

**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:

Papahānaumokuākea Marine National Monument Permit Coordinator  
6600 Kalaniana'ole Hwy. # 300  
Honolulu, HI 96825  
nwhipermit@noaa.gov  
PHONE: (808) 397-2660      FAX: (808) 397-2662

**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:** Ryan S. Nichols

**Affiliation:** NOAA Fisheries, Pacific Islands Fisheries Science Center

**Permit Category:** Research

**Proposed Activity Dates:** June 10-July 2, 2009

**Proposed Method of Entry (Vessel/Plane):** NOAA ship Hi'ialakai

**Proposed Locations:** Kure and Midway atolls

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

4

**Estimated number of days in the Monument:** 22

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

a.) The proposed activity would...  
substantively increase the information necessary to effectively manage and conserve stocks of the endemic hapu'upu'u or Hawaiian grouper at minimal risk and impact to its populations (ecological resource of the P-MNM) or to P-MNM cultural/historical resources.

b.) To accomplish this activity we would ....  
Conduct a collaborative study utilizing services and specimens provided by another P-MNM-permitted research study. In a separate Permit Application, Carl Meyer (HIMB) is proposing that, during summer 2009, a three-member dive team will capture and tag individual hapu'upu'u on the forereefs of Kure and Midway atolls using the same methods that their group successfully developed on cruises to Kure and Midway in May and August 2008. Fish will be hand-lined/netted in situ, measured (total length, TL in cm), internal acoustic tags implanted, and the fish marked with an external tag enabling recognition of prior-tagged individuals by divers underwater.

We herein propose that each of an additional maximum of ten (10) and five (5) subadult-adult grouper of a range of sizes (> 50 cm TL), at Kure and Midway atolls, respectively, be injected intraperitoneally using sterilized syringes loaded with 50 mg of the antibiotic oxytetracycline

(OTC, Liquimycin® 200) per kg body weight. For fish ranging in size from about 50-100 cm TL, the respective body weights and OTC dosages would be 2.5-20 kg (Nichols and DeMartini 2009) and about 125-1,000 mg/75-500 mg (0.6-5.0 ml/0.3-2.5 ml).

c.) This activity would help the Monument by ... providing the validation of age estimates necessary for accurately describing the age and growth of hapu'upu'u. The management of the extracted (MHI) and the conservation of protected (NWHI) stocks of this species are dependent on our knowledge of sustainable levels of take in the MHI, and the latter require sound age-growth and related life history data.

**Other information or background:** This collaborative study between academia (HIMB) and federal fisheries biologists would contribute substantively to the growing need and mandate for sharing natural resource specimens and the costs involved in their research.

## **Section A - Applicant Information**

### **1. Applicant**

Name (last, first, middle initial): Nichols, Ryan S.

Title: Fisheries Biologist (Research)

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

Carl Meyer, Hawaii Insitute of Marine Biology, U Hawaii

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

[REDACTED]

Phone: [REDACTED]

Cell: [REDACTED]

Fax: [REDACTED]

Email: [REDACTED]

For students, major professor's name, telephone and email address:

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

The proposed work is a collaborative study by NOAA Fisheries, Pacific Islands Fisheries Science Center, and the Hawaii Insitute of Marine Biology, Univ. Hawaii.

#### **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):**

HIMB personnel: two (2) diver-technicians (tbd)

**Section B: Project Information**

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

<input type="checkbox"/> Nihoa Island	<input type="checkbox"/> Land-based	<b><u>Ocean Based</u></b>	
<input type="checkbox"/> Necker Island (Mokumanamana)	<input type="checkbox"/> Land-based	<input type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input type="checkbox"/> French Frigate Shoals	<input 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 type="checkbox"/> Laysan Island	<input 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 type="checkbox"/> Pearl and Hermes Atoll	<input type="checkbox"/> Land-based	<input type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Midway Atoll	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Kure Atoll	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input type="checkbox"/> Other			

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

Location Description:

Shallow (< 30-m deep) forereef at Kure and Midway atolls

**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:***

In a separate Permit Application for June+ 2009 research, Carl Meyer (HIMB) is providing the rationale and justification for conducting in situ capture, external tagging, acoustic transmitter implantation, and release of hapu'upu'u grouper at Kure and Midway atolls on the same June-July 2009 cruise. Our justification for our Permit Application is as follows.

