

## **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:** J. Michael Reed, L. Michael Romero  
**Affiliation:** Tufts University

**Permit Category:** Research

**Proposed Activity Dates:** 2020

**Proposed Method of Entry (Vessel/Plane):** however USFWS employees normally travel

**Proposed Locations:** Midway, Laysan

**Estimated number of individuals (including Applicant) to be covered under this permit:**  
15

**Estimated number of days in the Monument:** 14

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

a.) The proposed activity would....

The specific activity would be to salvage feathers from Laysan ducks for use in quantifying stress hormone levels (corticosterone) in the feathers. Stress hormones are put down in feathers when they grow, so they are an integrated measure of hormone levels over the course of time when the feathers grew in. They have the added benefit that they can be extracted from feathers that have been molted, and from the feathers of dead birds, even decades after the bird's death.

We are interested in looking at stress hormone levels in the feathers of Laysan Ducks, comparing individuals from Laysan to those breeding on Midway. Our interest is comparing the birds between a setting of hypersaline wetland as compared to individuals with greater access to freshwater.

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

We would salvage feathers from each of at least 24 birds – 12 from each island; 15 birds from each island would be even better. We don't need many feathers – 2 primary or secondary or tail feathers, or 8 body feathers, from each bird would suffice. And as

stated, our goal would be to get them from dead birds so no one would disturb living birds. If the opportunity arises to pluck feathers (or clip the distal end from a feather, without actually plucking it) from a living bird – e.g., a rehab animal – and it is deemed that it will pose no risk to the bird, then those feathers would be fine also.

Feather(s) of each individual would be placed in its own envelope/bag/container, and labelled – at least by island, and sex (if known); ID if you have them banded.

It does not matter when the feather are collected on one island relative to the other. Regarding midway, even if the ghost crabs have taken the flesh, if there is a pile of feathers, that's also fine as a sample – it would be important, however, for the feathers from different piles (presumably individuals) to be stored in different bags, rather than all mixed together. Even an isolated feather placed in its own bag would be useful.

Feathers would be transported to Tufts University for analysis. Analyses are destructive, so no complete feathers would remain afterward.

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

Glucocorticoids have been used tentatively as bioindicators of habitat quality via its effects on individual condition. Glucocorticoids are central to the stress response, and they play significant roles in individual physiology; chronic stress can cause decreased survival and neuronal death, and its effects can be cross-generational (affecting the adult performance of the offspring of chronically stressed parents). Glucocorticoids in feathers reflect an integrated measure of stress hormone levels across the weeks they are regrown, and thus might reflect body condition that could have population-level consequences. The two islands differ strongly in wetland characteristics, as well as in duck behavior and vital rates. We are interested in knowing if the habitat and vital rate differences are reflected in glucocorticoid levels expressed in the feathers. If they are, it would suggest the need to investigate to determine if the elevated hormone levels are a management concern or not.

[It is important to know that stress hormones are natural products in an animal's body, and that having elevated stress hormones does not necessarily mean that there is concern for the individual – being able to produce stress hormones when needed is a sign of a healthy individual. But it also could indicate the presence of a stressor, that if chronically present, could lead to health consequences for the bird. Stress hormones are a good initial index of potential problems, but definitive diagnosis would need to rely on other metrics.]

#### **Other information or background:**

Collection methods should create no disturbance to living birds beyond that normally caused by a person walking around.