

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

April 23, 2021

Board of Land
and Natural Resources
Honolulu, Hawaii

Request for Authorization and Approval to Issue a Papahānaumokuākea Marine National Monument Native Hawaiian Practices Permit to Pelika Andrade, Nā Maka Onaona (Formerly Nā Maka o Papahānaumokuākea) and the University of Hawai‘i at Mānoa, for Access to State Waters to use Traditional Ecological Knowledge to Conduct Intertidal Surveys and Monitoring to Advise and Direct Management Strategies for Intertidal Fisheries Activities

The Division of Aquatic Resources (DAR) hereby submits a request for your authorization and approval for issuance of a Papahānaumokuākea Marine National Monument Native Hawaiian practices permit to Pelika Andrade, Nā Maka Onaona (Formerly Nā Maka o Papahānaumokuākea) and the University of Hawai‘i at Mānoa, pursuant to §187 A-6, Hawai‘i Revised Statutes (HRS), Chapter 13-60.5, Hawai‘i Administrative Rules (HAR), and all other applicable laws and regulations.

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

- Nihoa
- Necker Island (Mokumanamana)
- French Frigate Shoals

The activities covered under this permit would be authorized to occur between May 2021 and May 2022.

INTENDED ACTIVITIES

The applicant, Pelika Andrade of Nā Maka Onaona (Formerly Nā Maka o Papahānaumokuākea) and the University of Hawai‘i at Mānoa, is proposing to support sustainable fisheries and aina momona through continuing intertidal surveys and monitoring across the archipelago to advise and direct management strategies which support intertidal fishery productivity, specifically ‘ōpihi. This research is a natural continuation of previous

intertidal ecosystem studies, surveys and monitoring (with a variation on the research question), that have been the conducted by the co-researcher working on the project, Kim Kanoe‘ulalani Morishige, and many other researchers affiliated with similar expeditions in the past eleven (11) years. This project will be done in conjunction and collaboration with Kane PMNM-2021-008 and the Office of Hawaiian Affairs (OHA). It will focus on the intertidal and marine ecosystems at Lalo (French Frigate Shoals), with potential stops at both Mokumanamana and Nihoa if weather and schedule allows. To accomplish this activity, the applicant will utilize a newly developed survey method called Productivity and Carrying Capacity surveys (“PACC”), which focuses on the effects of seasonal changes in habitat on patterns of reproductive cycles, recruitment, and productivity of rocky intertidal communities. The work generated will be used to develop a sustainable fishery model for evaluating species productivity on any intertidal coastline in Hawai‘i.

The applicant and permitted personnel will utilize traditional observational practices through the Huli‘ia process while additionally recording substrate type, limu presence/density, crustose/turf/macro algae proportions, other species ratios, clumping of ‘opihi and hā‘uke‘uke, presence of natural predators, other intertidal species, and other intertidal information. Additional sampling of gonads for ‘opihi (*Cellana exarata*, *C. sandwicensis*) and hā‘uke‘uke (*Colobocentrotus atratus*) will be done to determine fecundity-at-size. Select samples are requested to be brought back for analysis at UH Mānoa using a 10% buffered formalin. Shells will also be saved for analysis of growth rates.

The applicant is also requesting to consume intertidal resources, collect limu for consumption, and to subsist and sustenance fish by trolling using handlines and/or other hook and trolling equipment to further support the cultural practice and relationship between participants and Papahānaumokuākea. Vessel operations will be covered under OHA’s authority per the Co-managers permit. These studies will add onto the eleven (11) years of data on intertidal species, re-establishing Native Hawaiian ancestral consciousness and awareness about the health and condition of marine resources. Collections list for individual species below:

Collections List

of individuals & size of specimens:

1. ‘A‘ama (Thin-shelled rock crab, *Grapsus tenuicrustatus*):
 - a. Up to 24 per island/location, total up to 48
 - b. 3 inches or larger
2. Makaloa (Spotted drupe, *Drupa ricina*)
 - a. Up to 24 per island/location, total up to 48
 - b. ½ inch or larger
3. Pipipi (Black Nerite, *Nerita picea*)
 - a. Up to 24 per island/location, total up to 48
 - b. ½ inch or larger
4. Pūpū ‘Awa (Open Drupe, *Thais aperta* (formally *Purpura aperta*))
 - a. Up to 24 per island/location, total up to 48
 - b. ½ inch or larger
5. Hā‘uke‘uke (Helmet urchin, *Colobocentrotus atratus*)
 - a. Up to 30 per island/location for a total up to 60

- b. 3cm or larger
- 6. Makaiauli (Black-Foot ‘Opihi, *Cellana exarata*)
 - a. Up to 40 per island/location, up to 80
 - b. 1 ¼ inch or larger
- 7. ‘Ālinalina (Yellow-Foot ‘Opihi, *Cellana sandwicensis*)
 - a. Up to 40 per island/location, up to 80
 - b. 1 ¼ inch or larger
- 8. He‘e Mauli / He‘e Pali (Day Octopus / Cliff Octopus, *Octopus cyanea/Octopus oliveri*)
 - a. Up to 2 individuals per island
 - b. 1 lb or heavier, per State regulations
- 9. Leho Ahi (Humpback Cowry, *Cypraea mauritiana*)
 - a. Up to 12 per i per island/location, Up to 24
 - b. 2 inches or larger
- 10. Pūpū – (Intermediate Drupe, *Thais intermedia*)
 - a. Up to 24 per island/location, up to 48
 - b. 1 inch or larger
- 11. Limu Kohu
 - a. Up to 1 small “snack size” ziploc full (approx. 100g) per island
- 12. Pālahalaha
 - a. Up to 1 small “snack size” ziploc full (approx. 100g) per island
- 13. Līpe‘epe‘e
 - a. Up to 1 small “snack size” ziploc full (approx. 100g) per island

To safeguard Monument resources, the applicant will harvest from various places along the shoreline to be mindful of harvest pressure on one rock. The applicant has also attended and completed the 2019 Resource Monitor Training and has ample experience at the locations proposed over multiple trips. Applicant would additionally abide by the following PMNM Best Management Practices (BMPs) while conducting the aforementioned activities within the PMNM: Best Management Practices for Boat Operations and Diving Activities (BMP #004); General Storage and Transport Protocols for Collected Samples (BMP #006); Marine Wildlife Viewing Guidelines (BMP #010); and Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment (BMP #011).