In addition to information on movement patterns, complementary data on age, growth, and other specific life-history attributes such as size-at-maturity and spawning seasonality of hapu'upu'u grouper are presently lacking. Combined parameter estimates provide the comprehensive input necessary for a detailed stock assessment of this commercially valuable (MHI and NWHI), Hawaiian endemic species. Understanding the biology of both NWHI and MHI populations will be necessary to help conserve populations being protected within the P-MNM and populations subject to regulated extraction in the MHI.

Construction of an accurate growth curve requires empirical validation of the periodicity of marks on growth structures used to assign ages to fish individuals. Growth marks are readily apparent on cross-sectioned otoliths (ear stones – a type of hard part typically used to age marine fish) of hapu'upu'u. Marks on hapu'upu'u otoliths appear to be formed annually, but the accuracy of the age estimates still requires validation (Nichols and DeMartini 2009). The only technique available for validating the exact age estimate of an individual fish is injecting each of a series of individuals with a fluorescent biomarker such as oxytetracycline (OTC) and then harvesting the fish after a period of time spanning formation of the growth mark. (Annuli on hapu'upu'u otoliths appear to complete translucent zone formation in late spring.) Harvested fish are then sacrificed and their otoliths extracted, sectioned, and examined microscopically under ultraviolet light in a darkened room to evaluate whether how many annuli are present peripheral to the fluorescent mark. For example, the presence of a single annulus peripheral to the fluorescent mark on the otolith of a fish at liberty for a year validates a once-yearly formation of the presumed annual growth mark.

The use of OTC to validate growth mark formation in commercially harvested and other fishes has a long history of success. At the proposed concentrations (which are accepted standard for marking fish otoliths), OTC is non-toxic to fishes. Although the application of OTC is presently regulated for domestic animal populations only under the Code of Federal Regulations (C.F.R.) 21, 556.500, the spirit of the law is to proactively prohibit the unknowing consumption of antibiotics by humans. Based on 2008 observations (C. Meyer, unpubl. data), however, the grouper to be OTC-marked appear to be resident to the study sites and occur well inshore of the boundary that forms the spatial fishery closure protecting resources on the shallow forereef of Kure atoll. Furthermore, no Ho'omalau Zone-permitted bottomfishers fish as far upchain as Kure atoll and therefore the chance that OTC-marked fish will be captured by fishers is essentially nil. All recreational or commercial extraction of reef fishes at Midway Atoll is currently prohibited. Lastly, all OTC-marked fishes will be individually recognizable with external tags; notices advertising such would be distributed to licensed Ho'omalau Zone fishers well in advance of the marking study.

## References

Nichols RS, DeMartini EE (2009) Preliminary estimates of age and growth for the endemic Hawai'ian grouper (hapu'upu'u, *Epinephelus quernus*, F. Serranidae). Pacific Islands Fisheries Science Center, PIFSC Administrative Report H-09-x.

## **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?

First, by avoiding coral damage by anchoring small craft only on sand adjacent to shallow foreereef. Second, by capturing and tagging fish in situ at depth-of-capture to avoid barotrauma that would otherwise result from bringing fish up to the surface to tag. The collaborator (C. Meyer) who is petitioning for a separate permit to continue his group's underwater capture, external tagging, and acoustic transmitter implantation activities in 2009, has demonstrated in his report on 2008 activities that adverse effects are minimal when hapu'upu'u are treated in the described manner. Lastly, we will either review the NOAA vessel Hi'ialakai's cultural briefing material or attend a cultural briefing to ensure proper cultural safeguards are incorporated into research design.

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?

The possibility that some of the tagged hapu'upu'u might be seriously injured or die as a result of capture and tagging has been effectively minimized by successful protocols developed on May and June 2008 research cruises to Kure and Midway.

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 pricticable alternative to conducting the activity elsewhere, say, in the MHI. Hapu'upu'u grouper are endemic to the Hawaiian Archipelago and Johnston atoll, and they do not occur at diving depths in the MHI or Johnston. And, in order to conduct the study, the tagging and marking of individual fish must be done underwater by divers at 10-30 m depths.

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

The potential benefit, specifically to the Monument, which has an interest in biodiversity and habitat as they relate to native species, is the direct need to better document life history, habitat requirements, and the role that the native species like hapu'upu'u play in maintaining a stable ecosystem. In addition to the Monuments understanding of biodiversity and habitat is the compliment of validating the estimated ages of this species, thereby providing accurate input to the assessment of its stock in the MHI. These end values for both the Monument and MHI far outweighs the negatives of any serious injury or mortality of relatively few individuals in the short term (duration of this permit). The benefits of this information for assessing the MHI stock and understanding the biology of this important benthic predator in the P-MNM further overshadow the anticipated future recapture and sacrifice of at most 10 individual fish in 2010-2011.

