

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: Pelika Andrade

Affiliation: Na Maka Onaona (formerly Na Maka o Papahānaumokuākea) & UH Mānoa

Nā Maka Onaona (NMO) is a non-profit 501(c)3 supporting Aina Momona: A thriving and productive Hawaii. NMO cultivates and supports Aina Momona through providing culturally grounded educational programs and partnerships that support the over all health of our communities; mentally, spiritually, emotionally, and physically. NMO 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. NMO focuses on addressing people to shift our behaviors, our values and our relationships and including people in healing the natural world around us. NMO 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: TBD July 2020 – June 2021, postponed due to Covid-19

Proposed Method of Entry (Vessel/Plane): Vessel – MAKANIOLU

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

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

16-18 (10 project personnel + 6-8 vessel crew) total people will be covered to conduct activities under this permit, co-listed under the Research application submitted by Dr. Haunani Kane.

Estimated number of days in the Monument: 12

Description of proposed activities: (complete these sentences):

a.) The proposed activity will...

Support sustainable fisheries and aina momona through continuing intertidal surveys and monitoring across the archipelago to advise and direct management strategies to support the

intertidal fishery focusing on Opihi/Limpet productivity. Over the past decade of collaborative intertidal monitoring, our locally led research team has identified significant shortcomings to the current research being conducted on Hawai‘i’s unique wave-dominated, rocky intertidal shoreline. For instance, prior data collection methods failed to measure environment – a key component to intertidal ecology and sustainable fisheries management. From recent findings, we draw new hypotheses and a new survey method (PACC) that focus on the effects of seasonal changes in habitat on patterns of reproductive cycles, recruitment and productivity of rocky intertidal communities. The work generated would be used to develop a sustainable fishery model for evaluating species productivity on any intertidal coastline in Hawai‘i. As a model system for intertidal mollusc fisheries, our objectives are to assess the stock status for three species of limpet (*Cellana* spp.) in the Hawaiian Islands by: (1) describing and delineating their environment and habitat, (2) improving the understanding of the biology and ecology of *Cellana* spp., and (3) proposing sustainable harvest practices and management measures using an indicator-based approach.

Sustainable ecosystems and aina that are thriving and productive are fundamental in Native Hawaiian values and systems. Looking beyond the obvious Native Hawaiian practice of harvesting and gathering, there was a system in place that supported productive lands, oceans, and communities generationally. Our proposed activities are supporting the Native Hawaiian practice of Aina Momona.

Since 2009, Na Maka Onaona has been a major partner in Hawaii’s Intertidal Monitoring Partnership conducting research in PMNM. Over the past eleven years, our team has been conducting intertidal monitoring along Hawaii’s wave-exposed shorelines to address community concerns on sustainable harvest of ‘opihi (*Cellana* spp). Working with numerous schools and community organizations, we have learned valuable lessons about both the productivity of our shorelines, and how this productivity aligns within the larger goals of thriving communities (Morishige et al. 2018). Through integrating institutional research, traditional knowledge systems, end-user (i.e. fisher) engagement, and outreach/education, our team has developed a unique research approach - made possible through the contributions of these multiple perspectives, considerations, and relationships. This journey provides us the capacity to understand a space through the multiple lenses within a community and create a platform that is inclusive of various knowledge systems to address the needs of our people, our environment, and a thriving relationship between the two entities. Building on recent research, our understanding of place changes by season and across multiple landscapes. We have developed a modified survey to look at the role of different habitat types, and the influence of environment on the carrying capacity of our intertidal fishery. Based on a shared goal of a productive and sustainable fishery, our latest series of questions have led us to identify management strategies that can maximize replenishment in these rocky intertidal ecosystems. We believe the sharing of this journey is valuable, and will encourage a more inclusive conversation to evolve management and conservation to truly support ‘aina momona, abundant and productive communities of people and place.