The applicant’s proposed activities directly support the Marine Conservation Science (MCS) Monument Management Plan Action Plan activities:

MCS-1.1: Continue to characterize types and spatial distributions of shallow-water marine habitats to inform protection and management efforts.

MCS-1.2: Continue monitoring of shallow-water coral reef ecosystems to protect ecological integrity.

NHCH 2.3: Facilitate cultural field research and cultural education opportunities annually;

NHCH 2.6: Continue to facilitate Native Hawaiian cultural access.

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

- Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving monument resource
- Anchoring a vessel
- Possessing fishing gear except when stowed and not available for immediate use during passage without interruption through the Monument
- 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

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 the environment (genealogy).

Project Background

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-yearold ‘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.

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, the 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, the researchers/team 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, the 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. The 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, the 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, the researchers/team have learned valuable lessons about both the productivity of the 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, the team has developed a unique research approach - made possible through the contributions of these multiple perspectives, considerations, and relationships. This journey provides the researchers/team 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 Hawaiian people, the environment, and a thriving relationship between the two entities. Building on recent research, the understanding of place changes by season and across multiple landscapes. The researchers/team have developed a modified survey to look at the role of different habitat types, and the influence of environment on the carrying capacity of the intertidal fishery. Based on a shared goal of a productive and sustainable fishery, the latest series of questions have led the researchers/team to identify management strategies that can maximize replenishment in these rocky intertidal ecosystems. The researchers/team 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.

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 the researchers/team can understand a shoreline’s stable habitat (habitat size and population densities at its minimum normally during the seasonal dieback), the researchers/team can understand that shoreline’s stable carrying capacity of ‘opihī. 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. The research team will train and work with local and Native Hawaiian communities to build local research capacity by surveying their intertidal ecosystems.

These activities will additionally 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 'opihī 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 ‘opihī 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.

Procedures/Methods:

The cultural research team would make visual assessments of intertidal areas where ‘opihī 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 ‘opihī, 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, the crew would require access to nearshore areas (below the splash zone) that contain ‘opihī 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.

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, the researchers/team will be mindful to harvest individuals that are larger than the legal-size limit of 1-1/4 inches (shell diameter) or 1/2 inch (meat diameter, if meat only), as well as to leave larger 'opihi alone as they are believed to be more fecund. The researchers/team 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 the researchers/team 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. The researchers/team believe that two traditionally harvested and prepared individuals of each invert species (see "Collections list") per person and a total of one "mini snack-sized zip lock bag" approximately 100 grams of limu (see "Collections list") is appropriate to harvest per island.

Appropriate oli/mele will be conducted prior to arrival and departure on each island to introduce the researchers/team and the pono intentions as well as to thank each island for their contributions. The researchers/team 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, makalua, he'e, and leho. 'Opihi will be gathered by hand using an 'opihi knife, and the researchers/team will be mindful to harvest individuals that are larger than the legal-size limit of 1-1/4 inches (shell diameter) or 1/2 inch (meat diameter, if meat only), as well as to leave larger 'opihi alone as they are believed to be more fecund.

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. The researchers/team 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.

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. This 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 researchers/team will 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. The researchers/team 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, the researchers/team 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 opihi 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 1 μ m 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, the researchers/team 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.

The researchers/team 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 the 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 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, the researchers/team 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, the researchers/team 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 the islands.

Cultural Protocol

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 reestablish 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 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.

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.

REVIEW PROCESS:

The permit application was sent out for review and comment to the following scientific and cultural entities: Hawaii Division of Aquatic Resources, Hawaii Division of Forestry and Wildlife, Papahānaumokuākea Marine National Monument (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO), United States Fish and Wildlife Service and Pacific Islands National Wildlife Refuge Complex Office (USFWS), and the Office of Hawaiian Affairs (OHA). In addition, the permit application has been posted on the Monument Web site since March, 2020, giving the public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument's Public Notification Policy.

MMB Agency Reviewer Questions and Applicant Responses:

*Note: Several review questions pertaining to land access on Nihoa were removed to avoid confusion, see question 7 below.

1. Will limu consumption occur on land only, or will collections be brought to the boat for preparation? Extra precautions must be in place to prevent the spread of invasive algae.
 - a. Limu consumption will occur on the vessel if gathering is done. The limu mostly gathered would be limu kohu which needs some preparation prior to serving. Limu picked is very selective and eliminates most opportunities for invasive limu to spread. Preparation includes a thorough cleaning and a long soak in fresh water. These are also precautionary actions to prevent the spread of invasive limu.
2. The application identified 12 days needed in PMNM in the summary section but 15 days in on page 14. Please confirm how many days are proposed for this activity.
 - a. The 15 days mentioned on page 14 are referring to the time allotted for the entire voyage with days in transit outside of the monument (Oahu to Middle bank and return).
3. What methods will be used for an indicator-based approach? Does the applicant intend to publish?
 - a. The method used for indicator-based approach is called Huli'ia developed by our organization and used to provide support to many communities across the pae'aina. We supported Kure Atoll to complete their own seasonal calendar through our Huli'ia methods and are currently working with Midway atoll supporting their collection of this data.
 - b. Not intending to publish at this time
4. On page 6 (bottom) it states they will refrain from collecting animals if populations appear too small, but is there a minimum number or density they can consider?

