

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 Kanoe‘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

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 Native Hawaiian Practices applications submitted by Kim Kanoe‘ulalani Morishige

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 (Kanahale) 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 '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

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