PACC surveys aim to better understand how natural fluctuations occur even on remote shorelines with low human impact. This research will shed light on seasonal growth and die back of populations in relation to their habitat size and local physical environment. In 2012, the intertidal data was collected for the fourth consecutive year and Dr. Chris Bird and intertidal monitoring crews have noted changes over time. For example, there was a high density of recruits recorded in June 2010, however, they did not 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.papahanaumokuakea.gov/news/opihi/opihi_chris_b.html). Although one year might seem like there are many recruited ‘opihi, the habitat and environmental conditions can limit their survival and influence successful recruitment into adult populations. This highlights the importance of considering the maximum and minimum thresholds of population densities by size to identify stable carrying capacities.

PACC implements a mix of standardized and novel methodologies across boulder, bench, and sloped rocky substratum to: 1) examine the effect of swell exposure (Low, Medium, High) on habitat size; 2) develop a practical, routine method for determining opihi growth rates and age in-situ; and 3) measure species fecundity and reproductive output in relation to major environmental drivers such as temperature. Our project evaluates how environment, growth and age structure, and reproductive output affects total shellfish production on temporal and spatial scales; and re-establishes productive ecosystems as a fundamental strategy of traditional Hawaiian resource management.

The outputs of this project will be the identification of optimal habitat for a productive intertidal fishery, effective management strategies/tools, and support for stakeholder decision-making based on the sustainable opihi population density for respective shorelines-types. If we can understand a shoreline’s stable habitat (habitat size and population densities at its minimum normally during the seasonal dieback), we can understand that shoreline’s stable carrying capacity of ‘opihi. This research in PMNM is part of an on-going initiative to survey multiple locations in the Main Hawaiian Islands to inform management techniques to sustainably harvest and rest populations that compliments cyclical productivity. Locations across the Hawaiian Archipelago have been selected due to existing, long-term partnerships and/or areas of interest expressed by Native Hawaiian community members. Our research team will train and work with local and Native Hawaiian communities to build local research capacity by surveying their intertidal ecosystems.

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 ...

conduct PACC surveys to examine ‘opihi densities by size classes and maximum sizes within each vertically stratified zone (black zone (basalt rock) and pink zone (crustose coralline algae zone)). The black zone is located on the upper extent of the shoreline defined as the Emergent Tidal Zone where black rock is exposed to the air depending on the tide and the pink zone is located lower on the shoreline in the Wave Zone (Bird et al. 2013). Rugosity measurements will be recorded for the black zone and pink zone to identify differences in ‘opihi carrying capacity by distinct habitat zones within the intertidal ecosystem. Tight measurements will also quantify the growth and shrinkage of the broader shoreline within each survey site to provide a practical measure of seasonal habitat threshold. PACC surveys will provide a total rugosity measurement for black and pink zones within the mixed (overlap of black and pink zones) rugosity zones. In order to increase the precision of ‘opihi habitat availability, PACC will also record differences in ‘opihi habitat and non-habitat to develop more precise estimates of ‘opihi densities.

We will collect ‘opihi to dissect gonads and use histological methods that can provide fecundity estimates and reproductive state by sizes that have not been used for ‘opihi in PMNM in prior years. To determine fecundity-at-size, we will examine ‘opihi ovaries histologically for all size groups except size class A (0-1 cm SL). A total of n=80 specimens will be collected from Nihoa using an opihiki knife. These specimens will be measured by caliper for shell length, shell width, and shell height, and weighted by scale for total weight, soft-body weight, and gonad weight. Gonad tissue will be fixed in 10% v/v Neutral Buffered Formalin and rinsed with 70% v/v ethanol prior to haematoxylin and eosin staining (H&E) at the University of Hawaii’s Histology and Imaging Core Facility (Honolulu, Hawaii). Using a microscope and imageJ, oocytes will be measured for diameter, and enumerated to determine fecundity.

