

Papahānaumokuākea Marine National Monument
NATIVE HAWAIIAN PRACTICES 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:
NOAA/Inouye Regional Center
NOS/ONMS/PMNM/Attn: Permit Coordinator
1845 Wasp Blvd, Building 176
Honolulu, HI 96818
nwhipermit@noaa.gov
PHONE: (808) 725-5800 FAX: (808) 455-3093

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: Kim Kanoē‘ulalani Morishige

Affiliation: Nā Maka o Papahānaumokuākea & UH Mānoa

Nā Maka o Papahānaumokuākea (NMP) is a non-profit 501(c)3 working to provide services to our Hawaii communities addressing health and wellness within families, communities, and place (natural resources). Founded in 2008, NMP has been developing programs focused on investing in our communities and the next generation to lay a foundation for change paving the way to redefining health, wellness, and productivity. Most issues we face today are rooted in the misbehavior of people and the values, or lack of, we collectively share today. NMP focuses on addressing people to shift our behaviors, our values and our relationships and including people in healing the natural world around us. NMP strongly believes that the health of our environment is reflected in our people and the health of our people are reflected in our environment and it is a journey we must all take together.

Permit Category: Native Hawaiian Practices

Proposed Activity Dates: August 1, 2017 – July 31, 2018

Proposed Method of Entry (Vessel/Plane): Vessel – MV SEARCHER

Proposed Locations: Nihoa, Mokumanamana, Mokupapapa (French Frigate Shoals, La Perouse Pinnacle), Puhahonu (Gardner Pinnacles)

Estimated number of individuals (including Applicant) to be covered under this permit: 15 total people will be covered to conduct activities under this permit, co-listed under the Research application submitted by Chris Bird & Rob Toonen.

Estimated number of days in the Monument: 15

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...

The proposed activity aims to examine the basic ecology of 'opihi populations and intertidal

ecosystems within the NWHI by integrating Hawaiian, institutional/western, and other sciences and/or knowledge systems. We will make keen observations of the environment and interactions by understanding connections with atmospheric and seasonal cycles from a Native Hawaiian perspective and to reconnect kanaka maoli to these resources. Through a collaboration with Nā Mamo o Mūole'a, The Nature Conservancy, Hawai'i Institute of Marine Biology, Nā Maka o Papahānaumokuākea, Conservation International-Hawaii, Texas A&M and the NOAA Papahānaumokuākea Marine National Monument; a standard intertidal monitoring protocol developed by Dr. Chris Bird and a Native Hawaiian observational protocol developed by NMP. The monitoring methods are used in various ways to monitor intertidal ecosystems within select locales on Hawai'i Island, Maui, Kaho'olawe, Moloka'i, Kaua'i and the NWHI. This would be the eighth year collecting data at locations within the NWHI.

NMP strives to integrate western science, indigenous science, and community relationships to influence human behavior and resource management while addressing and supporting health and well-being of people and place. NMP extends this approach in various communities throughout Hawai'i through a program known as Nā Kilo 'Āina (NKA). NKA engages with community networks to bring our collective understanding of environmental patterns and overall health of people and place to the forefront of community-based monitoring and resource management.

We also aim to examine the reproductive capacity of culturally and ecologically significant urchin, hā'uke'uke (*Colobocentrotus atratus*). Many marine invertebrates possess a free-living pelagic larval stage. The factors that impact larval survival and performance can have strong effects on adult population size and structure (Gaines and Roughgarden 1985; Lewin 1986; Hughes et al. 2000); these factors have received considerable attention but are still not fully understood. Maternal investment (# of eggs and egg size) can generally predict larval size and performance and is mediated by the environment the mother (intertidal systems) and larvae (pelagic ocean) (Bernardo 1996; Marshall and Keough 2008). There has been considerable interest in describing how adult populations are contributing to the larval pool in order to identify source and sink populations that may contribute disproportionately to larval production and supply (Lewin 1986; Hughes et al. 2000; Rognstad et al. 2014). In tropical island systems, less is known about how major biophysical factors such as temperature, wave exposure, and primary productivity affect spatial and temporal patterns of reproductive timing and how much energy the female invertebrates put into their offspring. Tropical ectotherms are extremely sensitive to environmental change due to living near their thermal maximum (Stillman 2003). Understanding how maternal investment is affected by current abiotic and biotic factors will predict how these populations may perform under future environmental stress.

The overarching goal of this research component is to identify environmental factors that drive spatial and temporal variation in maternal investment of the culturally and ecologically significant Indo-Pacific urchin, *Colobocentrotus atratus*, across the Hawaiian Archipelago. Characterizing variation in maternal investment can identify populations that are contributing disproportionately to the larval pool. Populations that produce few, large and high quality larvae may contribute more to larval recruitment and dispersal than populations producing many, low

quality larvae (Marshall and Keough 2007). However, consistently produced larger eggs compared to other populations. Larger eggs may be a proxy for higher energetic content that can lead to higher offspring survival that ensures the continuation of future generations. These results suggest that there may be local-scale differences in temperature, salinity, or nutrients that can explain why certain populations are producing healthier, nutrient-rich offspring. This project will facilitate sustainable management of Hawai‘i’s intertidal ecosystem and develop marine management strategies that consider times of the year where higher-quality eggs are produced and sizes that are most productive. Understanding how factors such as temperature and nutrients allow for certain populations to produce healthier offspring compared to others will provide critical information to predict how populations will respond to climate change.

