

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Aquatic Resources
Honolulu, Hawaii 96813

May 9, 2008

Board of Land
and Natural Resources
Honolulu, Hawaii

Request for Authorization and Approval to Issue a Papahānaumokuākea Marine National Monument Research Permit to Joshua Reece, Washington University in Saint Louis, for Access to State Waters to Conduct Moray Eel Research Activities

The Division of Aquatic Resources (DAR) hereby submits a request for your authorization and approval for issuance of a Papahānaumokuākea Marine National Monument research permit to Joshua Reece, Ph.D. candidate, Washington University in Saint Louis, pursuant to § 187A-6, Hawaii Revised Statutes (HRS), chapter 13-60.5, Hawaii Administrative Rules (HAR), and all other applicable laws and regulations.

The research permit, as described below, would allow entry and activities to occur in the Papahānaumokuākea Marine National Monument (Monument), including the NWHI State Marine Refuge and the waters (0-3 nautical miles) surrounding the following sites:

- Nihoa Island
- Necker Island
- French Frigate Shoals
- Gardner Pinnacles
- Maro Reef
- Laysan Island
- Lisianski Island
- Pearl and Hermes Atoll
- Kure Atoll State Seabird Sanctuary

The activities covered under this permit would occur from June 1, 2008 through September 30, 2008.

The proposed activities are a renewal of work previously permitted and conducted in the Monument.

INTENDED ACTIVITIES

The applicant proposes to collect a representative sample of moray eel species throughout the Northwestern Hawaiian Islands in order to gather molecular genetic information and full specimens for morphological and dietary studies. The proposed activity would allow researchers

already conducting sampling of other species and catching moray eels as by-catch, to preserve a small number of moray eel species for these studies.

The applicant's collection activities would take place on up to 3 cruises into the Monument over the course of this field season. The applicant would probably travel to the Monument on one of these trips, while the remainder of the collections would be preformed by researchers already in the area for other purposes.

There would be no boat-based sampling done specifically for moray eels. Rather, sampling sites would be restricted to those already being sampled by other researchers who potentially capture moray eels as by-catch. The only novel sampling the applicant proposes is land-based sampling at Midway, which would be moray eel-specific. The pier at Midway Atoll is a highly productive area for sampling moray eels. It allows for constant monitoring of traps and is a critical sampling point for capturing multiple moray eel species.

The applicant is proposing to collect 11 moray eel species. He would collect 15 organisms per species per bank for all banks in the NWHI. The sample sizes requested are highly unlikely to impact local or regional populations of moray eels or their ecological role on the coral reef. This claim is based on preliminary data documenting high levels of gene flow and large effective population sizes in moray eels within the Papahānaumokuākea Marine National Monument.

Any moray eels captured would be immediately placed into an iced cooler where their metabolism would quickly slow and cease. Based on the applicant's prior experience, moray eels can breathe or at least persist out of water for over two hours. On-ice, however, their metabolism ceases after approximately thirty minutes, resulting in a humane euthanasia prior to asphyxiation.

Once in the lab, DNA sequences would be analyzed to define species by their genetic patterns. Species thus defined would be compared to traditional morphologically-defined species to identify any dissimilarity and identify potentially misleading morphological features. Whole specimens would be curated at the Bishop Museum for permanent addition to their Ichthyology collection.

The proposed project would lead to a better understanding of moray eels, connectivity among the Northwest Hawaiian Islands, and the ecological role of moray eels as key predators.

The activities described above may require the following regulated activities to occur in State waters:

- Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving monument resource
- Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

REVIEW PROCESS:

The permit application was sent out for review and comment to the following scientific entities: Hawaii Division of Aquatic Resources, Hawaii Division of Forestry and Wildlife,

Are there any other relevant concerns from previous permits? Yes No

RESPONSE:

1. The applicant states that he is confident that the traps pose no entanglement hazard to protected species. Traps deployed in the past have been monitored carefully to note potential entanglements from protected species such as monk seals. In addition, precautions have been taken, such as measuring buoy ropes to the specific depth of deployment for each trap, to reduce the amount of rope floating at the surface. The applicant notes that despite extra rope length in shallow deployments, he has never observed incidences of entanglement or potential entanglement with any fauna, despite the presence of monk seals, manta rays, and marine turtles in the vicinity.
2. DAR and Monument staff are consulting with OHA and the cultural reviewer who made this request on how best to incorporate and implement this practice into Monument activities that require the taking of samples. The result of this consultation will be relayed to the applicant.

STAFF OPINION:

DAR staff is of the opinion that the Applicant has properly demonstrated valid justifications for his application and should be allowed to enter the NWHI State waters and to conduct the activities therein as specified in the application with the following special instructions and conditions, which are in addition to the Papahānaumokuākea Marine National Monument Research Permit General Conditions. The following special conditions have been vetted through the legal counsel of the Co-Trustee agencies.

1. This permit is not to be used for nor does it authorize the sale of collected organisms. Under this permit, the authorized activities must be for noncommercial purposes not involving the use or sale of any organism, by-products, or materials collected within the Monument for obtaining patent or intellectual property rights.
2. The permittee may not convey, transfer, or distribute, in any fashion (including, but not limited to, selling, trading, giving, or loaning) any coral, live rock, or organism collected under this permit without the express written permission of the Co-Trustees.
3. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocol attached to this permit.
4. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.
5. Refueling of tenders and all small vessels must be done at the support ships and outside the confines of lagoons or near-shore waters in the State Marine Refuge

6. No fishing is allowed in State Waters except as authorized under State law for subsistence, traditional and customary practices by Native Hawaiians.

MONUMENT MANAGEMENT BOARD OPINION:

The MMB is of the opinion that the Applicant has met the findings of Presidential Proclamation 8031 and this activity may be conducted subject to completion of all compliance requirements. The MMB concurs with the special conditions recommended by DAR staff.

RECOMMENDATION:

“That the Board authorize and approve a Research Permit to Joshua Reece, Washington University in Saint Louis.”

Respectfully submitted,



DAN POLHEMUS
Administrator

APPROVED FOR SUBMITTAL



LAURA H. THIELEN
Chairperson

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: Joshua Reece, M.S., Ph.D. Candidate

Affiliation: Washington University in Saint Louis

Permit Category: Research

Proposed Activity Dates: Three cruises between June 1, 2008 to September 20, 2008

Proposed Method of Entry (Vessel/Plane): Vessel

Proposed Locations: Nihoa, Ni'ihau, Necker, French Frigate Shoals, Gardner, Maro, Laysan, Lisianski, Pearl and Hermes, Midway, Kure

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

15

Estimated number of days in the Monument: Three cruises of approximately 25 days

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...