Extra shells from collections will be saved where a subset of them will be analyzed to measure sub-annual growth rates. Following the methods of Mau et al. (2019), each shell will be cross-sectioned from anterior to posterior direction using a low speed saw (Isomet 1000, Buehler) equipped with a 0.5 mm diamond coated blade. Parallel cuts will be made at the apex or maximal growth-axis to obtain two replicate 1.3 mm thick-sections per specimen. The replicate thick-section will be mounted in its entirety on a large glass slide using quick-drying epoxy (EPO-TEK 301, Epoxy Technology Inc, Billerica, MA), grinded with F1000 grit SiC powder secondarily, and polished with 3 and 1µm Al₂O₃ powder on a lapping wheel. The polished, thick-sections will be stained with Mutvei’s solution to expose major lines, micro lines, and micro increments by light microscopy (Schöne et al. 2005). Shell thick-sections will be placed in a petri dish and submerged in Mutvei’s solution for 45 minutes held constant at 37-40°C with 14 constant stirring. These stained thick-sections will be imaged using a Nikon Eclipse E600 Polarizing light microscope at 100x magnification. Daily growth will be measured along two axes using the standard measuring tool in ImageJ. To measure daily growth (as shell length) along the

horizontal axis, we will record x-coordinates for each point where a micro increment band intersects the outermost layer, and subtract x-coordinates of sequential points to calculate horizontal distance or growth. Back-calculated shell length measurements will be used to model age-at-length data.

We will also be engaging in Huli ‘ia, an observational process documenting seasonal changes and shifts across entire landscapes, *ma uka* (ocean) to *ma kai* (ocean) identifying dominant correlating cycles to support and guide our management and best practices that support a productive and thriving community, ‘aina momona. It is an observational process documenting natural changes over time, identifies dominant cycles within certain species or occurrences (*flowering, fruiting, presence/absence of flora/fauna, cloud formations, spawning, or recruiting of fish species, etc.*) and assists in identifying correlations between species and/or occurrences as indicators of the other. When one thing happens (a flower blooms in mass), it indicates that another occurrence (a fish is spawning in mass) is happening (Sterling et al. 2017, Morishige et al. 2018). It allows natural cycles to support and guide our management practices allowing the flexibility needed to ensure the best times to rest areas or species and/or to harvest areas or species. Huli ‘ia stems from traditional management systems driven by an intimate understanding of the natural environment and the ability for communities to adjust and adapt their activities to support these systems of nature. Through this documentation process, Huli ‘ia supports the development of best practices enabling communities to adjust and adapt their activities to assist in malama ‘aina.

- Lani (atmospheric) 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.
- Honua (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.
- Kai (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)

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. 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.

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

Bird, C.E., Franklin, E.C., Smith, C.M. and Toonen, R.J., 2013. Between tide and wave marks: a unifying model of physical zonation on littoral shores. *PeerJ*, 1, p.e154.

Kay, E.A. and Magruder, W., 1977. The biology of opihi. Department of Planning and Economic Development, Honolulu, p.46.

Mau, A.B., 2019. The Aquaculture and Biology of ‘Opihi ‘Alinalina (*Cellana sandwicensis*) (Doctoral dissertation, University of Hawai‘i at Mānoa).

Morishige, K., Andrade, P., Pascua, P., Steward, K., Cadiz, E., Kapon, L. and Chong, U., 2018. Nā Kilo ‘Āina: Visions of Biocultural Restoration through Indigenous Relationships between People and Place. *Sustainability*, 10(10), p.3368.

Sterling, E., Ticktin, T., Morgan, T.K.K., Cullman, G., Alvira, D., Andrade, P., Bergamini, N., Betley, E., Burrows, K., Caillon, S. and Claudet, J., 2017. Culturally grounded indicators of resilience in social-ecological systems. *Environment and Society*, 8(1), pp.63-95.

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Andrade, Pelika

Title: M.A., President Na Maka Onaona

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

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

[REDACTED]

Phone: [REDACTED]

Fax:

Email: [REDACTED]

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

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

Na Maka Onaona, University of Hawai'i Sea Grant, University of Hawaii Manoa, 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, Diver):

We expect that the final list of cruise personnel will be available in June 2020 and will be submitted via an updated PMNM Compliance Information Sheet at that time.