Consistent with proclamation 8031, these activities will strengthen cultural and spiritual connections to the Northwestern Hawaiian islands and foster the expansion and perpetuation of Native Hawaiian ecological knowledge and research methodologies. This knowledge may be critical as it is observed by local Hawaii residents that ‘opihi and hā‘uke‘uke stocks are generally diminishing in size and number in the main Hawaiian Islands, therefore more data in this area may help to curb the decline. The continuation of ‘opihi data collection, and comprehensive intertidal surveys (including fishes, algae and invertebrates) using Native Hawaiian ecological knowledge and methodologies coupled with western science will help to contribute to the overall health of Papahānaumokuākea.

b.) To accomplish this activity we would

To accomplish this activity, we will utilize Native Hawaiian protocol and practice, based on traditional knowledge and methodologies, to assess the environment, which will be integrated with the scientific ecological data. Native Hawaiian observations include using all senses by using your “eight eyes” makawalu (Kanahele) to note activities in the sky, land, and ocean and to connect these elements to our daily lives. Not only is it important to make observations of these elements and how they relate to natural resources, it is also vitally important to reconnect to our our ‘āina, sources of sustenance, by consuming intertidal resources to participate in the cultural practice of local sourcing our food - subsistence fishing and eating - and also on a more spiritual level, to partake in these physical representations of our ancestors and all they represent - strength, steadfastness, flexibility, healing, releasing, etc. Documenting activities and recording connections between these events will highlight relationships and possible dependencies between reoccurring events and activities over seasons and between years.

- Sky observations include looking at cloud formations, noting wind direction/strength and what times it changes, visibility of the horizon, bird activity, other weather related observations such as rain or rainbows, the rising and setting of the moon and sun, the moon phase, and stars.
- Land observations include looking at any plants that are flowering, seeding or fruiting, new growth, animals reproducing, precipitation and soil moisture, bird arrival and departure and any other animal behaviors. Land observations from the main Hawaiian Islands during the

expedition may also be useful to help remember activities in the NWHI during that time. For example, we notice hala fruiting here on the main islands and can relate that in the Northwestern Hawaiian Islands, this is the season when juvenile iwa are still in the nest.

- Ocean observations include noting the tide (high/low and time), waves and currents, identifying and looking at the behavior of invertebrates, limu (algae) and fish in the intertidal environments, noting any spawning or aggregation of species, and noting any juveniles and newly recruited species. (see observation datasheet).

Through these types of observations, one can discover how different the intertidal zone changes between seasons (Kauwela-summer/Ho‘oilo-winter). At sites in the MHI, the limu (Crustose Coralline Algae (CCA) and macroalgae) zone expands during the winter, due to the large waves that are generated by winter storms, and decrease during the calm summer months. This allows other organisms such as ‘opihi and hā‘uke‘uke to expand their habitable zone as well. New recruits for ‘opihi and hā‘uke‘uke were observed during the winter season about 1-2 months after a peak spawning event, but wasn’t observed during the summer season. The peak spawning period was determined by conducting a gonad study for both ‘opihi and hā‘uke‘uke. These are just a few examples that demonstrate how both western and traditional knowledge can complement each other to obtain both quantitative and qualitative data.

The western/institutional scientific research tools and methods integrated into these broader observations include laying belt transects to assess class size, population density, community structure, species range, distribution, and rugosity for all organisms within the intertidal zone. Approximately 15 ‘opihi population/ intertidal surveys at each island / atoll will be conducted. Statistical analysis of the data will be analyzed at the Hawai‘i Institute of Marine Biology & Texas A&M labs. Data analyzed will be useful to local and governmental managers to make effective decisions on managing the resources. See Bird’s 2017 Research application for reference.

As an extension of the scientific research methods, we will collect hā‘uke‘uke to examine maternal investment of these intertidal species on various areas in the intertidal zone. There is no feasible method to successfully spawn ‘opihi or ascertain the sex of ‘opihi other than through dissection. We will collect individual ‘opihi, extract the gonad tissue, and freeze the eggs for future biochemical analyses. For hā‘uke‘uke, we will spawn individuals on shore to ensure that we only collect females. Spawning of hā‘uke‘uke will be induced by injecting 0.5 M KCl. Eggs of each female will be counted, then a subset will be placed in filtered seawater on glass slides under cover slips resting on clay feet to prevent flattening. Eggs will be measured on board the research vessel with a large field microscope. We will use ImageJ software to measure egg diameter and calculate egg volume from the measurements. Egg samples will be frozen at -80°C for future biochemical analyses at the University of Hawai‘i at Mānoa (Moran lab, Edmondson Hall). To ensure responsible and ethical practices, we will refrain from collecting ‘opihi and hā‘uke‘uke if populations appear too small to sustain collections.

