of Sand Island, at Midway Atoll and field camp staff on other islands/atolls) between sunset and sunrise.

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

**Location Description:**

Colony of sooty tern (*Onychoprion fuscatus*) on Midway Atoll (priority 1), Nihoa Island, Laysan Island, French Frigate Shoals, Pearl and Hermes Atolls (all potential/additional sites). Precise collection site will be determined by the Monument staff itself, given their local knowledge and field experience.

**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 purpose of the proposed activity is to collect feathers of sooty terns, to quantify their mercury concentrations and hence, to determine their contamination level.

\*Considering the purpose of the proposed activities, do you intend to film / photograph federally protected species?    Yes  No

If so, please list the species you specifically intend to target.

NA

For a list of terrestrial species protected under the Endangered Species Act visit:

<http://www.fws.gov/endangered/>

For a list of marine species protected under the Endangered Species Act visit:

<http://www.nmfs.noaa.gov/pr/species/esa/>

For information about species protected under the Marine Mammal Protection Act visit:

<http://www.nmfs.noaa.gov/pr/laws/mmpa/>

**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 will have minimal impact on birds and no negative impact on the cultural, natural and historic resources of the Monument, since sampling will be performed by the local and experienced Monument 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?  
Since feathers would be collected by the Monument staff, the activity would be conducted in the most appropriate and compatible manner with the management direction.  
There is no indirect, secondary, effect to expect with this activity.

c. Is there a practicable alternative to conducting the activity within the Monument? If not, explain why your activities must be conducted in the Monument.

There is no practical alternative to collecting samples, since feather sampling is the **least** invasive and destructive sampling methods when studying seabirds or birds in general.

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

There is no adverse impact on Monument resources. In fact, our project will provide valuable information on levels, hotspots and coldspots of Hg contamination in the Pacific Ocean, on both global and local scale, in a context of increasing human activities and accelerating climate change. Thus, results will help identifying potential risks to coastal communities that rely on marine food resources in these tropical regions and will provide additional information for wildlife conservation and management policy on PMNM sites and its surrounding waters. More broadly, results will ultimately help policymakers to implement mitigation policy to reduce Hg impacts and its emissions in the future, especially the GMA (Global Mercury Assessment of the UNO Environmental Program) related to the Minamata Convention, of which the United States of America and France are signatory.

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

Feathers constitute the raw material, then analyzed in the laboratory. Thus, their collection is usually a 'one-shot' (or short-time) activity that does not require any extended period on site.

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

As agreed beforehand, the activity will be performed directly by the Monument staff itself, thus ensuring full respect of conservation measures on PMNM sites.

Regarding the analytical qualification, our laboratory is renowned for its expertise for several years: over the last 10 years, it contributed to more than 70 scientific papers investigating Hg contamination in seabirds. That includes previous investigations on tropical seabirds from the Indian Ocean for example.

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.

The analyses will be funded by the 'Institut Universitaire de France' project granted to Prof. Paco Bustamante (2017-2022).

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.

Because of the chemical affinity between Hg and keratin contained in them, feathers constitute a Hg storing tissue, and hence a relevant proxy of Hg body burden in seabirds. Besides, feather sampling is a non-invasive and non-destructive sampling procedure, which poses no threat to

bird health and life (feathers regrow after collection) and hence without any impact on the Monument natural and ecological integrity.

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

No vessel involved.

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

NA

## 8. Procedures/Methods:

### Feather collection:

For this activity, we would need **cover feathers** (so body feathers, not flight feathers) collected on **sooty terns** nesting on **Midway Atoll (highest priority), Nihoa Island, Laysan Island, French Frigate Shoals, Pearl and Hermes Atolls** (potential/additional sites if logistically possible) in 2021. Please take **5-10 feathers from the belly for each individual**. Pull out the feathers rather than cut them at the base: there is no really importance for analyses but they will regrow faster, it is just better for the birds. Feathers should be sampled on both **breeding adults (30 individuals)** and **chicks (30 individuals)**, in order to compare global (annual) and local (seasonal) contamination, respectively. For the five potential/additional sites (cited above), **5 individuals** for each stage would be the **minimum** sample size required.

Since our focus is on Hg contamination of the whole population rather than parent-chick relationships, adults and chicks must be sampled **from different nests**. To allow comparison between sites, all adult samples should be (when possible of course) collected **during the chick-rearing period**. Chick samples should be collected before fledging at a sufficiently advanced stage to get almost fully-grown feathers (when possible of course) or feathers growing under the down otherwise.