The 2008 NWHI Lobster tagging cruise uses Fathoms-Plus (F-plus) box-like funnel traps to sample and tag lobster. Moray eels are frequently caught as bycatch. The proposed activity would allow for a small number of moray eel species to be preserved for studies of molecular genetics, morphology, and diet. In addition, the pier at Midway Island is a highly productive area for sampling moray eels and can be easily sampled from land at night when boat operations are not permitted. The proposed activity would allow for a representative sample of moray eel species to be taken by the use of lobster traps. In addition, other researchers collecting during two other cruises would be allowed to deploy traps for use in non-lethal sampling of their target species and collecting moray eels caught as by-catch.

b.) To accomplish this activity we would

The proposed activity would allow researchers already conducting sampling of other species and catching moray eels as bycatch to broaden the scientific impact of their sampling by removing a representative sample of moray eels for future analyses. This sampling is not time consuming, dangerous or costly, and will greatly enhance our understanding of moray eels, connectivity among the Northwest Hawaiian Islands, and the ecological role of moray eels as key predators.

Moreover, the sample sizes requested are highly unlikely to impact local or regional populations of moray eels or their ecological role on the coral reef. This claim is based on our preliminary data documenting high levels of gene flow and large effective population sizes (see background information below) in moray eels within the Papahānaumokuākea Marine National Monument.

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

This activity would help the monument in two ways. First, this work will identify population genetic structure in an abundant and ecologically important group of coral reef fishes. Population genetic structure describes the pattern of genetic diversity over a specified geographic area. Understanding how moray eel populations are connected or disjunct from one another informs management decisions that depend on estimates of gene flow and population size. Secondly, this research will elucidate species boundaries in moray eels. Our preliminary work is based on non-lethal sampling in which an organism was caught, keyed out to species, and then sampled for a rice grain sized piece of tissue and released. Non-lethal sampling is preferred when possible, however, our preliminary results identify extremely strange patterns. Repeatedly, individuals identified as the same species by morphology were not the same species genetically, and also individuals identified at different species by morphology were sometimes the same species genetically. This pattern is not limited to our work or to the Papahānaumokuākea Marine National Monument, and is repeated in museum collections for which voucher specimens are available, suggesting that the pattern is not due to misidentification but to a real pattern of phenotypic plasticity. Collection of voucher specimens from the Papahānaumokuākea Marine National Monument will allow for consistent species identification and detailed morphological and skeletal analyses to describe biologically realistic species. From the perspective of the monument, it is impossible to manage or protect species when the fundamental species unit is ambiguous or unknown. This small level of lethal sampling will have the long-lasting benefit of delimiting species boundaries for accurate management in the future.

Other information or background: The proposed sampling is largely based on a preliminary body of work generated by Joshua Reece at Washington University. His results are summarized through two figures in Appendix A. Figure 1 is a multilocus Bayesian phylogenetic reconstruction with an insert that depicts mitochondrial and nuclear phylogenetic reconstructions independently. This phylogeny demonstrates that species as defined by morphological characters do not form monophyletic groups, nor is there geographic clustering of species within the phylogeny. In other words, when we examine genetic patterns, we see that all organisms identified as one "species" do not form a single group that excludes all other "species." The congruency among loci in terms of phylogenetic placement rules out alternative explanations of hybridization or ancestral polymorphism, and leaves two alternatives: plasticity or misidentification. The only way to distinguish among these alternatives is by examining voucher specimens linked to DNA sequences to rule out misidentification and to specify which features currently used to identify species are uninformative. Figure 2 highlights and expands upon the lack of geographic clustering observed in Figure 1 by focusing on an example species, *Gymnothorax undulatus*. As the figure denotes, mitochondrial cytochrome b haplotypes are not clustered by geography, such that individuals sampled in Panama

are just as likely to be closely related genetically to individuals in South Africa as they are to other members of the same species in Panama. Moreover, three other species have genes that place them within the gene pool of *Gymnothorax undulatus*, but they clearly have morphologies that distinguish them as other species. The geographic expanse over which connectivity of mitochondrial haplotypes is maintained is incredible and spans over 20,000 kilometers. This suggests that moray eel larvae disperse great distances, which is not surprising given that moray eels have the longest pelagic larval durations among other coral reef fishes (Hourigan and Reese, 1987). Lastly, we have generated sufficient preliminary data to estimate effective population sizes based on standing genetic diversity. We have generated estimates of effective population sizes based on cytochrome b variation for reciprocally monophyletic clades for each of the following species sampled only from the Papahānaumokuākea Marine National Monument (estimated number of individuals in parentheses): *Gymnothorax undulatus* (2.75 million), *Gymnothorax eurostus* (3.14 million), *Gymnothorax steindachneri* (1.14 million), and *Gymnothorax flavimarginatus* (480,000). These estimates are exceedingly large and likely result from connectivity with reef systems outside of the Monument. In summary, given the high level of connectivity and large effective population sizes of moray eels in the Papahānaumokuākea Marine National Monument, lethal sampling is extremely unlikely to have any negative effects on demographic patterns on any time scale.

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Reece, Joshua S

Title: Graduate Researcher- Ph.D. Candidate

1a. Intended field Principal Investigator (See instructions for more information):
Joshua Reece

2. Mailing address (street/P.O. box, city, state, country, zip): [REDACTED]

Phone: [REDACTED]

Fax: [REDACTED]

Email: [REDACTED]

For students, major professor's name, telephone and email address: Allan Larson, Washington University in Saint Louis, [REDACTED]; Brian Bowen, Hawaii Institute of Marine Biology, [REDACTED]

3. Affiliation (institution/agency/organization directly related to the proposed project):
Washington University in Saint Louis; Hawaii Institute of Marine Biology

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):

Brian Bowen (Co-PI; Hawaii Institute of Marine Biology)
Joseph O'Malley (Field collaborator, NOAA)
Randall Kosaki (Research Diver, NOAA)
John Klavitter (Field collaborator) Midway Island
Barry Christenson (Field collaborator) Midway Island
Carl Meyer (Research Diver,
Jeff Eble (Research Diver) Hawaii Institute of Marine Biology,