Consumption of intertidal resources including invertebrates, limu will further support cultural practice and relationship between participants and our islands. Consumption feeds physical, spiritual, and cultural health rooting us in our ancestral ties and customary practices. Consumption allows us to be nurtured and nourished by place and genealogy. Our islands and the resources thriving here are older siblings and customary relationships are based on the reciprocal practice of being fed and cared for by our older siblings while we care for and “feed” them in return. Our presence, activities, oli, observations, surveys, etc feed and care for place further supporting the physical, spiritual and cultural health of our islands and ourselves. Consumption also allows us to interact with place and understanding the network involved to produce a meal, which feeds a community.

Prior to departure to NWHI, the Nā Maka o Papahānaumokuākea will conduct a cultural orientation which will include the harvesting, preparation and consumption of food to introduce and ground all the participants to the importance of feeding a community and the relationship between the natural environment (genealogy) and ourselves.

The research team will work together to apply this integrated monitoring approach. The research team will be comprised of cultural researchers / practitioners, scientists, and managers. To ensure the success of these field studies, the team will conduct appropriate protocol and offer ho'okupu (cultural offerings) to maintain the spiritual integrity of the sites that are visited.

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

This activity will not only add to the current knowledge of the marine environment in the NWHI, it will help to gain a better understanding of the resources by looking at the resources through a Native Hawaiian cultural lens ensuring a holistic approach to interaction and care. It will also help the monument by continuing to re-establish Native Hawaiian ancestral consciousness and awareness about the health and condition of the marine resources. This integrated monitoring research cruise is the only one of its kind that integrates Native Hawaiian worldview and knowledge systems with western scientific methods to better understand the status of intertidal marine resources. It helps the Monument strengthen its management of cultural resources and ensures the strong participation of Native Hawaiians in the region's long-term protection. By providing opportunities to conduct cultural research, (cultural) researchers will assist in the recovery of important Native Hawaiian marine management practices and support the use of Native Hawaiian traditional ecological knowledge. Additionally, the permitted cultural practitioners and researchers will be key to the development of an eventual cultural access and monitoring plan for the NWHI.

The scientific research methods will build on the valuable long-term monitoring data collected on previous intertidal research cruises. The additional method will provide baseline knowledge of how environmental factors influence the egg quality of 'opihi and hā'uke'uke populations in the NWHI. These activities align with continuing research of recruitment, intertidal habitat

quality, and population connectivity implemented on previous PMNM intertidal cruises. Monitoring maternal investment of these populations in the NWHI will provide critical information about how climate change effects such as sea level rise and increased sea surface temperatures can affect the ability of these populations to produce healthy eggs and larvae. Overall, this study will shed light on the effects of climate change on natural populations of these two culturally significant marine invertebrates. On a larger scale, this study will help us understand the populations and reproductive cycles of Hawaiian ‘opihi and hā‘uke‘uke in the NWHI. We will better understand differences of maternal investment between remote populations in the NWHI and the Main Hawaiian Island populations experiencing greater levels of anthropogenic pollution and overharvesting.

Other information or background:

Additionally this project is also supported by the following activities in the Monument Management Plan, (NHCH-2.1, 2.2, 2.3, 2.5, 2.6, 3.4, 4.2, 5.3 and NHCI – 3.1 and 3.2) all of which call for the identification of Native Hawaiian research priorities and access opportunities.

NHCH-2.1: Continue to compile information and conduct new cultural historical research about the NWHI.

NHCH-2.2: Support Native Hawaiian cultural research needs.

NHCH-2.3: Facilitate cultural field research and cultural education opportunities annually.

NHCH-2.5: Incorporate cultural resources information into the Monument Information Management System.

NHCH-2.6: Continue to facilitate Native Hawaiian cultural access.

NHCH-3.4: Identify and integrate Native Hawaiian traditional knowledge and management concepts into Monument management.

NHCH-4.2: Develop and implement specific preservation and access plans, as appropriate, to protect cultural sites at Nihoa and Mokumanamana.

NHCH-5.3: Integrate Native Hawaiian values and cultural information into the Monument permittee education and outreach program.

NHCI-3.1: Engage the Native Hawaiian community to identify how traditional knowledge will be integrated into Monument activities.

NHCI-3.2: Use and integrate Native Hawaiian traditional knowledge in Monument management activities.

References

Bernardo J (1996) The particular maternal effect of propagule size, especially egg size: patterns, models, quality of evidence and interpretations. *Am. Zool.* 36:216–236

Gaines S, Roughgarden J (1985) Larval settlement rate: A leading determinant of structure in an ecological community of the marine intertidal zone. *Proc. Natl. Acad. Sci. U. S. A.* 82:3707–11

Hughes TP, Baird AH, Dinsdale EA, Moltschanowskyj NA, Pratchett MS, Tanner JE, Willis BL,

Aug N (2000) Supply-Side Ecology Works Both Ways: The Link between Benthic Adults, Fecundity, and Larval Recruits. *Ecology* 81:2241–2249
Lewin R (1986) Supply-Side Ecology. *Science* (80). 234:25–27
Marshall DJ, Keough MJ (2007) The evolutionary ecology of offspring size in marine invertebrates. *Adv. Mar. Biol.* 53:1–60
Marshall DJ, Keough MJ (2008) The relationship between offspring size and performance in the sea. *Am. Nat.* 171:214–224
Rognstad R, Wethey DS, Hilbish TJ (2014) Connectivity and population repatriation: limitations of climate and input into the larval pool. *Mar. Ecol. Prog. Ser.* 495:175–183
Stillman JH (2003) Acclimation Capacity Underlies Susceptibility to Climate Change. *Science* (80). 301:65