- a. Through our PACC methods, we are currently looking at carrying capacity and how many individuals are too much for a specific area to carry. As we continue this research we base our collection judgement on our 12 years of experience in understanding not only population size at different months of the year, but the size of an individual, size of available habitat, and the number of recruits in the area. Large numbers of legal sized 'opihi at the end of Spring going into summer would allow us to harvest some since the habitat is at its largest area of the year and recruitment is most likely. Removing some of the legal sized individuals (leaving large important producers) will allow recruits to survive with less competition for space and gain an advantage to grow into adulthood, reproduce, and contribute to genetic diversity. Based on our 12 years of experience conducting intertidal research on these specific islands, we know that habitat size will begin to shrink over the next 6-8 months (summer calm season) and the population will sometimes decrease to half $\frac{1}{2}$, if not $\frac{3}{4}$, of its size compared to its peak productive season.
 - b. We are working on narrowing down that minimum number or density but that will take a couple more years of understanding seasonal habitat growth and shrinkage dependent on shoreline type, directional exposure, wave intensity exposure, sunlight exposure, and freshwater. We have some great information and are final steps to be able to provide well-informed advice to management and regulations. From past monitoring data, the numbers for permitted harvesting account for less than 1% of the population.
5. On page 12 (middle), it says they will be mindful to leave 'larger 'opihi alone'. What is the larger size that they would leave alone?
- a. Through studying gonad production and spawning seasons in North Kona over a period of 4 years, we've found that 'opihi increase productivity as they get bigger (like other marine species). Though every shoreline has different growth rates and growth max sizes per species, we've found that gonad weight doubles for both the Makaiauli (Black foot) and the Alinalina (Yellow foot) between F size class (50-60 cm) and G size class (60-70 cm). We would refrain from taking 'opihi over 60 cm. Koele, the third species, is not known to be found in the monument. We acknowledge the importance of large important producers and therefore, will target 'opihi of smaller sizes (<60cm) which are also more abundant.
6. On page 15 (bottom) it says they will refrain from harvesting if inverts or algae populations are too low. What is too low?
- a. Again, our intertidal is complex and have so many variables to consider when we look at productive systems. As we continue research to pinpoint specific numbers, we base our collective judgement on our 12 years of experience in understanding the intertidal zone. Limu are like plants and do best, productively, when "pruned" correctly (pinching or cutting tops leaving hard-fast, etc). Other invertebrates listed to harvest would be based on population size, if there was a recent

recruitment (carrying capacity and competition for survival like ‘opihi), and seasonal considerations of habitat size. Like ‘opihi, “grazing” land changes over the year and as habitat shrinks, a lot of grazers will face natural deaths due to shrinking habitat and lack of food. We find that the larger individuals remain while new recruits do not. Utilizing this information with harvesting and understanding carrying capacity of these growing and shrinking habitats, could actually boost productivity.

7. Under 5a, Nihoa, Mokumanamana and FFS are marked but on page 14 they only reference activities at Nihoa and FFS in terms of duration. Could the applicant clarify their intent to conduct activities at Mokumanamana or not?
 - a. We are focusing and planning activities on FFS and Nihoa. Because we will be sailing past Mokumanamana and it is an extremely important cultural site as a boundary between ao and po, our crew hopes to have the time to engage and correspond with Mokumanamana. We do not foresee a time allotted to conduct intertidal surveys but we will be documenting our observations using the Huli‘ia methodology.

COMMENTS / RECOMMENDATIONS:

1. Since the application is proposing to conduct sustenance and subsistence fishing the deep-water boxes should be marked in the location section.
2. NMFS has no comments on this application.
3. The USFWS thanks you for having Resource Monitors as part of your expedition crew.
4. Please be aware of the recent outbreak of invasive algae at Pearl and Hermes. New Best Management Practices must be followed to mitigate the risk of spread to other locations.
 - a. Noted. Our crew will be made aware of the invasive algae outbreaks on P&H.
5. A de-hooker must be on board along with an experienced operator in the event a shark is caught.
6. Due to a DOI Secretarial Order, drone (UAS) use will not be permitted over USFWS managed lands or waters unless the order is reversed prior to conducting activities.
7. The USFWS recommends approval of this permit.
8. DAR requests the following condition to be included in the permit, (if this is not already stated in the permit conditions or BMPs): *Permittee will implement collection/sampling design that removes a sustainable proportion from the local population of target organisms and make efforts to distribute collection activities across shoreline/reef*

flat/benthic areas, so as not to consolidate the impacts of collection in one location (if applicable/if collecting samples).

- a. Yes of course! Mahalo nui.

Comments received from the Native Hawaiian community are summarized as follows:

Cultural reviews support the acceptance of this application.

Comments received from the public are summarized as follows:

No comments were received from the public on this application.

Additional reviews and permit history:

Are there other relevant/necessary permits or environmental reviews that have or will be issued with regard to this project? (e.g. MMPA, ESA, EA) Yes No

If so, please list or explain:

Other Consultations: (ESA/MMPA Section 7; NHPA Section 106, etc.)