Luiz Rocha (Research Diver) Hawaii Institute of Marine Biology
Matthew Craig (Research Diver) Hawaii Institute of Marine Biology
Michelle Gaither (Research Diver) Hawaii Institute of Marine Biology
Matthew Iacchei (Research Diver) Hawaii Institute of Marine Biology
Toby Daly-Engel (Research Diver) Hawaii Institute of Marine Biology
John Puritz (Research Diver) Hawaii Institute of Marine Biology

Section B: Project Information

5a. Project location(s):

- | | |
|--|--|
| <input checked="" type="checkbox"/> Nihoa Island | <input type="checkbox"/> Land-based |
| <input checked="" type="checkbox"/> Necker Island (Mokumanamana) | <input type="checkbox"/> Land-based |
| <input checked="" type="checkbox"/> French Frigate Shoals | <input type="checkbox"/> Land-based |
| <input checked="" type="checkbox"/> Gardner Pinnacles | <input type="checkbox"/> Land-based |
| <input checked="" type="checkbox"/> Maro Reef | |
| <input checked="" type="checkbox"/> Laysan Island | <input type="checkbox"/> Land-based |
| <input checked="" type="checkbox"/> Lisianski Island, Neva Shoal | <input type="checkbox"/> Land-based |
| <input checked="" type="checkbox"/> Pearl and Hermes Atoll | <input type="checkbox"/> Land-based |
| <input checked="" type="checkbox"/> Midway Atoll | <input checked="" type="checkbox"/> Land-based |
| <input checked="" type="checkbox"/> Kure Atoll | <input type="checkbox"/> Land-based |
| <input type="checkbox"/> Other | |

Ocean Based

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| <input checked="" type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
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NOTE: There is a fee schedule for people visiting Midway Atoll National Wildlife Refuge via vessel and aircraft.

Location Description:

Locations include shallow water near-shore sampling from small boats in all specified localities and trap deployment from the pier at Midway.

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:*

The proposed sampling scheme will sample every major reef system in the Papahānaumokuākea Marine National Monument through collaborators on three research cruises. This sampling scheme attempts to maximize the geographic expanse of sampling to identify cryptic evolutionary units within the geographic range of individual species and also to maximize the number of species encountered by sampling different habitats. Moray eels escape from traps at a relatively high rate when left unmonitored overnight, thus we are proposing extensive sampling while expecting limited results. Essentially, we are casting a big net with the hope of landing a few fish. The proposed geographic spread is necessary to maximize the potential to sample all species at as many locations as possible, and include flexibility for each cruise to modify their sampling schemes according to unpredictable weather conditions. Moreover, no boat-based sampling will be done specifically for moray eels; these sampling sites will be restricted to those already being sampled by other researchers who potentially capture moray eels as bycatch. The land-based sampling at Midway is moray eel-specific and allows for constant monitoring of traps and maximizes capture rates by orders of magnitude. This sampling is at one of the very few locations where constant monitoring of traps is possible, and is a critical sampling point for capturing multiple moray eel species.

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?

I have extensively researched Native Hawaiian culture through resources provided by the Office of Hawaiian Affairs, and I have sent this application to that office for their input with respect to the cultural significance of the Papahānaumokuākea Marine National Monument. Hawaiian culture is ingrained in the responsible use of natural resources including Mālama ‘āina, or care for the ocean. This respect for the value and intricate interdependence of natural ecosystems results in the philosophy that one should only take what is absolutely needed from the environment. This approach is particularly relevant to predators, because native Hawaiians recognized the top-down role predators play on ecosystems. The proposed sampling is an evolution in sampling strategy. Most coral reef fish are sampled lethally from the environment, however, most coral reef fish are not top predators. Thus, to be sensitive to potentially smaller population sizes in predators, we proposed non-lethal sampling throughout the Papahānaumokuākea Marine National Monument. This approach was successful after several modifications (beginning in 2006), and the genetic studies based on specimens acquired in this manner and specimens acquired from museum voucher specimens suggest that species identified by morphology do not reflect species units in a multi-locus molecular gene phylogeny. Our results strongly indicate that two individuals that appear to be the same species by morphology

can be different species genetically, and two individuals that appear to be different species by morphology may be the same species genetically. There are two potential explanations for this pattern: morphological species are not biologically realistic, or specimens are commonly misidentified across a wide array of researchers and locations. Voucher specimens are critical to distinguishing between these alternative explanations. Towards that end, the proposed sampling is limited to the absolute minimum number of lethally-sampled moray eels necessary for statistically supported inferences (Karl et al., 1992; Muss et al., 2001; Streebman et al., 2002). Our preliminary non-lethal sampling also allows us to estimate migration and population sizes in moray eels in the Papahānaumokuākea Marine National Monument so that we can propose sample sizes that are highly unlikely to impact local populations on a demographic scale. This ensures the ecological stability of reef systems in the Papahānaumokuākea Marine National Monument. Lastly, it is impossible to conserve or culturally respect ecological resources if one does not know what those resources are in terms of species units. The proposed work will identify species units in moray eels and the geographic scale over which management is biologically and ecologically relevant.

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? As described above, this sampling scheme is designed to minimize the demographic and ecological impact of lethal sampling, as well as respect the cultural significance of this prized region. Effective population size estimates for the targeted species are between 500,000 and 2.5 million individuals. It is highly unlikely that the proposed sampling would have any negative impacts on moray eel populations or the ecosystems they inhabit. We have endeavored with great effort since 2006 to incorporate non-lethal sampling. We have demonstrated that lethal sampling is necessary and where possible, we have generated preliminary data to document that our proposed sampling scheme would be both statistically rigorous from a scientific standpoint and environmentally and culturally sensitive to these organisms and their ecosystem. The benefits to science, the informed management of Hawaii's natural resources, and our understanding of migration patterns and species boundaries justify the small level of lethal sampling proposed here.

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.

The Papahānaumokuākea Marine National Monument is the largest protected marine area on earth, giving global significance to estimates of gene flow within the Monument and among other reef systems in the Indo-Pacific. On a local scale, the vast stores of biological diversity protected by the Monument potentially serve as a means of replenishing the depleted coral reef fish populations in the main Hawaiian Islands. The ability to sample an entire chain of coral reef systems, the pristine nature of these populations, and the local and global significance of the Papahānaumokuākea Marine National Monument to coral reef conservation are impossible to recreate in alternative sampling schemes. This results in a necessity to conduct this research in the Monument. The alternative to lethal sampling is continued non-lethal sampling. We have employed this methodology in 2007 with excellent results in terms of sample sizes and minimal

bycatch. A single hinalea luahine (*Thalassoma ballieui*) was caught over the course of 15 deployments. It was a target species for the researchers on board and was non-lethally sampled and released. Thus, trapping ensures targeted sampling of moray eels and lobster. Unfortunately, given the strange species ambiguities with respect to morphology, voucher specimens are critical to ensuring that organisms are properly classified in the future. We considered taking a series of morphological measurements in the field and digital photographs, however, many of the species diagnostic measurements include vertebral counts and analyses of dental morphology. It would be prohibitively dangerous to the researcher to examine the dental morphology of a living moray eel. Thus, given the need for detailed morphological analyses that often require skeletal measures and with the safety of researchers in mind, limited lethal sampling is the only viable alternative.

