

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: Roger J. Cuffey

Affiliation: Pennsylvania State University

Permit Category: Research

Proposed Activity Dates: June 1, 2011 (earlier if possible) - Dec 31, 2011

Proposed Method of Entry (Vessel/Plane): Plane (already in Dec 2010)

Proposed Locations: Reef Hotel snorkel site, bone yard near boathouse, breakwater at harbor entrance

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

2

Estimated number of days in the Monument: 0 (had already visited Midway as member of WANT expedition/tour, permit no. PMNM-2010-015, Dec 13-20, 2010)

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...

..., for the first time ever (to my knowledge), determine if bryozoans (Phylum Bryozoa) are present on Midway Atoll, and if so what species they represent, and what those species' distributions may indicate about their history, ecology, and biogeography. Bryozoans are minute polyps (1/2-mm long) which secrete porous calcareous/shell-material colonies/skeletons (up to several mm across) embedded in or attached to sheltered undersides of rubble, shells, ships, and rocks (hence can not be seen by divers using visual-survey-type methods).

b.) To accomplish this activity we would

... examine several small pieces of rubble, crusts, and rocks with stereoscopic binocular microscope, dissect or section some if necessary, and compare them with known species figured in the monographs and papers on bryozoans which I have accumulated over the course of my career in my lab at Penn State. While on Midway during the WANT expedition/tour (Dec 2010), I showed Jason Beatty, Monument Officer on Midway (who supervised water- and land-based activities of that tour), bryozoan specimens brought with me from Penn State, and explained what I would need him to collect, and from which locations on Midway. I also made detailed

sketches and notes of a few bryozoans which I saw there, but because I did not have powerful enough microscopes nor comparative literature there, I need to examine them here to confirm my tentative identifications made while in the field. After Jason Beatty collects (after hours) the bryozoan-bearing rubble, crusts, and rocks, he will air-mail them to me at Penn State so I can further examine and identify them. Once identified, I plan to write results up for publication/presentation at next fall's (Oct 2011; submission deadline June 30, 2011) annual national meeting of the Geological Society of America, where I have presented a number of similar papers in the past (see my Selected Bibliography attached).

c.) This activity would help the Monument by ...
... documenting/demonstrating the occurrence of this major but inconspicuous phylum of invertebrates on this atoll, and thus adding to basic scientific knowledge of the Monument's inventory of its natural resources. So far as I am aware, no one has ever recorded bryozoan species from Midway. I would expect that such invertebrates should occur here, because they occur in sizeable diversity (~90 species) on other atolls and reefs I have examined in detail (Eniwetok/Enewetak, Okinawa, and the Great Barrier Reef in the Pacific; Bermuda, Bahamas, Bonaire, and Florida in the Atlantic).

Other information or background: Unlike many other marine organisms, bryozoans when seen and collected in the field are not alive any longer. By the time their colony crusts come to the attention of scientists (except in exceptional cases requiring much live-culturing techniques, access to running sea-water, and specialized equipment not available to me), the polyps have been dead for 10-100 years. Therefore, we refer to these as "modern" rather than "living". The up-side to this situation is that we can study these as if they were fossils, so that we can directly integrate knowledge from these modern forms with ancient ones, so that the long evolutionary history of their phylum can potentially be better known than is the case for many groups which have significant proportions of soft-bodied (hence not fossilized) members.

Among those older forms, we further distinguish between "subfossil" ones which are only a few thousand years old, and strictly "fossil" ones which are over 10 thousand years old (and, in the case of bryozoans elsewhere, may go back to about 500 million years old). The reason for mentioning this distinction is that, back in the mid-20th century, extensive dredging and harbor work was done on Midway, and some of the rock brought up was used to build the breakwater across the harbor entrance. From the appearance of the type and degree of fossilization or "diagenesis" of those dredged rocks, I think they fall into the subfossil category, which is of interest here because a few possible bryozoans occur in those rock fragments as well as on the modern rubble from the snorkel site.

The adjective "reefal" refers to bryozoans which are found on or dwelling in reefs whose frameworks are built by other organisms (i.e., not by bryozoans).