Section A - Applicant Information

1. Applicant

[REDACTED]

[REDACTED]

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

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

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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

NATIVE HAWAIIAN PRACTICES

Nā Maka o Papahānaumokuākea, University of Hawai'i at Mānoa

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, Diver):

We expect that the final list of cruise personnel will be available in July 2017 and will be submitted via an updated PMNM Compliance Information Sheet at that time. We seek a crew of 10 people drawn from across the partners listed above and these are the same participants as those on the Native Hawaiian Practices Permit Application filed by Kim Kanoē'ulalani Morishige.

Tentative List for 2017 Opihi Cruise

- Chris Bird (Ph.D., Asst Professor, TAMUCC),
- Kim Kanoē'ulalani Morishige (Researcher; Ph.D. Candidate, NMP, UH Mānoa & NHP Permittee)
- Tia Brown (PMNM Resource Manager & Monitor)
- TBD Community Representative from Hāna
- TBD Community Representative from Kipahulu
- TBD Community Representative from Kaua'i
- TBD Community Representative from Miloli'i
- TBD Community Representative from Kalaemanō
- TBD Kū'ula Student Representative
- TBD Community Representative/EMT Safety Officer

Section B: Project Information

5a. Project location(s):

Ocean Based

- | | | | |
|--|-------------------------------------|---|-------------------------------------|
| <input checked="" type="checkbox"/> Nihoa Island | <input type="checkbox"/> Land-based | <input checked="" type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> Necker Island (Mokumanamana) | <input type="checkbox"/> Land-based | <input checked="" type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> French Frigate Shoals | <input type="checkbox"/> Land-based | <input checked="" type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> Gardner Pinnacles | <input type="checkbox"/> Land-based | <input checked="" type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> Māro 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 type="checkbox"/> Midway Atoll | <input type="checkbox"/> Land-based | <input type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> Kure Atoll | <input type="checkbox"/> Land-based | <input type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> Other | | | |

NOTE: Shallow water is defined by water less than 100 meters in depth.

- Remaining ashore on any island or atoll (with the exception of Sand Island at Midway Atoll)

and field camp staff on other islands/atolls) between sunset and sunrise.

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

Location Description:

Intertidal areas of all islands checked above. Will not go on land above the splash zone of any island and will conduct all research/survey work in nearshore waters and within the tidal zone (below the high tide).

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 central purpose of the expedition is to expand and advance traditional Native Hawaiian knowledge in the field of marine conservation and management and continue to bridge the gap between cultural and western research methodologies. The primary objectives of the cultural expedition are to:

- (1) collect environmental data related to traditional Native Hawaiian marine management;
- (2) expand the application of traditional Hawaiian environmental monitoring tools and methodologies;
- (3) increase the knowledge base pertaining to intertidal ecosystems, including ‘opihi / hā‘uke‘uke / limu abundance, health, and reproductive cycles; and

(4) re-establishing and strengthening cultural ties through feeding and being fed by our environment (genealogy).

*Considering the purpose of the proposed activities, do you intend to film / photograph federally protected species? Yes No

If so, please list the species you specifically intend to target.

For a list of terrestrial species protected under the Endangered Species Act visit:

<http://www.fws.gov/endangered/>

For a list of marine species protected under the Endangered Species Act visit:

<http://www.nmfs.noaa.gov/pr/species/esa/>

For information about species protected under the Marine Mammal Protection Act visit:

<http://www.nmfs.noaa.gov/pr/laws/mmpa/>

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?

All activities contained in this permit application were permitted over prior years (except maternal investment research of ‘opihi and hā‘uke‘uke) and have demonstrated no impact on Monument cultural, natural and historic resources. All consultations (e.g. Section 106 National Historic Preservation Act) and compliance requirements would be completed prior to departure. The activities would adhere to all rules and regulations established by the Monument including adherence to all quarantine requirements, wildlife viewing guidelines, and entry/exit notification procedures where applicable.

The intertidal monitoring / ‘opihi team consists of Native Hawaiian practitioners / cultural researchers on this voyage who are experienced in proper protocol and will help to ensure the entire group enters Papahānaumokuākea with proper intent and that all resources are treated with respect and care. Native Hawaiian protocols, including oli and mele, will be conducted to re-establish an awareness between people and place. It will also serve to reconnect the Northwestern Hawaiian Islands into the Hawaiian consciousness and worldview. This ceremony/protocol is very important because it establishes a sense of respect and reverence for the environment and all things it encompasses. It also supports a cultural interaction between people (younger siblings) and the islands & resources (older siblings) and prepares participants

for that interaction. These protocol and ceremony are necessary to tap into an elevated state of awareness which will support cultural research and participants’ openness to “see” properly.

A pre-trip cultural orientation will also be conducted by the Nā Maka o Papahānaumokuākea to introduce all participants to the cultural practice of harvesting, preparing and feeding a community. The objective of this orientation is to demonstrate the cultural importance of food and environment, the network and investment of time and community into food, and how it feeds us physically, spiritually, and culturally.

