

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.