- A request to the National Marine Fisheries Service (NMFS) for Section 7 informal consultation coverage pursuant to the Endangered Species Act of 1973 was completed on March 25, 2021. Based on the limited nature of the proposed activity, NOAA NMFS concurs with the ONMS assessment that permit PMNM 2021-009 would be within the scope of the PMNM programmatic consultation; therefore, NMFS concurs with the ONMS' determination of may affect, but not likely to adversely affect for the actions that will be covered under the proposed permit, PMNM 2021-009 Andrade. ONMS' consultation requirements under Section 7 of the ESA have been met and no further consultation under the ESA is required for this action.
- An informal review of all aforementioned activities following section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 U.S.C. 1855(b)) was completed on March 25, 2021 by NOAA National Marine Fisheries Service (NMFS) Pacific Islands Regional Office (PIRO) for the Habitat Conservation Division. NMFS is concerned that there is the potential for the unavoidable loss of EFH from physical damage, and degradation of the quality of EFH from exposure to chemical contaminants, pollution, and waste and discharge. NMFS expects that many potential adverse effects from the proposed activity will be reduced due to implementation of the Monument-imposed BMPs. However, to further avoid and minimize the risk to EFH in the project area, NMFS offers the conservation recommendations to be added as Special Conditions below:
 - *Conservation Recommendation 1:* To avoid physical damage to corals during transit to and from Nihoa and FFS, a spotter should be placed in the bow of the dingy to watch for exposed or near surface coral heads.

- *Conservation Recommendation 2:* Measures should be implemented to prevent detergents and other cleaners from being washed overboard.

The Department has made an exemption determination for this permit in accordance chapter 343, HRS, and Chapter 11-200, HAR. See Attachment (“DECLARATION OF EXEMPTION FROM THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT UNDER THE AUTHORITY OF CHAPTER 343, HRS AND CHAPTER 11-200 HAR, FOR PAPAĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT NATIVE HAWAIIAN PRACTICES PERMIT TO PELIKA ANDRADE, NĀ MAKA ONAONA (FORMERLY NĀ MAKA O PAPAĀNAUMOKUĀKEA) AND THE UNIVERSITY OF HAWAI‘I AT MĀNOA, FOR ACCESS TO STATE WATERS TO USE TRADITIONAL ECOLOGICAL KNOWLEDGE TO CONDUCT INTERTIDAL SURVEYS AND MONITORING TO ADVISE AND DIRECT MANAGEMENT STRATEGIES FOR INTERTIDAL FISHERIES ACTIVITIES UNDER PERMIT PMNM-2021-009”)

Has Applicant been granted a permit from the State in the past? Yes No

If so, please summarize past permits:

Have there been any a) violations: Yes No

 b) Late/incomplete post-activity reports: Yes No

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

Monument permits have been issued to the co-researcher working on the project, Kim Kanoe‘ulalani Morishige, for similar activities in 2011 and 2012 (PMNM-2011-040, PMNM-2012-052, PMNM-2014-020, PMNM-2015-017, PMNM-2015-017 A1, and PMNM-2017-024 respectively).

Similar activities, including cultural monitoring activities on land and intertidal areas, have been previously permitted in the Monument for different applicants (PMNM-2007- 024 Kanahale, PMNM-2008-041 Kikiloi-Graves, PMNM-2009-021 Kikiloi-Graves, PMNM-2009-023 Kanahale, PMNM-2009-047 Kawelo, PMNM-2011-036 Kanahale, PMNM-2011-039 Kikiloi-Graves, PMNM-2011-040 Tom, PMNM-2012-038 Anthony, PMNM-2012-052 Springer, PMNM-2013-026 Anthony, and pending applications PMNM-2015-014 Kikiloi and PMNM-2015-022 Kanahale. Personnel that would be participating in these activities have participated in past approved permitted activities previously listed.

STAFF OPINION:

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

MONUMENT MANAGEMENT BOARD OPINION:

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

RECOMMENDATION:

Based on the attached proposed declaration of exemption prepared by the department after consultation with and advice of those having jurisdiction and expertise for the proposed permit actions:

1. That the Board declare that the actions which are anticipated to be undertaken under this permit will have little or no significant effect on the environment and is therefore exempt from the preparation of an environmental assessment.
2. Upon the finding and adoption of the department's analysis by the Board, that the Board delegate and authorize the Chairperson to sign the declaration of exemption for purposes of recordkeeping requirements of chapter 343, HRS, and chapter 11-200, HAR.
3. That the Board authorize and approve a Native Hawaiian Practices Permit to Pelika Andrade, Nā Maka Onaona (Formerly Nā Maka o Papahānaumokuākea) and University of Hawai'i at Mānoa, with the following special conditions:
 - a. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocol attached to this permit.
 - b. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.
 - c. Refueling of tenders and all small vessels must be done at the support ships and outside the confines of lagoons or near-shore waters in the State Marine Refuge.
 - d. No fishing is allowed in State Waters except as authorized under state law for subsistence, traditional, and customary practices by Native Hawaiians.
 - e. If there is any Hawaiian monk seal or any other protected species in the area when performing any permitted activity shall cease until the animal(s) depart the area, except as permitted for specific management of that species.
 - f. For all activities requiring landing on uninhabited islands an authorized staff escort trained for each particular inhabited island will be included on the landing team.

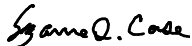
- g. The permittee is required to follow all applicable Federal, State, and County laws with respect to the COVID-19 emergency response that apply at the time of departure and return. In issuance of this permit, the State of Hawaii is not otherwise monitoring or regulating permittee's compliance with COVID-19 laws and is not responsible for the health and safety of crew members, researchers or other occupants of the vessel associated with this permit.