The consumption of intertidal resource invertebrates, limu will be conducted with adequate safeguards by not taking more than what is needed to allow participants to practice their culture but without compromising the ecological integrity and natural resources. For example, when harvesting ‘opihi we will be mindful to harvest individuals that are larger than the legal-size limit of 1 ¼ inch as well as to leave larger ‘opihi alone as they are believed to be more fecund. We will also harvest from various places along the shoreline to be mindful of harvest pressure on one rock. ‘Opihi are also able to reach reproductive maturity at approximately 7 months after settling onto the rocks (Kay & Magruder 1977), thus we are confident that there will be larval recruitment the following year. When harvesting limu, proper practice of cutting the branches off and leaving the holdfast will be utilized to ensure continual growth after it is harvested. We believe that two traditionally harvested and prepared individuals of each invert species (see Quest #9) per person and a total of one “mini snack-sized zip lock bag” approximately 100 grams of limu (see Quest #9) is appropriate to harvest per island.

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?

Per 7a above, all activities (except maternal investment research of ‘opihi and hā‘uke‘uke) obtained in this permit application were permitted over prior years and have previously demonstrated no impact on Monument cultural, natural and historic resources. All consultations (e.g. ESA Section 7) and compliance requirements would be completed prior to departure. All personnel named in this permit are experienced with conducting surveys in the intertidal zone and are aware of the risks associated with working in nearshore areas with high wave action. Activities proposed in this application would have no cumulative effect as the applicant is proposing short (1-3 day) survey days at each island, and no negative effects have resulted from previous years’ surveys within the NWHI.

In addition, this activity is part of the following Monument Management Plan Action Plans:

- NHCH 2.3: Facilitate cultural field research and cultural education opportunities annually;
- NHCH 2.6: Continue to facilitate Native Hawaiian cultural access;
- NHCH-3.1: Assess Monument cultural resource capacity;

- NHCH-3.2: Increase knowledge base of Native Hawaiian values and cultural information through “in-reach” programs for research managers;
- NHCH-4.2: Develop and implement specific preservation and access plans, as appropriate, to protect cultural sites at Nihoa and Mokumanamana;
- NHCH-5.3: Integrate Native Hawaiian values and cultural information into the Monument permittee education and outreach program

In addition, NOAA Office of National Marine Sanctuaries (ONMS) as a managing agency on the Monument Management Board, does and would commit to monitoring the intertidal zones of Nihoa, Mokumanamana, and French Frigate Shoals (FFS). ONMS monitors the intertidal zones annually in the same areas of Nihoa, Mokumanamana, and FFS in which permitted sampling of various invertebrate species occurred the prior year. ONMS funds this monitoring work 100%. The project is led by two experts: Ms. Kim Kanoe‘ulalani Morishige (applicant) and Dr. Chris Bird (scientist). ONMS and permittee will provide survey and report data to the U.S. Fish and Wildlife Service (USFWS) as stipulated in the general conditions of this permit.

Previous permitted intertidal monitoring efforts suggest the take activity is beneficial for the resource. In 2012, the intertidal data was collected for the fourth consecutive year and Dr. Bird and other intertidal monitoring participants have noted changes over time. For example, the high density of recruits recorded in June 2010, didn’t all survive, suggesting that more ‘opihi settled on the shore than the habitat could sustain. In 2010 participants recorded numerous small one month old ‘opihi (300 per m²), whereas in 2011, there were less 1.5-year-old ‘opihi (50 per m²) (http://www.Papahānaumokuākea.gov/news/opihi/opihi_chris_b.html). Similarly, researchers and participants have noted differences in population distribution, for example, in 2012, ‘opihi at Mokumanamana and Nihoa were recorded in the tens of thousands compared to the 3,000 found at La Perouse Pinnacles at FFS (http://www.Papahānaumokuākea.gov/research/intertidal_cruise2013_return.html). No ‘opihi samples were collected at La Perouse Pinnacles due to the low population size.

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 practicable alternative to conducting the activity within the Monument. There is no other place within the Hawaiian archipelago that can serve as a baseline of abundance for local community-based marine managers due to its remote locale and legal protection status. Because the Northwestern Hawaiian Islands are remotely managed, this area serves as an optimal measure to determine expected abundances-as these cultural researchers are engaged in community-based near shore marine management in the main Hawaiian Islands. A field study was attempted on Kaho’olawe, however, due to fishing pressures and run-off, the study site was determined to be sub-optimal.

The consumption of intertidal inverts and limu can be conducted outside of

Papahānaumokuākea, however there is no alternative to consuming an important cultural resource at a place like Papahānaumokuākea because it allows one to connect to a place on a spiritual level which cannot be done by consuming it elsewhere. This is the reason kanaka maoli can connect to the place they live, because they have a deep and intimate connection to their land, their oceans and to their resources. We cannot whole-heartedly connect to Papahānaumokuākea without practicing our culture like we do in other parts of Hawai‘i, this is an extension of our daily lives and make up who we are. We will harvest, prepare, and consume each invert species, two hā‘uke‘uke and five ‘opihi (see Quest #9) per person and a total of one “mini snack-sized zip lock bag” approximately 100 grams of limu per island (see Quest #9). The intent is to mālama Papahānaumokuākea by re-connecting ourselves to the place, being present, observe & listen to what she tells us and to allow her to spiritually and physically mālama us by consuming resources found there and by giving us ‘ike and showing us hō‘ailona and experiences found nowhere else on this planet.