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

The cruise duration is no longer than needed to accomplish the proposed activities.

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

The PIFSC PI (Nichols) has been a working member of a team of respected fisheries research biologists at the PIFSC who work on fish age and growth. Representative, relevant publications include:

DeMartini EE, Landgraf KC, Ralston S (1994) A recharacterization of the age-length and growth relationships of Hawaiian snapper, *Pristipomoides filamentosus*.

NOAA Tech Memorandum NMFS-SWFSC-199 Humphreys RL Jr (2000) Otolith-based assessment of recruitment variation in a North Pacific seamount population of armorhead *Pseudopentaceros wheeleri*. *Mar Ecol Prog Ser* 204: 213-223

Humphreys RL Jr, Campana SE, DeMartini EE (2005) Otolith elemental fingerprints of juvenile Pacific swordfish *Xiphias gladius*. *J Fish Biol* 66:1660-1670.

None of the potential impacts on hapu'upu'u populations would require mitigation.

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 relatively minimal costs (< \$ 0.5 K) required for the fluorescent biomarker and syringes are easily subsumed by the 2009 Life History Program base budget (\$ 30K) within the Fisheries Stock Assessment and Fish Biology Division of the PIFSC.

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.

The number of test fish individuals is trivial relative to the resident natural populations at the two atolls. The eventual sacrifice (in 2010-2011) of at most 10 individual fish would have no impact on their populations (estimated from 2002-2008 survey data of the PIFSC, CRED, as about 5 fish per ha at these depths in atoll forereef habitat).

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

NOAA vessel Hi'ialakai has all the required electronics.

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

No

### **8. Procedures/Methods:**

All activities related to the underwater capture, tagging, and release of specimens is described in a separate permit application being submitted by Carl Meyer of HIMB, which describes methods for the monitoring of fish movements.

**NOTE: If land or marine archeological activities are involved, contact the Monument Permit Coordinator at the address on the general application form before proceeding, as a customized application will be needed. For more information, contact the Monument office on the first page of this application.**

### **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:

hapu'upu'u grouper

Scientific name:

Epinephelus quernus

# & size of specimens:

15 total (50-110 cm fork length)

Collection location:

Kure (10 specimens); Midway (5 specimens)

Whole Organism  Partial Organism

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

All fish collected during the period of the permit will have been released underwater at their exact underwater capture sites

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

No organisms kept.

• General site/location for collections:

Forereef at 10-30 m depths of Kure and Midway atolls.

• 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?**

None of the fish individuals that are to be collected will be transported anywhere.

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

This collaborative (HIMB, PIFSC) study is unique

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

A fluorescent bio-marker (oxytetracycline, aka OTC); sterile syringes to administer solution in situ at depth.

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

fluorescent bio-markers (oxytetracycline hydrochloride [OTC]). MSDS are appended.

**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:**

A subset (an estimated 10 individuals) of the fish that have been externally tagged and internally marked with the fluorescent biomarker in 2009 will need to be collected and sacrificed for

extraction of bio-marked otoliths (earstones) in either 2010 (1-yr validation) or 2011 (2-yr validation). Laboratory otolith analysis, statistical data analyses, and incorporation of test results into a manuscript on hapu'upu'u age and growth will extend through 2012. At that time a final draft ms should be available. It is reasonable to expect that results of the study would be published in a peer-reviewed journal like Fishery Bulletin in 2013.

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

None \_directly\_ related to the subject species but one co-author (DeMartini) has published on both the age-growth and reproductive life histories of allied Hawaiian bottomfishes:

DeMartini EE, Lau BB (1998) Morphometric criteria for estimating sexual maturity in two snappers, *Etelis carbunculus* and *Pristipomoides sieboldii*. *Fishery Bulletin* 97:449-458.

Lau BB, DeMartini EE (1994) An evaluation of oocyte size in multiple regressions predicting gonad weight from body weight: a test using Hawaiian ehu, *Etelis carbunculus*. NOAA Technical memorandum NMFS-SWFSC-212.

DeMartini, Landgraf, Ralston (1994) See full reference in section 7f above.

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.

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Signature

Date

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

Papahānaumokuākea Marine National Monument Permit Coordinator  
6600 Kalaniana'ole Hwy. # 300  
Honolulu, HI 96825  
FAX: (808) 397-2662

**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