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 end value of this activity is two fold. First, the proposed sampling will definitively identify species units in moray eels. The identification of species units allows for detailed analyses of geographic variation within taxa for estimates of population sizes, connectivity, and migration among populations; critical information for managing a marine reserve. It is impossible to provide meaningful management, conservation, or monitoring information for species units that are not biologically realistic. Secondly, this study will provide samples and voucher specimens for a group of key predatory coral reef fishes. In addition to serving a key predatory role, moray eels have two other major ecologically important roles. They have the longest pelagic larval durations among coral reef fish (potentially conferring the greatest dispersal distance; Hourigan and Reese 1987) and they serve as a food resource for the endangered Hawaiian monk seal (Goodman-Lowe 1999). It should be noted that they make up only 5.6% of the monk seal diet, and are not a staple food resource, nor would our sampling be likely in any way to deplete monk seal food resources. Monitoring moray eel population genetic structure allows for estimates of gene flow among the Papahānaumokuākea Marine National Monument and depauperate main Hawaiian Island reefs as well as estimates of population sizes available as a prey resource for monk seals.

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

The duration of this activity is set to include the projected durations of three cruises. Once sample sizes are reached all sampling of moray eels will cease. With respect to the duration of any single sampling activity, the proposed sampling is in addition to ongoing sampling of lobster and will not increase the duration of any of the sampling cruises or the soaking time of any of the traps. This means that whatever ecological impact researcher presence confers is already ongoing and unchanged by the proposed sampling. By accomplishing the objectives of multiple researchers simultaneously in a single trip we hope to minimize anthropogenic impact to the Papahānaumokuākea Marine National Monument.

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

This research is in collaboration with and overseen by Dr. Brian Bowen of the Hawaii Institute of Marine Biology, who has over 20 years of experience in this field, including two major

expeditions to the NWHI. He is known to the MNM staff, DAR staff, and USFWS staff, and is clearly qualified to perform this research. Joshua Reece is a Ph.D. candidate researching moray eel phylogenetics and phylogeography for his dissertation research and has sampled moray eels lethally and non-lethally throughout the Indo-Pacific, including a 2007 expedition to the NWHI. He has been working with moray eels in the field for three years and is qualified to conduct the proposed research. To mitigate any potential impacts resulting from our conduct we have endeavored to make all of our sampling (with the exception of sampling the pier at Midway) originate from collections that are already ongoing, ensuring that we maximize the benefits of biological collections while minimizing the impact to ecological and culturally sensitive areas.

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. There are sufficient financial resources in the NWHIMNM-HIMB partnership to conduct and complete the research outlined herein. The partnership is supplemented by two grants from the National Science Foundation to Brian Bowen and collaborators. This work is also funded by grants to Joshua Reece from the PADI Foundation and the National Geographic Society.

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.

This project has two main goals, 1) to resolve ambiguities between morphologically-defined species and genetically-defined species, and 2) to provide estimates of migration, connectivity, and population sizes for moray eel species. Molecular genetic studies using multiple loci are essential to the first goal, and the most feasible and widely used means of estimating the second goal. Molecular genetic studies of fish are widely used to identify patterns of migration, connectivity among populations, and to estimate population sizes (e.g. Bowen et al., 2001; Planes and Fauvelot, 2002; Bowen et al., 2006; Rocha et al., 2007). The graduate researcher Joshua Reece has published four papers using molecular genetics to identify these patterns, and the collaborator Brian Bowen has authored over 70 peer-reviewed publications using molecular genetics to estimate population patterns. Our methods do not extend any of the current sampling within the Papahānaumokuākea Marine National Monument, and thus minimize ecological and cultural impacts.

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

The NOAA vessel Hi'ialakai is properly outfitted with the OLE approved transceiver and complies with requirements of Presidential Proclamation 8031.

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

There are no other factors that would make the issuance of the permit inappropriate.

8. Procedures/Methods:

The moray eel species listed below will be collected by trapping in the plastic F-plus eel traps used for sampling lobster. Traps will be deployed in the evening (approximately 4 pm) and retrieved the following morning (about 8:00-9:00 am) to minimize any unnecessary stress to the organism. Any moray eels captured will be immediately placed into an iced cooler. Humanely euthanizing moray eels could be done by injection, however, this procedure exposes the researcher to an extended handling time and the potential for injury from an eel bite. Instead, the eels will be placed into an iced cooler where their metabolism will quickly slow and cease. Based on our experience, moray eels can breathe or at least persist out of water for over two hours. However, on ice their metabolism ceases after approximately thirty minutes, resulting in a humane euthanasia prior to asphyxiation.

Laboratory methods for molecular DNA analyses are standard and include DNA isolation, PCR of two mitochondrial (cytochrome b and cytochrome oxidase) and three nuclear genes (rhodopsin, RAG-1, and RAG-2), and automated sequencing. DNA aliquots will be made available to other researchers for future studies.

DNA sequences will be analyzed to create a multilocus Bayesian phylogenetic reconstruction in the program MrBayes (Huelsenbeck & Ronquist, 2001) that defines species by their genetic patterns. Species thus defined will be compared to traditional morphologically-defined species to identify any dissimilarity and identify potentially misleading morphological features. Within each species we will summarize genetic variation using standard diversity indices with an analysis of molecular variance (AMOVA) in the program Arlequin v.3.11 (Excoffier et al., 2005). We will provide estimates of directional gene flow among populations and effective population sizes in the program Lamarc v.2.1 (Kuhner, 2006).

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:
Snowflake moray
Zebra moray
Yellowmargin moray
Steindachner's moray
Whitemargin moray
Whitemouth moray
Undulated moray
Stout moray

Giant moray
Dragon moray
Banded moray

Scientific name:

Echidna nebulosa
Gymnomuraena zebra
Gymnothorax steindachneri
Gymnothorax albimarginatus
Gymnothorax meleagris
Gymnothorax undulatus
Gymnothorax eurostus
Gymnothorax javanicus
Enchelycore pardalis
Gymnothorax rueppellii

& size of specimens:

15 organisms all sizes all species, all locations

Collection location:

Nihoa, Necker, French Frigate Shoals, Gardner, Maro, Laysan, Lisianski, Pearl and Hermes,
Midway, Kure.