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 the activity outweighs any adverse impacts by safeguarding against the loss of opportunity to expand Native Hawaiian knowledge and re-connect kanaka maoli culturally, physically, and spiritually to Papahānaumokuākea. There is a great need to recover traditional Native Hawaiian marine ecosystem management practices, and as such, the Monument provides an unparalleled venue to accomplish this.

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

Fifteen days is the shortest possible duration to conduct intertidal surveys. Fifteen days would allow 1-2 days at each island/atoll to conduct surveys and adequate transit time for the vessel.

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

The applicant, Kim Kanoē‘ulalani Morishige, is qualified to conduct both traditional and scientific surveys because of her knowledge using both methods for the past seven years. Born and raised in Kapahulu, O‘ahu, she is a Ph.D. candidate in Marine Biology at UH Mānoa and a National Science Foundation Graduate Research Fellow who extends her research into her work with community-based monitoring to support community-driven marine resource management. Her research has focused on intertidal community ecology, maternal investment, limu (algae), and reproductive biology of ‘opihi and hā‘uke‘uke. She has worked with communities in Ka‘ūpūlehu, Hā‘ena, Kekaha, and Hāna through Nā Maka o Papahānaumokuākea (NMP). NMP is a non-profit 501(c)3 organization that aims to build a foundation of kilo (keen observations/observers) to empower local communities to re-establish healthy relationships with each other and the world around us based on indigenous worldviews. Kim is a founding member

of NMP and works with a network of locals and Hawaiians to implement Nā Kilo ‘Āina (NKA) programs within various communities across Hawai‘i. NKA supports collectively building a community of observers of ‘āina, our sources of physical, emotional, cultural, and spiritual sustenance. As an extension of our ancestral knowledge systems, NMP uses a Huli ‘ia spatial observation protocol as a method to understand dominant weather, land, and sea patterns that indicate seasonal changes and ecosystem health. This allows us to critically think about how we can maintain productive ecosystems and relationships with ‘āina. Through this foundation, we also implement tools of institutional western science to critically think about how we can support balance and holistic health of our people and place. Kim is an active lead on integrated monitoring designed to look for ways to continue maintaining healthy reciprocal relationships with our oceans. She works to build capacity of the tools we have to address ways to take care of ‘āina through our collective understanding built from community experience and kilo. Her research is focused on hā‘uke‘uke as a model to determine a way to feed from our ‘āina with minimal impact, ultimately supporting productivity for future generations.

Furthermore, the cultural researchers that will perform various research activities are all trained in traditional near-shore marine management, fishery management, traditional weather observations and working in dangerous near-shore, high wave action 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.

The proposed field activities are funded in full by NOAA, Papahānaumokuākea Marine National Monument. The data workup for all the information collected through this project would also be supported by the Monument Texas A&M and the Hawaii Institute of Marine Biology, University of Hawai‘i Mānoa Marko-Moran Lab, and Nā Maka o Papahānaumokuākea.

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 methods and procedures employed are widely accepted methods for acquiring data in the marine environment by Native Hawaiian marine practitioners and research scientists. The proposed methodology would not require specialized equipment and would also take into full account the fragility of the Monument's resources. We will conduct responsible and ethical practices by refraining from collecting ‘opihi or hā‘uke‘uke if the population numbers appear too low. We will use hook/handline and trolling methods for the sustenance fishing while in federal waters.

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

It is highly likely that this activity would be carried out aboard the M/V SEARCHER.

SEARCHER is outfitted with a mobile transceiver unit approved by OLE and therefore complies with the 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.

All permits required for access and conducting cultural observations of the marine environment will be obtained. Also, several members from the Native Hawaiian cultural working group have been consulted regarding the activities to be permitted under this application. Similar to all previous Intertidal Cruise's (2011-2016), a presentation will be provided to the working group both before and after the trip.

ADDITIONAL FINDINGS FOR PROPOSED NATIVE HAWAIIAN PRACTICES

k. Explain how the activity is non-commercial and will not involve the sale of any organism or material collected.

The activity is non-commercial. The end-value of the activity is informational and is intended to provide local and governmental managers the information critical to the conservation of these cultural resources.

l. Explain how the purpose and intent of the activity is appropriate and deemed necessary by traditional standards in the Native Hawaiian culture (pono), and demonstrate an understanding of, and background in, the traditional practice and its associated values and protocols.

The purpose and intent of the proposed activity is appropriate and pono by traditional standards in the Native Hawaiian culture in that the expedition is centered on enhancing traditional marine resource management skills through careful observation. The ability to increase or maintain productivity of a particular kai (fishery) is integral to maintaining traditional Native Hawaiian knowledge and marine management systems; and is therefore consistent with pono marine stewardship tenets.

m. Explain how the activity benefits the resources of the Northwestern Hawaiian Islands and the Native Hawaiian community.