Respectfully submitted,



Brian J. Neilson, Administrator
Division of Aquatic Resources

APPROVED FOR SUBMITTAL

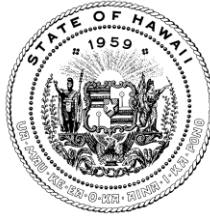


Suzanne D. Case, Chairperson
Board of Land and Natural Resources

Attachments:

- 1) Declaration of Exemption ("DE") from the Preparation of an Environmental Assessment under the Authority of Chapter 343, HRS & Chapter 11-200 HAR
- 2) PMNM Application
- 3) PMNM Compliance Information Sheet ("CIS Form")

DAVID Y. IGE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

SUZANNE D. CASE
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
FIRST DEPUTY

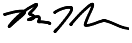
M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

April 23, 2021

TO: Division of Aquatic Resources File

THROUGH: Suzanne D. Case, Chairperson

FROM: Brian J. Neilson, Administrator 
Division of Aquatic Resources

SUBJECT:

DECLARATION OF EXEMPTION FROM THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT UNDER THE AUTHORITY OF CHAPTER 343, HRS AND CHAPTER 11-200 HAR, FOR A PAPAĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT NATIVE HAWAIIAN PRACTICES PERMIT TO PELIKA ANDRADE, NĀ MAKA ONAONA (FORMERLY NĀ MAKA O PAPAĀNAUMOKUĀKEA) AND THE UNIVERSITY OF HAWAI'I AT MĀNOA, FOR ACCESS TO STATE WATERS TO USE TRADITIONAL ECOLOGICAL KNOWLEDGE TO CONDUCT INTERTIDAL SURVEYS AND MONITORING TO ADVISE AND DIRECT MANAGEMENT STRATEGIES FOR INTERTIDAL FISHERIES ACTIVITIES UNDER PERMIT PMNM-2021-009.

The following permitted activities are found to be exempted from preparation of an environmental assessment under the authority of Chapter 343, HRS and Chapter 11-200, HAR:

Project Title: Papahānaumokuākea Marine National Monument Native Hawaiian Practices Permit to Pelika Andrade, Nā Maka Onaona (Formerly Nā Maka o Papahānaumokuākea) and the University of Hawai'i at Mānoa, for Access to State Waters to use Traditional Ecological Knowledge to Conduct Intertidal Surveys and Monitoring to Advise and Direct Management Strategies for Intertidal Fisheries Activities.

Permit Number: PMNM-2021-009

Project Description: The applicant, Pelika Andrade of Nā Maka Onaona (Formerly Nā Maka o Papahānaumokuākea) and the University of Hawai'i at Mānoa, is proposing to support sustainable fisheries and aina momona through continuing intertidal surveys and monitoring across the archipelago to advise and direct management strategies which support intertidal fishery productivity, specifically 'ōpihi, during expeditions planned between May 2021 and May 2022. This research is a natural continuation of previous intertidal ecosystem studies, surveys and monitoring (with a variation on the

research question), that have been the conducted by the co-researcher working on the project, Kim Kanoe‘ulalani Morishige, and many other researchers affiliated with similar expeditions in the past eleven (11) years. This project will be done in conjunction and collaboration with Kane PMNM-2021-008 and the Office of Hawaiian Affairs (OHA). It will focus on the intertidal and marine ecosystems at Lalo (French Frigate Shoals), with potential stops at both Mokumanamana and Nihoa if weather and schedule allows. To accomplish this activity, the applicant will utilize a newly developed survey method called Productivity and Carrying Capacity surveys (“PACC”), which focuses on the effects of seasonal changes in habitat on patterns of reproductive cycles, recruitment, and productivity of rocky intertidal communities. The work generated will be used to develop a sustainable fishery model for evaluating species productivity on any intertidal coastline in Hawai‘i.

The applicant and permitted personnel will utilize traditional observational practices through the Huli‘ia process while additionally recording substrate type, limu presence/density, crustose/turf/macro algae proportions, other species ratios, clumping of ‘opihi and hā‘uke‘uke, presence of natural predators, other intertidal species, and other intertidal information. Additional sampling of gonads for ‘opihi (*Cellana exarata*, *C. sandwicensis*) and hā‘uke‘uke (*Colobocentrotus atratus*) will be done to determine fecundity-at-size. Select samples are requested to be brought back for analysis at UH Mānoa using a 10% buffered formalin. Shells will also be saved for analysis of growth rates.

The applicant is also requesting to consume intertidal resources, collect limu for consumption, and to subsist and sustenance fish by trolling using handlines and/or other hook and trolling equipment to further support the cultural practice and relationship between participants and Papahānaumokuākea. Vessel operations will be covered under OHA’s authority per the Co-managers permit. These studies will add onto the eleven (11) years of data on intertidal species, re-establishing Native Hawaiian ancestral consciousness and awareness about the health and condition of marine resources. Collections list for individual species below:

Collections List

of individuals & size of specimens:

1. ‘A‘ama (Thin-shelled rock crab, *Grapsus tenuicrustatus*):
 - a. Up to 24 per island/location, total up to 48
 - b. 3 inches or larger
2. Makaloa (Spotted drupe, *Drupa ricina*)
 - a. Up to 24 per island/location, total up to 48
 - b. ½ inch or larger
3. Pipipi (Black Nerite, *Nerita picea*)
 - a. Up to 24 per island/location, total up to 48
 - b. ½ inch or larger
4. Pūpū ‘Awa (Open Drupe, *Thais aperta* (formally *Purpura aperta*))
 - a. Up to 24 per island/location, total up to 48
 - b. ½ inch or larger
5. Hā‘uke‘uke (Helmet urchin, *Colobocentrotus atratus*)
 - a. Up to 30 per island/location for a total up to 60
 - b. 3cm or larger
6. Makaiauli (Black-Foot ‘Opihi, *Cellana exarata*)
 - a. Up to 40 per island/location, up to 80