Whole Organism Partial Organism

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

All specimens will be curated at the Bishop Museum so that they can serve as a natural resource for scientific study by other researchers throughout Hawaii and abroad.

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

• General site/location for collections:

• 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?

- Will organisms be released?

10. If applicable, how will the collected samples or specimens be transported out of the Monument?

Samples will be frozen in the on-board cold room and transported upon return to Oahu to on-site storage at HIMB until they can be curated and moved to the Bishop Museum for permanent addition to their Ichthyology collection.

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

This research makes advantage of collaboration by emphasizing work on a species that is already caught as bycatch during approved research activities. The only novel aspect with regard to sampling that is proposed here is the pier-based sampling at Midway Island. Thus, there is no duplicative sampling and we maximize the collection of valuable scientific data with minimal impact on the environment. The samples collected during this study will provide molecular genetic information and full specimens for morphological and dietary studies. All molecular genetic information will be made available to researchers globally through posting on GenBank, and DNA aliquots will be made available for other researchers. Whole specimens will be permanently curated at the Bishop Museum for future study.

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

The only additional gear utilized in this study is an iced-cooler for euthanizing moray eels. The means of capture, plastic F-plus traps, are already utilized for sampling lobster populations. All traps and materials are cleansed in a modified bleach solution to guard against translocation of microbes among sites.

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

None.

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:

We expect to publish preliminary results from this sampling within one year of the close of sampling, or by Fall 2009.

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

Please see attached CVs.

Papahānaumokuākea Marine National Monument Compliance Information Sheet

1. Updated list of personnel to be covered by permit. List all personnel names and their roles here (e.g. John Doe, Diver; Jane Doe, Field Technician, Jerry Doe, Medical Assistant):

Brian Bowen (Co-PI; Hawaii Institute of Marine Biology, [REDACTED])

Joseph O'Malley (Field collaborator, NOAA, [REDACTED])

Randall Kosaki (Research Diver, NOAA, [REDACTED])

John Klavitter (Field collaborator, Wildlife Biology Midway Atoll National Wildlife Refuge, [REDACTED])

Barry Christenson (Field collaborator, Refuge Manager, Midway Atoll National Wildlife Refuge, [REDACTED])

Carl Meyer (Research Diver, Hawaii Institute of Marine Biology, [REDACTED])

Jeff Elbe (Research Diver) Hawaii Institute of Marine Biology, [REDACTED]

Luiz Rocha (Research Diver) Hawaii Institute of Marine Biology, [REDACTED]

Matthew Craig (Research Diver) Hawaii Institute of Marine Biology, [REDACTED]

2. Specific Site Location(s): (Attach copies of specific collection locations): see attached form, "Sampling Locations"

3. Other permits (list and attach documentation of all other related Federal or State permits): State Permit 2008-15

3a. For each of the permits listed, identify any permit violations or any permit that was suspended, amended, modified or revoked for cause. Explain the circumstances surrounding the violation or permit suspension, amendment, modification or revocation. None

4. Funding sources (Attach copies of your budget, specific to proposed activities under this permit and include funding sources. See instructions for more information): Funding for field equipment and the molecular and morphological analyses detailed above are made possible through grants from the National Science Foundation, the PADI Foundation, and the National Geographic Society.

5. Time frame:

Activity start: June 1, 2008

Activity completion: June 1, 2009

Dates actively inside the Monument:

From: August 2

To: September 5

Describe any limiting factors in declaring specific dates of the proposed activity at the time of application: Sampling will be conducted by any cruise member listed on permit that is employing traps for sampling lobster.

Personnel schedule in the Monument:

6. Indicate (with attached documentation) what insurance policies, bonding coverage, and/or financial resources are in place to pay for or reimburse the Monument trustees for the necessary search and rescue, evacuation, and/or removal of any or all persons covered by the permit from the Monument: All researchers are either covered by their employer (Hawaii Institute of Marine Biology, NOAA, or private insurance (DAN).

7. Check the appropriate box to indicate how personnel will enter the Monument:

- Vessel
 Aircraft

Provide Vessel and Aircraft information: NOAA Vessel Hi'ialakai

8. The certifications/inspections (below) must be completed prior to departure for vessels (and associated tenders) entering the Monument. Fill in scheduled date (attach documentation):

- Rodent free, Date:
- Tender vessel, Date:
- Ballast water, Date:
- Gear/equipment, Date:
- Hull inspection, Date:

9. Vessel information (NOTE: if you are traveling aboard a National Oceanic and Atmospheric Administration vessel, skip this question):

Vessel name:

Vessel owner:

Captain's name:

IMO#:

Vessel ID#:

Flag:

Vessel type:

Call sign:

Embarkation port:

Last port vessel will have been at prior to this embarkation:

Length:

Gross tonnage:

Total ballast water capacity volume (m3):

Total number of ballast water tanks on ship:

Total fuel capacity:

Total number of fuel tanks on ship:

Marine Sanitation Device:

Type:

Explain in detail how you will comply with the regulations regarding discharge in the Monument. Describe in detail. If applicable, attach schematics of the vessel's discharge and treatment systems:

Other fuel/hazardous materials to be carried on board and amounts:

Provide proof of a National Oceanic and Atmospheric Administration (NOAA) Office of Law Enforcement-approved Vessel Monitoring System (VMS). Provide the name and contact information of the contractor responsible for installing the VMS system. Also describe VMS unit name and type:

VMS Email:

Inmarsat ID#:

10. Tender information:

On what workboats (tenders) will personnel, gear and materials be transported within the Monument? List the number of tenders/skiffs aboard and specific types of motors: The Hi'ialakai tender vessels include:
HI-1 (8m) in-board diesel jet
HI-2 (10m) in-board diesel jet
Inflatable craft and Boston Whaler with 60 hp outboard motor

Additional Information for Land Based Operations

11. Proposed movement of personnel, gear, materials, and, if applicable, samples:

12. Room and board requirements on island:

13. Work space needs:

DID YOU INCLUDE THESE?