The data collected from these field studies will better enable these cultural researchers / practitioners to understand the biological, spiritual and cultural connections between the NWHI and the main Hawaiian Islands. In doing so, researchers will be better equipped to manage their areas in the main Hawaiian Islands from which the Northwestern Hawaiian Islands will ultimately benefit. Outreach & Education opportunities will be offered and presented to the Native Hawaiian communities and students.

n. Explain how the activity supports or advances the perpetuation of traditional knowledge and

ancestral connections of Native Hawaiians to the Northwestern Hawaiian Islands.

The group of cultural researcher / practitioners being selected for this expedition possess intricate knowledge of traditional Native Hawaiian marine management practices in the near shore fishery area within their own ahupua'a. Of equal importance, knowledge gained will be utilized to inform local marine management and conservation education within their home communities. Each practitioner will reflect upon traditional concepts like 'āina momona (bountiful lands), ho'omalū (regulated activities) and kapu (prohibited activities) which are fundamental in traditional Native Hawaiian marine management.

o. Will all Monument resources harvested in the Monument be consumed in the Monument? If not, explain why not.

Yes, under this permit, all of the resources harvested for cultural purposes will be consumed in the monument. The eggs of the hā'uke'uke will be frozen in seawater in a liquid nitrogen dry shipper for future biochemical analyses.

8. Procedures/Methods:

The cultural research team would make visual assessments of intertidal areas where 'opihi and hā'uke'uke are located. The research team would record substrate type, limu type/density, crustose/turf/macro algae proportions, other species proportions/ratio, clumping of 'opihi, hā'uke'uke, and other intertidal species, presence of natural predators, freshwater input, etc. The team would take wet/dry notes and use digital cameras to record observations (Will remain within the BMO distance for any filming or photography of protected species). At the end of each day, a discussion will be held to share observations and relationships made with the group. One person will be designated and write all the observations made by the group on one data sheet to facilitate the analysis process while observations are still fresh and can be clarified. To complete these activities, cultural practitioner / researchers would require access to nearshore areas (below the splash zone) that contain 'opihi habitat (e.g. intertidal zone at Mokumanamana). Cultural practitioners / researchers would adhere to all Monument requirements while undertaking this project.

Cultural harvesting protocols for intertidal invertebrates and limu will be conducted with adequate safeguards by not taking more than what is needed to allow participants to practice their culture but without compromising the ecological integrity and natural resources. Appropriate oli/mele will be conducted prior to arrival and departure on each island to introduce ourselves and our pono intentions as well as to thank each island for their contributions. We believe that two traditionally harvested and prepared individuals of each invert species per person, five hā'uke'uke and 'opihi (see Quest #9) per person, two he'e per island and a total of one "mini snack-sized zip lock bag" approximately 100 grams of limu (see Quest #9) is appropriate to harvest per island. Harvesting will supplement meals and may consist of 'opihi, hā'uke'uke, limu, 'a'ama, pipipi, makaloa, he'e and pupu 'awa. 'Opihi will be gathered by hand

using an ‘opihi knife, and we will be mindful to harvest individuals that are larger than the legal-size limit of 1 ¼ inch as well as to leave larger ‘opihi alone as they are believed to be more fecund. We will also harvest from various places along the shoreline to be mindful of harvest pressure on one rock. On Mokupāpapa, after confirming the census population size to be ~2900-3400 via Dr. Chris Bird’s survey methods employed from 2013 - 2016, only 3 individuals per ‘opihi species (makaiauli & ‘ālinalina) will be collected per participant (there are 10 participants conducting intertidal surveys) (30 total per island) thereby ensuring that we collect ~ 1% of the population. If we visit Pūhāhonu, we will use the mapping protocol to conduct a census of the ‘opihi population. Based on previous DNA analyses, Pūhāhonu is comprised of *Cellana exarata/melanostoma* populations. Assuming that the population size is similar to that in 2016 (~100,000), then the sampling will be conducted as outlined for Mokumanamana and Nihoa. Our cut off is that we will not sample more than 1% of the population at any island. Previous surveys of hā‘uke‘uke populations indicate that hā‘uke‘uke grow in excess of 4800 individuals per island on Mokumanamana and Nihoa where we plan to collect.

‘Opihi are also able to reach reproductive maturity at approximately 7 months after settling onto the rocks (Kay & Magruder 1977), thus we are confident that there will be larval recruitment the following year. When harvesting limu, proper practice of cutting/ pinching off the branches off and leaving the holdfast will be utilized to ensure continual growth after it is harvested. All other invertebrates will be gathered by hand. All inverts will be consumed raw, except leho, pipipi and pūpū ‘awa which will be boiled then consumed. Limu will be “cured” and prepared to supplement meals. He‘e will be harvested by using a metal rod to attract the he‘e out of its house and then be gathered by hand. We will not harvest he‘e that is under one pound, in accordance to the State of Hawai‘i fishing regulations. The he‘e will either be prepared by either drying or boiling before consumption. Hook, handline and trolling methods will be used to sustainance fish while in federal. Refer to attached table for list of species.

NOTE: If land or marine archeological activities are involved, contact the Monument Permit Coordinator at the address on the general application form before proceeding.