- b. 1 ¼ inch or larger
- 7. 'Ālinalina (Yellow-Foot 'Opihi, *Cellana sandwicensis*)
 - a. Up to 40 per island/location, up to 80
 - b. 1 ¼ inch or larger
- 8. He'e Maui / He'e Pali (Day Octopus / Cliff Octopus, *Octopus cyanea/Octopus oliveri*)
 - a. Up to 2 individuals per island
 - b. 1 lb or heavier, per State regulations
- 9. Leho Ahi (Humpback Cowry, *Cypraea mauritiana*)
 - a. Up to 12 per i per island/location, Up to 24
 - b. 2 inches or larger
- 10. Pūpū – (Intermediate Drupe, *Thais intermedia*)
 - a. Up to 24 per island/location, up to 48
 - b. 1 inch or larger
- 11. Limu Kohu
 - a. Up to 1 small “snack size” ziploc full (approx. 100g) per island
- 12. Pālahalaha
 - a. Up to 1 small “snack size” ziploc full (approx. 100g) per island
- 13. Līpe'epe'e
 - a. Up to 1 small “snack size” ziploc full (approx. 100g) per island

To safeguard Monument resources, the applicant will harvest from various places along the shoreline to be mindful of harvest pressure on one rock. The applicant has also attended and completed the 2019 Resource Monitor Training and has ample experience at the locations proposed over multiple trips. Applicant would additionally abide by the following PMNM Best Management Practices (BMPs) while conducting the aforementioned activities within the PMNM: Best Management Practices for Boat Operations and Diving Activities (BMP #004); General Storage and Transport Protocols for Collected Samples (BMP #006); Marine Wildlife Viewing Guidelines (BMP #010); and Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment (BMP #011).

The applicant’s proposed activities directly support the Marine Conservation Science (MCS) Monument Management Plan Action Plan activities:

MCS-1.1: Continue to characterize types and spatial distributions of shallow-water marine habitats to inform protection and management efforts.

MCS-1.2: Continue monitoring of shallow-water coral reef ecosystems to protect ecological integrity.

NHCH 2.3: Facilitate cultural field research and cultural education opportunities annually;

NHCH 2.6: Continue to facilitate Native Hawaiian cultural access.

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

- Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving monument resource
- Anchoring a vessel
- Possessing fishing gear except when stowed and not available for immediate use during passage without interruption through the Monument

- 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

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 the environment (genealogy).

Minimization of Impact (Note: See BLNR Submittal for more Project Background info)

The cultural research team would make visual assessments of intertidal areas where ‘opihi and ha‘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, the 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.

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, the researchers/team will be mindful to harvest individuals that are larger than the legal-size limit of 1-1/4 inches (shell diameter) or 1/2 inch (meat diameter, if meat only), as well as to leave larger ‘opihi alone as they are believed to be more fecund. The researchers/team 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 the

researchers/team 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. The researchers/team believe that two traditionally harvested and prepared individuals of each invert species (see “Collections list”) per person and a total of one “mini snack-sized zip lock bag” approximately 100 grams of limu (see “Collections list”) is appropriate to harvest per island.

Appropriate oli/mele will be conducted prior to arrival and departure on each island to introduce the researchers/team and the pono intentions as well as to thank each island for their contributions. The researchers/team 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 the researchers/team will be mindful to harvest individuals that are larger than the legal-size limit of 1-1/4 inches (shell diameter) or 1/2 inch (meat diameter, if meat only), as well as to leave larger ‘opihi alone as they are believed to be more fecund. To ensure responsible and ethical practices, the researchers/team 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 the islands.

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. The researchers/team 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.

MMB Agency Reviewer Questions and Applicant Responses:

*Note: Several review questions pertaining to land access on Nihoa were removed to avoid confusion, see question 7 below.

1. Will limu consumption occur on land only, or will collections be brought to the boat for preparation? Extra precautions must be in place to prevent the spread of invasive algae.
 - a. Limu consumption will occur on the vessel if gathering is done. The limu mostly gathered would be limu kohu which needs some preparation prior to serving. Limu picked is very selective and illiminates most opportunities for invasive limu to spread. Preparation

includes a thorough cleaning and a long soak in fresh water. These are also precautionary actions to prevent the spread of invasive limu.

2. The application identified 12 days needed in PMNM in the summary section but 15 days in on page 14. Please confirm how many days are proposed for this activity.
 - a. The 15 days mentioned on page 14 are referring to the time allotted for the entire voyage with days in transit outside of the monument (Oahu to Middle bank and return).

3. What methods will be used for an indicator-based approach? Does the applicant intend to publish?
 - a. The method used for indicator-based approach is called Huli'ia developed by our organization and used to provide support to many communities across the pae'aina. We supported Kure Atoll to complete their own seasonal calendar through our Huli'ia methods and are currently working with Midway atoll supporting their collection of this data.

 - b. Not intending to publish at this time

4. On page 6 (bottom) it states they will refrain from collecting animals if populations appear too small, but is there a minimum number or density they can consider?
 - a. Through our PACC methods, we are currently looking at carrying capacity and how many individuals are too much for a specific area to carry. As we continue this research we base our collection judgement on our 12 years of experience in understanding not only population size at different months of the year, but the size of an individual, size of available habitat, and the number of recruits in the area. Large numbers of legal sized 'opihi at the end of Spring going into summer would allow us to harvest some since the habitat is at its largest area of the year and recruitment is most likely. Removing some of the legal sized individuals (leaving large important producers) will allow recruits to survive with less competition for space and gain an advantage to grow into adulthood, reproduce, and contribute to genetic diversity. Based on our 12 years of experience conducting intertidal research on these specific islands, we know that habitat size will begin to shrink over the next 6-8 months (summer calm season) and the population will sometimes decrease to half $\frac{1}{2}$, if not $\frac{3}{4}$, of its size compared to its peak productive season.