- Map(s) or GPS point(s) of Project Location(s), if applicable
- Funding Proposal(s)
- Funding and Award Documentation, if already received
- Documentation of Insurance, if already received
- Documentation of Inspections
- Documentation of all required Federal and State Permits or applications for permits

Sampling Locations

Location	Longitude	Latitude
	-178.19706	28.55825
Kure Atoll	-178.19624	28.29958
	-178.45988	28.29958
	-178.46071	28.55742
Midway Atoll	-177.19638	28.37420
	-177.19721	28.13377
	-177.52801	28.13460
	-177.52801	28.37420
	-176.08851	28.04643
Pearl and Hermes Atoll	-175.63289	28.04540
	-175.63289	27.70729
	-176.08954	27.70626
	-173.67293	26.25151
Lisianski Island	-173.67293	25.83943
	-174.23095	25.83943
	-174.23095	26.25151
	-171.47900	25.96027
Laysan Island	-171.47725	25.65597
	-171.97918	25.65772
	-171.97918	25.96202
Gardner Pinnacles	-167.74832	25.26071
	-167.75087	24.34878
	-168.36222	24.35133
	-168.36477	25.26071
	-161.66032	23.23817
Nihoa Island	-161.66287	22.94013
	-162.05005	22.94268
	-162.05260	23.23562
French Frigate Shoals	-166.125	23.770
Maro Reef	-170.590	25.415
Necker Island	-164.7	23.58333

COPY

State of Hawaii
Department of Land & Natural Resources
DIVISION OF AQUATIC RESOURCES
Punchbowl Street, Room 330
Honolulu, Hawaii 96813

Special
Activity Permit No. 2008-15

Date of Issue: July 3, 2007

Expiration Date: July 2, 2008

SPECIAL ACTIVITY PERMIT

The Board of Land and Natural Resources hereby grants permission for certain collection of organisms belonging to the people of Hawaii, under Section 187A-6, Hawaii Revised Statutes, and other applicable laws.

The permittee is

Name: Dr. Jo-Ann C. Leong

Title: Director

Affiliation: Hawaii Institute of Marine Biology
University of Hawaii at Manoa

Address: P. O. Box 1346
Kaneohe, Hawaii 96744

Under the attached conditions, and for the purpose of scientific research

this permit authorizes the permittee (and any assistants designated on the SIGNATURE AND ACKNOWLEDGEMENT page of this permit) to

TAKE CATCH POSSESS TRANSPORT KILL

aquatic life from the waters of the State as follows:

Common Name	Scientific Name	Maximum No. of Specimens	Collecting Location
Various numbers of marine, estuarine and freshwater fishes and invertebrates as listed on Attachment No. 2.		as required	State waters, except as prohibited in Special Conditions section, of this permit.
Hard Corals	Various species	as required	Sites around Coconut Island and within Kaneohe Bay

Live coral from four sites around Coconut Island will be salvaged and transplanted from the Island's ramp, channel, lighthouse, and boathouse areas to 16 previously established plots on the dredged reef in Kaneohe Bay.

I. GENERAL CONDITIONS:

A. This permit does not make the Board of Land and Natural Resources or the State of Hawaii liable in any way for any claim of personal injury or property damage to the permittee or assistants which may occur during collection activity authorized by this permit; moreover, the permittee and all assistants agree to hold the State harmless against any and all claims of personal injury, death or property damage resulting from activities of the permittee or any assistant.

B. This permit conveys a privilege to engage in only those activities under the jurisdiction of the Division of Aquatic Resources. The permittee is responsible for complying with all applicable County, State, and Federal requirements. The permit does not convey any privilege of access over or through private property.

C. The permittee and each assistant are individually responsible and accountable for their actions while conducting activities authorized under this permit; additionally, the permittee is responsible and accountable for the actions of the permittee's assistants.

D. This permit is not transferable or assignable. Any person whose name does not appear on this permit and is conducting any activity described herein is subject to prosecution for violation of State laws.

E. The permittee may request changes to the permit. Any such request to make changes to the permit must be made in writing and received by the DAR at least two weeks prior to the change. All personnel changes will require each individual to sign an "Attachment" stating that they have read, understood, and agree to abide by all general and special permit conditions. No change may be implemented without written approval from the Department/DAR.

F. The permittee may request to:

1. Add assistants to the permit by having each assistant sign an "Attachment" and send the document to DAR;
2. Add another permittee or be replaced by another permittee in the manner stated above; and
3. Change the activities allowed under this permit.

G. A copy of this permit must be carried by the permittee or assistant while performing collecting activities authorized by this permit.

H. This permit authorizes collection of organisms protected by Federal law only with prior appropriate Federal authority, which must be described on Page 1 of this permit (if applicable).

I. The permit is not to be used for nor does it authorize the sale of collected organisms

J. This permit expires on the date indicated on Page 1. Within one month of the expiration date, the permittee must return this permit to the Division of Aquatic Resources with complete information on all collecting done under this permit, on the Activity Report form provided as part of this permit.

K. The permittee and assistants agree to provide access to data obtained under authority of this permit upon request of the Division of Aquatic Resources, and to provide to the Division a copy of each report, published for distribution, prepared with data obtained under this permit. The permittee agrees to provide the Division of Aquatic Resources access to organisms obtained and held under this permit for on-site inspection.

L. A violation of any terms or condition of this permit or any violation of State law not covered by this permit may result in revocation of the permit and other penalties as provided by law. In addition, the Division may consider any such violation as grounds for denying any future permit applications.

M. The permittee will notify the Division of Aquatic Resources prior to the release and/or transfer of any organisms collected under the permit. The permittee will not release any organisms collected under this permit nor any organisms raised in a propagation facility under the authority of this permit, without the Division of Aquatic Resources' written approval.

II. SPECIAL CONDITIONS

- 1. This Permit authorizes the possession of small mesh throw nets. Other nets, hands, and traps may be used to capture lobsters in the waters of the State except no aquatic life may be taken at the following Marine Life Conservation Districts (MLCDs), Shoreline Fisheries Management Areas (SFMA), Marine Life Refuge (MLRs), Public Fishing Areas (PFAs), Natural Area Reserves (NARs), Fishery Management Areas (FMAs) and other prohibited locations or areas that may be designated as such during the effective period of this permit.