(Optional) If morphometric measurements are part of usual sampling procedure at the Refuge, we would of course be interested in these data, such as bird weight, wing length (left and right), tarsus length (one side randomly), beak length for example.

Samples must be placed in individual plastic or paper bags (e.g., envelope) clearly identifying the individual to allow their easy identification and shipment. Please make sure that they are well-sealed and stored at ambient or room temperature. Before sealing the plastic bag, make sure that feathers are dried. Be sure to write on each feather bag: the **date**, the **location**, the **BIRD ID** and the origin of the feathers (“**Body feather**”).

On each individual, a few cover feathers (5-10) will be used for Hg analyses (with Advanced Mercury Analysers), which will be coupled with stable isotope analyses to investigate the role of trophic ecology in bird Hg contamination.

**NOTE: If land or marine archeological activities are involved, contact the Monument Permit Coordinator at the address on the general application form before proceeding.**

**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: *Sooty tern*

Scientific name: *Onychoprion fuscatus*

# & size of specimens:

30 breeding adults (5-10 breast feathers/individual) + 30 chicks (5-10 breast feathers/individual) on Midway Atoll

5 breeding adults (minimum; 5-10 breast feathers/individual) + 5 chicks (minimum; 5-10 breast feathers/individual) on potential/additional sites (i.e. Nihoa Island, Laysan Island, French Frigate Shoals, Pearl and Hermes Atolls).

Collection location:

Adults and chicks would be collected on the same site. Precise location of the breeding colony would be determined by the Monument staff, give their local knowledge and field experience.

Whole Organism  Partial Organism

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

Once we receive the samples, chemical analyses will be performed on the collected feathers, which include mercury and stable isotope analyses, to investigate contamination levels and trophic ecology, respectively.

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

Only a few body feathers will be collected for each specimen, posing no threat to the bird health or life.

• General site/location for collections:

As mentioned earlier, precise collection site will be determined by the Monument staff itself, given their local knowledge and field experience.

• Is it an open or closed system?  Open  Closed

• Is there an outfall?  Yes  No

• Will these organisms be housed with other organisms? If so, what are the other organisms?  
No.

- Will organisms be released?

Yes.

**10. If applicable, how will the collected samples or specimens be transported out of the Monument?**

Once collected, feathers will be stored in individual bags (plastic bags or paper envelopes) and sent by mail from the Monument to our laboratory in France for chemical analyses.

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

NA

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

NA

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

None.

**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:**

Feathers would be collected on Midway Atoll and potential/additional sites between April and September 2021 and should be sent to France thereafter. Chemical analyses would then be performed in the following fall and winter, followed by appropriate data analyses in 2022.

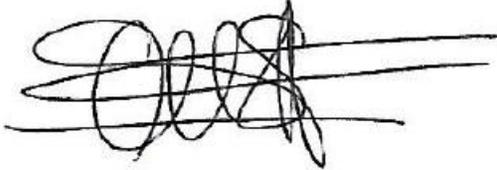
Data collected on Midway Atoll and related sites will be part of a broader project that includes several colonies of sooty terns in the intertropical zone worldwide, all dispersed across the Atlantic, the Pacific and Indian Oceans. In the Pacific Ocean for example, similar permit applications are currently under way for Johnston & Palmyra Atolls (approved in November 2020), and Rose Atoll. Thus, data obtained from Midway Atoll are heavily bound to data obtained from all these other sites and final results should be available in Spring 2022 approximately.

Overall, results obtained from this project will be reported in the PhD thesis of Fanny Cusset, as well as in a scientific paper to be published in a peer-reviewed journal, which will be defined later. Environmental Pollution, Science of the Total Environment or Environmental Science and Technology are good candidates for publication. Given the increasing importance of public communication and science popularization, results could also be communicated to the general public, in a form to be determined later (seminar, poster or video for example).

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

None yet.

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.



Fanny Cusset

09 February 2021

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Signature

Date

**SEND ONE SIGNED APPLICATION VIA MAIL TO THE MONUMENT OFFICE BELOW:**

NOAA/Inouye Regional Center  
NOS/ONMS/PMNM/Attn: Permit Coordinator  
1845 Wasp Blvd, Building 176  
Honolulu, HI 96818  
FAX: (808) 455-3093

**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