- b. We are working on narrowing down that minimum number or density but that will take a couple more years of understanding seasonal habitat growth and shrinkage dependent on shoreline type, directional exposure, wave intensity exposure, sunlight exposure, and freshwater. We have some great information and are final steps to be able to provide well-informed advice to management and regulations. From past monitoring data, the numbers for permitted harvesting account for less than 1% of the population.

- 5. On page 12 (middle), it says they will be mindful to leave 'larger 'opihi alone'. What is the larger size that they would leave alone?
 - a. Through studying gonad production and spawning seasons in North Kona over a period of 4 years, we've found that 'opihi increase productivity as they get bigger (like other marine species). Though every shoreline has different growth rates and growth max sizes per species, we've found that gonad weight doubles for both the Makaiauli (Black foot) and the Alinalina (Yellow foot) between F size class (50-60 cm) and G size class (60-70 cm). We would refrain from taking 'opihi over 60 cm. Koele, the third species, is not known to be found in the monument. We acknowledge the importance of large important producers and therefore, will target 'opihi of smaller sizes (<60cm) which are also more abundant.

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 - a. Noted. Our crew will be made aware of the invasive algae outbreaks on P&H.
5. A de-hooker must be on board along with an experienced operator in the event a shark is caught.
6. Due to a DOI Secretarial Order, drone (UAS) use will not be permitted over USFWS managed lands or waters unless the order is reversed prior to conducting activities.
7. The USFWS recommends approval of this permit.

8. DAR requests the following condition to be included in the permit, (if this is not already stated in the permit conditions or BMPs): *Permittee will implement collection/sampling design that removes a sustainable proportion from the local population of target organisms and make efforts to distribute collection activities across shoreline/reef flat/benthic areas, so as not to consolidate the impacts of collection in one location (if applicable/if collecting samples).*

- a. Yes of course! Mahalo nui.

Comments received from the Native Hawaiian community are summarized as follows:

Cultural reviews support the acceptance of this application.

Comments received from the public are summarized as follows:

No comments were received from the public on this application.

Additional reviews and permit history:

Are there other relevant/necessary permits or environmental reviews that have or will be issued with regard to this project? (e.g. MMPA, ESA, EA) Yes No

If so, please list or explain:

Other Consultations: (ESA/MMPA Section 7; NHPA Section 106, etc.)

- A request to the National Marine Fisheries Service (NMFS) for Section 7 informal consultation coverage pursuant to the Endangered Species Act of 1973 was completed on March 25, 2021. Based on the limited nature of the proposed activity, NOAA NMFS concurs with the ONMS assessment that permit PMNM 2021-009 would be within the scope of the PMNM programmatic consultation; therefore, NMFS concurs with the ONMS' determination of may affect, but not likely to adversely affect for the actions that will be covered under the proposed permit, PMNM 2021-009 Andrade. ONMS' consultation requirements under Section 7 of the ESA have been met and no further consultation under the ESA is required for this action.

- An informal review of all aforementioned activities following section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA; 16 U.S.C. 1855(b)) was completed on March 25, 2021 by NOAA National Marine Fisheries Service (NMFS) Pacific Islands Regional Office (PIRO) for the Habitat Conservation Division. NMFS is concerned that there is the potential for the unavoidable loss of EFH from physical damage, and degradation of the quality of EFH from exposure to chemical contaminants, pollution, and waste and discharge. NMFS expects that many potential adverse effects from the proposed activity will be reduced due to implementation of the Monument-imposed BMPs. However, to further avoid and minimize the risk to EFH in the project area, NMFS offers the conservation recommendations to be added as Special Conditions below:
 - *Conservation Recommendation 1:* To avoid physical damage to corals during transit to and from Nihoa and FFS, a spotter should be placed in the bow of the dingy to watch for exposed or near surface coral heads.
 - *Conservation Recommendation 2:* Measures should be implemented to prevent detergents and other cleaners from being washed overboard.

This activity is exempt from the preparation of an environmental assessment under the Authority of Chapter 343, HRS and Chapter 11-200, HAR. In accordance with the revised Exemption List For The Department Of Land And Natural Resources (Concurred on by the Environmental Council on November 10, 2020), this activity does not require a declaration of exemption or “exemption notice” as this activity falls under “**Part 1**” of its exemption class. This revision separates exemption lists into categories listed in §11-200.1-16 (a)(1) and (2). Activities categorized as “**Part 1**” will fall under §11-200.1-16 (a) (1). **Activities categorized as “Part 2” will require an exemption notice** and fall under §11-200.1-16 (a) (2). However, in order to be transparent for BLNR review purposes, this exemption notice had been drafted.

Consulted Parties: The permit application was sent out for review and comment to the following scientific and cultural entities: Hawaii Division of Aquatic Resources, Hawaii Division of Forestry and Wildlife, Papahānaumokuākea Marine National Monument (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO), United States Fish and Wildlife Service Hawaiian and Pacific Islands National Wildlife

Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application has been posted on the Monument Web site, giving the public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument's Public Notification Policy.