-----OAHU-----
 Hanauma Bay MLCD
 Pupukea MLCD
 Waikiki MLCD
 Heela Kea Wharf FMA
 Waialua Bay FMA
 Pokai Bay FMA
 Honolulu Harbor FMA
 Ala Wai Canal FMA
 Kapalama Canal FMA
 Wahiawa PFA
 Diamond Head SFMA
 Nuuanu Freshwater
 Fish Refuge
 Haleiwa Harbor FMA
 Paiko Lagoon Wildlife
 Refuge

-----HAWAII-----
 Kailua Bay FMA
 Waialea PFA
 Waialea Bay MLCD
 Lapakahi Bay MLCD
 Kealahou Bay MLCD
 Hilo Bay FMA
 Waialoa River FMA
 Waialuku River FMA
 Puako Bay & Reef FMA
 Kawaihae Harbor FMA
 Old Kona Airport MLCD
 West Hawaii Regional
 Fishery Management
 Area
 Waipae MLCD
 -----LANAI-----
 Manele-Hulopoe MLCD
 Manele Harbor FMA

-----MAUI-----
 Kahului Harbor FMA
 Honolua-Mokuleia Bay MLCD
 Molokini Shoal MLCD
 Ahihi-Kinau NAR
 -----KAUAI-----
 Waimea Recreation Pier &
 Waimea Bay FMA
 Kapaa Canal FMA
 Waikanae Canal FMA
 Kokee PFA
 Ahukini Recreational
 Pier FMA
 Hanamaulu Bay FMA
 -----MOLOKAI-----
 Kauanakakai Harbor FMA

Discretion should be used to avoid conflict with fishermen or others during collecting activities at any location.

- 2. The use of any chemical substance is expressly prohibited under this permit. The primary permittee and designated assistants, however, may have in possession a reasonable amount of preservatives such as formalin or alcohol for preserving the specimens collected.
- 3. The primary permittee and designated assistants are required to obtain permission before entering upon lands or waters not under the jurisdiction of the Division of Aquatic Resources (see "B", General Conditions, page 2 of this permit).
- 4. This permit does not by implication authorize the primary permittee or any designated assistant to engage in any other activity if in violation of any other State, Federal or County law, regulation or ordinance.
- 5. The primary permittee or a designated assistant responsible for the field collecting activity shall notify the Division of Conservation and Resources Enforcement at least 48 hours in advance of any field collecting activity and provide such information as: location; date; time; and number of persons to be involved. Telephone - Honolulu 587-0077; Hawaii 933-4291; Maui 243-5414; Kauai 241-3444; Molokai 567-6618 or Lanai 565-6688.


 ALLAN A. SMITH, Chairperson and member
 Board of Land and Natural Resources

cc: (x) DOCARE
 (x) Special Agent in Charge,
 USFWS, Honolulu

REPORT OF COLLECTING AND OTHER ACTIVITIES

Results of all activities performed under authority of this permit must be reported on this form (or copies) within one month after the permit expires (see first page). Use as many sheets as you need. Submit the report to the Division of Aquatic Resources at 1151 Punchbowl Street, Room 330, Honolulu, HI 96813.

Date	Location	Common or Scientific Name	Quantity Collected*	Disposition of Specimens
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Signature of Permittee

Date _____

*If salvaged (collected because the specimen was dead or injured already), please detail circumstances: condition (dead, or describe extent of injury), how or from whom the specimen was obtained.

SIGNATURE AND ACKNOWLEDGEMENT

By my signature below, I attest that I understand the general conditions (Items A-M on Page 2 & 3) and any special conditions (Nos. 1 through 5 on page 4) to Special Activity Permit No. 2008-15. Further, I agree to abide by all of these conditions when collecting under authority of this permit.

PRINCIPAL PERMITTEE: Jo Ann Leong
Jo-Ann Leong

DESIGNATED ASSISTANTS:

Signature: [Signature]
Print Name: JONATHAN DAVIS

Signature: [Signature]
Print Name: WILZA ROCHA

Signature: [Signature]
Print Name: RUTH GATES

Signature: [Signature]
Print Name: MARLIN ATKINSON

Signature: [Signature]
Print Name: BEN B ALEXANDER

Signature: [Signature]
Print Name: Megan ROSS

Signature: [Signature]
Print Name: Amy Apprill

Signature: [Signature]
Print Name: Kiulei Rodgers

Signature: [Signature]
Print Name: Yannis Papastamatiou

Signature: [Signature]
Print Name: Jennifer Kishimori

Signature: [Signature]
Print Name: Teresa D Lewis

Signature: [Signature]
Print Name: KELVIN D. GOROSPE

Signature: [Signature] FOR STEPHEN
KARL
Print Name: STEPHEN KARL

Signature: [Signature]
Print Name: DANIEL R REINMAN

SIGNATURE AND ACKNOWLEDGEMENT

By my signature below, I attest that I understand the general conditions (Items A-M on Page 2 & 3) and any special conditions (Nos. 1 through 5 on page 4) to Special Activity Permit No. 2008-15. Further, I agree to abide by all of these conditions when collecting under authority of this permit.

PRINCIPAL PERMITTEE: Jo Ann Leong
Jo-Ann Leong

DESIGNATED ASSISTANTS:

Signature: Eric Franklin
Print Name: ERIC FRANKLIN

Signature: Paul L. Jokiel
Print Name: Paul L. Jokiel

Signature: Rob Toonen
Print Name: Rob Toonen

Signature: Kara Perez III
Print Name: Kara Perez III

Signature: Daniel Schar
Print Name: Daniel Schar

Signature: Darren T. Lerner
Print Name: DARREN T. LERNER

Signature: Mary Hagedorn
Print Name: Mary Hagedorn

Signature: Jeff A. Ede
Print Name: Jeff A. Ede

Signature: Fred Farzen
Print Name: FRED FARZEN

Signature: Daniel J. Barshis
Print Name: Daniel J. Barshis

Signature: Jane H. Ball
Print Name: Jane H. Ball

Signature: Brian Bowen
Print Name: Brian Bowen

Signature: Xavier Pochon
Print Name: XAVIER Pochon

Signature: _____
Print Name: _____

ATTACHMENT No. 1 TO SPECIAL ACTIVITY PERMIT
NO. 2008-15

FOR DESIGNATED ASSISTANTS ONLY

Primary Permittee: JO-ANN C. LEONG

I, being the primary permittee, hereby acknowledge the attachment of additional designated assistants to my Special Activity Permit No. 2008-15.

Jo-Ann C. Leong

Date: _____

ADDITIONAL DESIGNATED ASSISTANTS

I have read, understand and hereby agree to the conditions stipulated in Special Activity Permit No. 2008-15.