Tentative List for 2020 Cruise

Haunani Kane, Ph.D., Coastal Geologist
Kammie Dominique Tavares, M.A., Coastal Geologist
Kristian McDonald, M.A., Coastal Geologist, Drone operator
Tressie Kaponu, GIS specialist
Shacles Chong, Videographer
Pelika Andrade, Ph.D. Student, UH Sea Grant Extension Agent, PMNM Cultural Resource Monitor, Na Maka Onaona, NHP Permittee
Kim Kanoe'ulalani Morishige, Ph.D. Candidate, Na Maka Onaona, UH Manoa
Anthony Mau, Ph.D., Researcher, Manager/Aquaculture Specialist at Kualoa Ranch
Lauren Kaponu, Na Maka Onaona
Brad Wong, OHA Papahānaumokuākea Program Specialist
6-8 Makani Olu crew TBD

Section B: Project Information

5a. Project location(s):

Niihau Island

Land-based Shallow water Ocean Based Deep water

- | | | | |
|--|-------------------------------------|---|-------------------------------------|
| <input checked="" type="checkbox"/> Necker Island (Mokumana) | <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 type="checkbox"/> Gardner Pinnacles | <input type="checkbox"/> Land-based | <input 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/angered/>

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 for the Productivity and Carrying Capacity surveys) 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.

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 PACC surveys) 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 and Mokupapapa (French Frigate Shoals). From 2010-2018, ONMS funded 100% of the annual intertidal research cruises to the same areas on Nihoa, Mokumanamana, and Mokupapapa (French Frigate Shoals - FFS) in which permitted sampling of various invertebrate species occurred the prior year. The project is led by two experts: Pelika Andrade and Kim Kanoe‘ulalani Morishige. ONMS and permittees 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, Na Maka Onaona, and the Intertidal Monitoring Partnership 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.papahanaumokuakea.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.papahanaumokuakea.gov/research/intertidal_cruise2013_return.html). No ‘opihi samples were or will be 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 for determining how environment and habitat availability influence ‘opihi populations with minimal human impact. These activities will directly contribute to the PACC surveys being conducted in the Main Hawaiian Islands to develop indicators of productivity that incorporate environmental factors and critical aspects of ‘opihi life history, both essential components for sustainable fisheries management.

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. 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. Most of the days will be spent at Mokupapapa (French Frigate Shoals) with a half day on Nihoa assisting with sea level rise research and PACC surveys leaving 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, Pelika Andrade, is qualified to conduct and complete the activities within this application. **Pelika Andrade** is the President and co-founder of Na Maka Onaona supporting productive communities across Hawaii. Andrade is a co-developer of Huli‘ia, Na Maka Onaona’s seasonal tracking tool/program which has been used during previous intertidal cruises,

in Kure Atoll field crew activities, as well as Midway FWS activities. Andrade has also spent the past 12 years working within Papahānaumokuākea conducting research, supporting management activities, supporting outreach and education initiatives and serving on both the PMNM Reserve Advisory Council and the Cultural working group. She was one of the co-founders of the formal intertidal cruise in 2010 supporting the collaboration from 2011 till it's final year in 2017. Andrade is also a Hawai'i Sea Grant Extension Agent at the University of Hawaii Manoa and a native Hawaiian born and raised on the island of Kaua'i. She has a long history working with coastal communities throughout the archipelago as a community member, sailor, voyager, cultural practitioner and researcher. For the past twelve years, she has been developing alternate approaches to monitoring Hawai'i's shoreline and supporting implementation of a management strategy that supports healthy, balanced communities in Hawai'i. Previous to her work as a Sea Grant Extension Agent, Andrade served as the program coordinator for the Keaholoa STEM Scholars Program at the University of Hawai'i at Hilo and a lecturer co-instructing the Kuula: Integrative Marine Resource Management course established in partnership with PMNM NOAA and UHHilo Marine Science and Uluakea program.

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 vessel and transport are funded in full by Dr. Haunani Kane's grant and Office of Hawaiian Affairs. The field and research activities are supported through the collaboration of the PACC project and Dr. Kane's field crew. The data workup for all the information collected through this project will be supported by the Hawaii Institute of Marine Biology School, University of Hawaii at Manoa, and Na Maka Onaona.