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:

1. Thin-Shelled Rock Crab
2. Spotted Drupe
3. Black Nerite
4. Open Drupe
5. Helmet Urchin
6. Black-Foot ‘Opihi
7. Yellow-Foot ‘Opihi
8. Day Octopus / Cliff Octopus

9. Humpback Cowry
10. Intermediate Drupe
11. None, Bonnemaisoniaceae Family
12. Sea lettuce, Ulvaceae Family
13. Yellowfin tuna
14. Dolphinfish
15. Wahoo

Scientific name:

1. *Grapsus tenuicrustatus*
2. *Drupa ricina*
3. *Nerita picea*
4. *Thais aperta* (formally *Purpura aperta*)
5. *Colobocentrotus atratus*
6. *Cellana exarata*
7. *Cellana sandwicensis*
8. *Octopus cyanea* / *Octopus oliveri*
9. *Cypraea mauritiana*
10. *Thais intermedia*
11. *Asparagopsis taxiformis* / *Laurencia nidifica*
12. *Ulva lactuca*
13. *Thunnus albacares*
14. *Coryphaena hippurus*
15. *Acanthocybium solandri*

Hawaiian name:

1. 'A'ama
2. Makaloa
3. Pipipi
4. Pūpū 'Awa
5. Hā'uke'uke
6. Makaiauli
7. 'Ālinalina
8. He'e Maui / He'e Pali
9. Leho ahi
10. Pūpū
11. Limu Kohu / Limu Līpe'epe'e
12. Pālahalaha
13. Ahi
14. Mahimahi
15. Ono

& size of specimens:

1. 'A'ama:
 - a. Up to 24 per island/location for a total up to 88
 - b. 3 inches or larger
2. Makaloa
 - a. Up to 24 per island/location for a total up to 88
 - b. ½ inch or larger
3. Pipipi
 - a. Up to 24 per island/location for a total up to 88
 - b. ½ inch or larger
4. Pūpū 'Awa
 - a. Up to 24 per island/location for a total up to 88
 - b. ½ inch or larger
5. Hā'uke'uke
 - a. Up to 60 on Mokumanamana and Nihoa for a total up to 240
 - b. 3cm or larger
6. Makaiauli
 - a. Up to 30 per island/location for a total up to 120
 - b. 1 ¼ inch or larger
7. 'Ālinalina
 - a. Up to 30 per island/location for a total up to 120
 - b. 1 ¼ inch or larger
8. He'e Maui / He'e Pali
 - a. Up to 2 individuals per island/location for a total up to 8
 - b. 1 lb or heavier
9. Leho Ahi
 - a. Up to 24 per island/location for a total up to 88
 - b. 2 inches or larger
10. Pūpū - Thais
 - a. Up to 24 per island/location for a total up to 88
 - b. 1 inch or larger
11. Limu Kohu / Limu līpe'epe'e
 - a. Up to 1 small "snack size" ziploc full (approx. 100g)
12. Pālahalaha
 - a. Up to 1 small "snack size" ziploc full (approx. 100g)
13. Ahi, Mahimahi, Ono
 - a. Up to 10 individuals of the species listed while in transit.

Collection location:

Nihoa, Mokumanamana, Mokupāpapa and Puhahonu

Whole Organism Partial Organism

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

All specimens will be consumed while in PMNM.

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

• General site/location for collections:

NA

• Is it an open or closed system? Open Closed

NA

• Is there an outfall? Yes No

NA

• Will these organisms be housed with other organisms? If so, what are the other organisms?

NA

• Will organisms be released?

NA/NO

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

N/A

11. Describe any fixed or semi-permanent structures or installations, or cultural offerings you plan to leave in the Monument:

Offerings of pa'akai(salt) and wai (water) may remain in the Monument.

12. List all specialized gear and materials to be used in the proposed activities:

Snorkeling gear, transect line, data sheets, 'opihi knives, handline, hook & trolling equipment.

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

NONE

14. Describe collaborative activities to share samples, cultural research and/or knowledge gained in the Monument:

This permit application has been submitted in conjunction with a joint permit application submitted Dr. Chris Bird of Texas A&M University, Corpus Christi. All samples and methodologies discussed in this permit application are directly related Dr. Bird's respective permit application. This project will continue to bridge the gap between cultural and western research.

In addition, cultural researchers will present preliminary findings to their respective communities (Hāna, Ka'ūpūlehu, Kalapana, Kipahulu etc.) and marine resource managers under this permit will continue to inform and update the public (e.g. at NWHI Coral Reef Ecosystem Reserve Advisory Council meetings) and the Native Hawaiian Cultural Working Group on all findings.

15a. Will you produce any publications, educational materials or other deliverables?

Yes No

15b. Provide a time line for write-up and publication of information or production of materials:

Education and Outreach materials are produced as a result of findings from annual PMNM surveys and other surveys across communities in the populated Hawaiian Islands. One such example is the various Huli'ia posters produced from Huli'ia data collected by communities across the archipelago (including PMNM).

16. If applicable, list all Applicant's publications directly related to the proposed project:

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.

Signature

Date

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

NOAA/Inouye Regional Center
NOS/ONMS/PMNM/Attn: Permit Coordinator
1845 Wasp Blvd, Building 176
Honolulu, HI 96818
FAX: (808) 455-3093

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