Signature: _____

Signature: _____

Print Name: _____

Print Name: _____

Signature: _____

Signature: _____

Print Name: _____

Print Name: _____

Signature: _____

Signature: _____

Print Name: _____

Print Name: _____

Signature: _____

Signature: _____

Print Name: _____

Print Name: _____

Signature: _____

Signature: _____

Print Name: _____

Print Name: _____

Signature: _____

Signature: _____

Print Name: _____

Print Name: _____

ATTACHMENT NO. 2 to Scientific Collecting Permit No. 2008-15

PRINCIPAL PERMITTEE: JO-ANN C. LEONG

NAMES AND APPROXIMATE NUMBERS OF SPECIMENS TO BE COLLECTED

gold spot herring	5 0 0	wrasse	2 0 0
nehu	10,000	papio/ulua	400
lao	5 0 0	chinese catfish	100
makiawa	1 0 0	snakeheads	100
omaka	5 0 0	hammerhead sharks	50
tilapia	10,000	toau	25
puhis	1 2 0	starfish (Asteroidia)	300
ahi	3 0 0	o'opuu, adults, eggs & larvae	2 0 0
mahimahi	1 0 0	freshwater turtles	1 0 0
aku	2 0 0	paopao	2 0 0
parrotfishes	4 0 0	<u>Hippa pacifia</u>	3 0 0
damselfish	4 0 0	<u>Schindleria</u> spp.	as required
damselfish eggs	3,000	<u>Eupremna</u>	1 0 0
spotted tobies	100	Scorpionfishes	3 0 0
marlin	10	Blennies	3 0 0
taape	300	Sand divers	5 0 0
weke	50	Hawk fishes	3 0 0
hinalea	1,000	Cardinal fishes	3 0 0
kupipi	1 0 0	Tiger sharks	50
maomao	1 0 0	Channel catfish	5 0 0
gobies	3 0 0	Limu (various)	As required
manini	2 0 0	Onaga	5 0 0
milkfish (juveniles)	1,000	Ehu	5 0 0
angelfishes	2 0 0	Opakapaka	5 0 0
butterflyfishes	2 0 0	Kalikall	5 0 0
goatfishes	5 0 0	Surgeonfishes	5 0 0
filefish	1 0 0	Brown Stingrays	25
sea cucumbers	1 0 0	White tip reef sharks	30
corals	1,000	Swordtails	1 0 0
Gen. Invertebrates	1,000	Weke Ula	20
dead coral rubble	1,000 pcs	Hage	20
haole crab	1 0 0	Kahala	20
shrimp (opae lolo)	5,000	Hawallian Bigeye	1 0 0
(juv. & adults)		Flounder	2 0 0
mullet (juv. & adults)	1,000	Squirelfish	2 0 0
lobster	25	Barracuda	2 0 0
slipper lobster	25	Ono	1 0 0
Mollies	2 0 0	mol	1,000
Gindai	1 0 0	kole	4 0 0
Sandbar Sharks	1 0 0	Urchins	1 0 0
Butagushi	20	fresh water ornamental fish	5 0 0
Hapu'upu'u	20		
Grouper (roi)	2 0 0		
Triggerfish	2 0 0		
Jack	2 0 0		
Eagle Ray	2 0 0		
Moray eel	3 0 0		
Shortspine Dogfish	1 0 0		
opelu	100		
ahule	100		
awa	50		
moorish idols	75		
(zanclus cornutus)			
octopus	50		

ATTACHMENT NO. 2 to Special Activity Permit No. 2008-15

PRINCIPAL PERMITTEE: JO-ANN C. LEONG

NAMES AND NUMBERS OF SPECIMENS TO BE COLLECTED

gold spot herring	500
nehu	10,000
iao	500
makiawa	100
omaka	500
tilapia	10,000
puhis	120
ahi	300
mahimahi	100
aku	200
parrotfishes	400
damsel fish	400
damsel fish eggs	3,000
spotted tobies	100
marlin	10
taape	300
weke	50
hinalea	1,000
kupipi	100
maomao	100
gobies	300
manini	200
milkfish (juveniles)	1,000
angelfishes	200
butterflyfishes	200
goatfishes	500
filefish	100
sea cucumbers	100
corals	1,000
Gen. invertebrates	1,000
dead coral rubble	1,000 pcs
haole crab	100

ATTACHMENT NO. 2 to Special Activity Permit No. 2008-15
Page 2.

shrimp (opae lolo) (juv. & adults)	5,000
mullet (juv. & adults)	1,000
lobster	25
slipper lobster	25
Mollies	200
Gindai	100
Sandbar Sharks	100
Butagushi	20
Hapu'upu'u	20
Grouper (roi)	200
Triggerfish	200
Jack	200
Eagle Ray	200
Moray eel	300
Shortspine Dogfish	100
opelu	100
ahule	100
awa	50
moorish idols (zanclus cornutus)	75
octopus	50
wrasse	200
papio/ulua	400
chinese catfish	100
snakeheads	100
hammerhead sharks	50
toau	25
starfish (Asteroidia)	300
o'opuu, adults, eggs & larvae	200
freshwater turtles	100
paopao	200
<u>Hippa pacifia</u>	300

ATTACHMENT NO. 2 to Special Activity Permit No. 2008-15
Page 3.

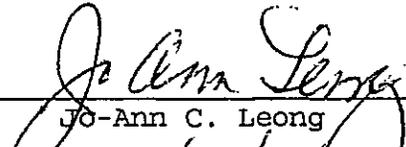
Blennies	300
Sand divers	500
Hawk fishes	300
Cardinal fishes	300
Tiger sharks	50
Channel catfish	500
Limu (various)	As required
Onaga	500
Ehu	500
Opakapaka	500
Kalikali	500
Surgeonfishes	500
Brown Stingrays	25
White tip reef sharks	30
Swordtails	100
Weke Ula	20
Hage	20
Kahala	20
Hawaiian Bigeye	100
Flounder	200
Squirelfish	200
Barracuda	200
Ono	100
moi	1,000
kole	400
Urchins	100
fresh water ornamental fish	500

ATTACHMENT No. 1 TO SPECIAL ACTIVITY PERMIT
NO. 2008-15

FOR DESIGNATED ASSISTANTS ONLY

Primary Permittee: JO-ANN C. LEONG

I, being the primary permittee, hereby acknowledge the attachment of additional designated assistants to my Special Activity Permit No. 2008-15.



JO-Ann C. Leong
Date: 1/28/08

ADDITIONAL DESIGNATED ASSISTANTS

I have read, understand and hereby agree to the conditions stipulated in Special Activity Permit No. 2008-15.

Signature: Josh Reece
Print Name: Josh Reece

Signature: _____
Print Name: _____

Signature: _____
Print Name: _____