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 by Native Hawaiian marine practitioners and research scientists for collecting quantitative and qualitative data in intertidal ecosystems. 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 and harvesting invertebrates or algae 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 Makani ‘Olu 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.

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.

In the Main Hawaiian Islands, Na Maka Onaona has built strong partnerships with UH Manoa, NOAA PMNM, OHA, USFWS, Hawaii Institute of Marine Biology, Hawaii DAR, Hui Maka’ainana o Makana, Kalaemano Interpretive Center, and various other community partners

across Hawai'i. Our team of research leads, student interns, and community volunteers will conduct monthly intertidal surveys and quarterly sample collections, while the UH Sea Grant College Program and UH graduate students will analyze the data and conduct outreach to disseminate the findings to community stakeholders. Drawing upon over a decade of experience in building local community capacity for conducting research and outreach in Hawai'i's rocky intertidal, our team will develop products that will inform local community decision-making on the development of effective adaptive management strategies and tools that support a productive intertidal 'opihi fishery that ensures a stable food resource for future generations of local residents and Hawaiians.

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 visiting each island, Na Maka Onaona will facilitate a Huli 'ia discussion for the group to share observations. 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, our crew would require access to nearshore areas (below the splash zone) that contain 'opihi habitat (e.g. intertidal zone at Mokumanamana). Every participant will 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, 1-3 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 leho. ‘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. ‘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 and pipipi 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 waters. 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. Order Ceramiales, Rhodomelaceae Family
13. Yellowfin tuna
14. Dolphinfin
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*
12. *Ulva lactuca*
13. *Palisada parvipapillata*
14. *Thunnus albacares*
15. *Coryphaena hippurus*
16. *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
12. Pālahalaha
13. Līpe'epe'e
14. Ahi
15. Mahimahi

16. Ono

& size of specimens:

1. 'A'ama:
 - a. Up to 24 per island/location for a total up to 48
 - b. 3 inches or larger
2. Makaloa
 - a. Up to 24 per island/location for a total up to 48
 - b. ½ inch or larger
3. Pipipi
 - a. Up to 24 per island/location for a total up to 48
 - b. ½ inch or larger
4. Pūpū 'Awa
 - a. Up to 24 per island/location for a total up to 48
 - b. ½ inch or larger
5. Hā'uke'uke
 - a. Up to 30 per island/location for a total up to 60
 - b. 2 inches or larger
6. Makaiauli
 - a. Up to 40 per island/location for a total up to 80
 - b. 1 ¼ inch or larger
7. 'Ālinalina
 - a. Up to 40 per island/location for a total up to 80
 - 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 4
 - b. 1 lb or heavier
9. Leho Ahi
 - a. Up to 12 per island/location for a total up to 24
 - b. 2 inches or larger
10. Pūpū - Thais
 - a. Up to 24 per island/location for a total up to 48
 - b. 1 inch or larger
11. Limu Kohu
 - 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. Līpe'epe'e
 - a. Up to 1 small "snack size" ziploc full (approx. 100g)
14. Ahi, Mahimahi, Ono
 - a. Up to 10 individuals of the species listed while in transit.

Collection location:

Nihoa, Mokumanamana, Mokupāpapa

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 the permit application submitted by Dr. Haunani Kane. All samples and methodologies discussed in this permit application are directly related to Dr. Kane’s respective permit application. This project will continue to bridge the gap between Native Hawaiian science and western institutional science.

In addition, cultural researchers will present preliminary findings to community partner organizations, agency partners, and marine resource managers under this permit. Na Maka Onaona 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 timeline for write-up and publication of information or production of materials:

Education and Outreach curriculum material will be produced from this project and incorporated into material used for local schools in the Main Hawaiian Islands. One such example are the various Huli ‘ia posters produced by Na Maka Onaona and partners (NOAA PMNM, USFWS, OHA) and Huli ‘a data collected by communities across the archipelago.

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