

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: Donald C. Potts

Affiliation: Institute of Marine Sciences, University of California, Santa Cruz

Permit Category: Research

Proposed Activity Dates: 1 June 2010 - 31 December 2011

Proposed Method of Entry (Vessel/Plane): Plane: USFWS flights from/to Honolulu

Proposed Locations: Midway Atoll: multiple shallow sites (0-35 m depth)

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

10

Estimated number of days in the Monument: up to 75 days per year

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...

... test and evaluate the potential for successful restoration of the primary frame-building coral (*Porites compressa*) on near shore patch reefs that have been severely degraded by past anthropogenic activities, including dredging, construction and sewage discharge. It will test the hypothesis that *P. compressa* is now absent from these patch reefs because recruits fail to reach them, and not because conditions are unsuitable for survival and growth. This activity will also contribute to a broader assessment of whether Midway Atoll can remain sustainable as a viable atoll ecosystem during the climatic and oceanographic changes expected over the next century.

b.) To accomplish this activity we would

... transplant living fragments of the finger coral (*Porites compressa*) from healthy patch reefs to degraded patch reefs without *P. compressa*, and monitor subsequent survival and growth of the fragments.

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

... providing initial groundwork and evaluations for planning near shore coral reef restoration in accordance with Strategy HMC-1 of the Papahānaumokuākea Marine National Monument (PMNM) Management Plan (December 2008, pp. 180-1): "...develop and implement a strategy for restoring the health and biological diversity of the shallow reefs and shoals where

anthropogenic disturbances are known to have changed the ecosystem, using best available information about pre-disturbance conditions.”.

Other information or background:

Nearshore patch reefs built by actively growing corals in Midway Atoll's lagoon were severely impacted by large-scale dredging, island construction and discharge of raw sewage, especially between 1930 and 1990, but the major reef-building finger coral (*Porites compressa*) is now absent from most patch reefs. We have evidence that *Porites compressa* larvae are not recruiting to these reefs today. We propose that these reefs are excellent candidates for restoration by means of coral transplants because high cover by *Porites compressa* was reported in the 1970s, and because abatement of the major degradative sources occurred over 20 years ago. We will test this hypothesis by monitoring survival and growth of transplanted *P. compressa* fragments, and determine the effects of depth, distance from shore, and algal growth on transplant success.

Coral restoration may be particularly important for Midway Atoll because it lies near Grigg's (1982) "Darwin Point" (28-29°N), the latitude north of which natural processes of reef destruction (erosion, sediment export and subsidence) exceed rates of reef growth (by corals, coralline algae and sediment deposition). Midway is also ecologically marginal and many reef-building species (e.g. corals, coralline algae) appear to have relatively low growth and survival rates, while bio-eroding species (e.g. fish, sea urchins) are abundant, and capable of rapid destruction of new coral growth. Large transplants are more likely to survive than small recruits, and successful transplants may create environments likely to attract larvae and/or induce settlement.

This project builds on work begun in 2005 under USFWS permits and continued under permits PMNM-2007-013, PMNM-2008-056a, PMNM-2008-056b, PMNM-2008-065 and PMNM-2009-040.