Exemption Determination: After reviewing §11-200-8, HAR, including the criteria used to determine significance under §11-200-12, HAR, DLNR has concluded that the activities under this permit would have minimal or no significant effect on the environment and that issuance of the permit is categorically exempt from the requirement to prepare an environmental assessment based on the following analysis:

1. All activities associated with this permit have been evaluated as a single action. Since this permit involves an activity that is precedent to a later planned activity, i.e., the same study methodology used throughout the permit period, the categorical exemption determination here will treat all planned activities as a single action under §11-200-7, HAR.

2. The General Exemption Type #5 for Basic Data Collection, Research and Experimental Management with no Serious or Major Environmental Disturbance Appears to Apply. §11-200.1-16 (a) (1) and §11-200.1-16 (a) (2), HAR, exempts the class of actions that involve "basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource." This exemption type has been interpreted to include the intertidal surveys and monitoring and the collection and analysis of opihi and reproductive biology, such as those being proposed.

The proposed activities here appear to fall squarely under the general exemption type identified under HAR §11-200.1-16 (a) (1) and as described under the revised 2020 DLNR Exemption List (Concurred on by the Environmental Council on November 10, 2020), under the general exemption type #5 (Part 1), item #15, which includes, the conducting of "game and non-game wildlife surveys, vegetation and rare plant surveys, aquatic life surveys, inventory studies, new transect lines, photographing, recording, sampling, collection, culture, and captive propagation."

The General Exemption Type #8 for Continuing Administrative Activities Appears to Apply. §11-200.1-16 (a) (1), HAR, exempts the class of actions that involve "continuing administrative activities." This exemption type have been interpreted to include educational activities consisting of a cultural curriculum, such as those being proposed.

The proposed activities here appear to fall squarely under the general exemption type identified under HAR §11-200.1-16 (a) (1) and as described under the revised 2020 DLNR Exemption List (Concurred on by the Environmental Council on November 10, 2020), under the general exemption type #8 (Part 1), item #5, which includes, "training, environmental interpretation, public safety efforts and other educational activities."

As discussed below, no significant disturbance to any environmental resource is anticipated. Thus, so long as the below considerations are met, an exemption class should include the action now contemplated.

3. Cumulative Impacts of Actions in the Same Place and Impacts with Respect to the Potentially Particularly Sensitive Environment Will Not be Significant. Even where a categorical exemption appears to include a proposed action, the action cannot be declared exempt if "the cumulative impact of planned

successive actions in the same place, over time, is significant, or when an action that is normally insignificant in its impact on the environment may be significant in a particularly sensitive environment.” HAR § 11-200-8.B. To gauge whether a significant impact or effect is probable, an exempting agency must consider every phase of a proposed action, any expected primary and secondary consequences, the long-term and short-term effects of the action, the overall and cumulative effect of the action, and the sum effects of an action on the quality of the environment. HAR § 11-200-12. Examples of actions which commonly have a significant effect on the environment are listed under HAR § 11-200-12.

Monument permits have been previously issued to the co-researcher working on the project (most recently 2018) in State Waters, and several permits have been issued to various researchers since 2011 for similar types of intertidal studies. There were no deleterious effects from the previous expeditions. With this in mind, significant cumulative impacts are not anticipated as a result of this activity, and numerous safeguards further ensure that the potentially sensitive environment of the project area will not be significantly affected. All activities will be conducted in a manner compatible with the management direction of the Monument Proclamation in that the activities do not diminish, but rather enhance monument resources, qualities, and ecological integrity, or have any indirect, secondary, cultural, or cumulative effects. The joint permit review process did not reveal any anticipated indirect or cumulative impacts, nor did it raise any cultural concerns, that would occur as a result of these activities.

Since no significant cumulative impacts or significant impacts with respect to any particularly sensitive aspect of the project area are anticipated, the categorical exemptions identified above should remain applicable.

4. Overall Impacts will Probably be Minimal and Insignificant.

Again, any foreseeable impacts from the proposed activity will probably be minimal, and further mitigated by general and specific conditions attached to the permit. Specifically, all research activities covered by this permit will be carried out with strict safeguards for the natural, historic, and cultural resources of the Monument as required by Presidential Proclamation 8031, other applicable law and agency policies and standard operating procedures.

Conclusion. Upon consideration of the permit to be approved by the Board of Land and Natural Resources, the potential effects of the above listed project as provided by Chapter 343, HRS and Chapter 11-200 HAR, have been determined to be of probable minimal or no significant effect on the environment and exempt from the preparation of an environmental assessment.

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: July 2-16, 2020

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 ‘opihi 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):

SEE ORIGINAL APP FOR CONTACT INFO

Phone: SEE ORIGINAL APP FOR CONTACT INFO

Fax:

Email: SEE ORIGINAL APP FOR CONTACT INFO

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 Kanoē'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):

Nihoa Island

Land-based Shallow water

Deep water

Ocean Based

- | | | | |
|--|-------------------------------------|---|-------------------------------------|
| <input checked="" type="checkbox"/> Necker Island (Mokumanamana) | <input type="checkbox"/> Land-based | <input 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"/> Maro Reef | | | |
| <input type="checkbox"/> Laysan Island | <input type="checkbox"/> Land-based | <input type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> Lisianski Island, Neva Shoal | <input type="checkbox"/> Land-based | <input type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> Pearl and Hermes Atoll | <input type="checkbox"/> Land-based | <input type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input 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 ‘opihī / 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 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‘t 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. 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*
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, Mokuāpapa

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

Papahānaumokuākea Marine National Monument Compliance Information Sheet

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

Pelika Andrade, Intertidal researcher
Ka‘ala Bertelmann, Intertidal researcher
Lauren Kapon, Intertidal researcher
Anthony Mau, Intertidal researcher
Kainoa Lum, First Responder and Safety
Haunani Kane, Coastal Geologist;
Kammie Dominique Tavares, Coastal Geologist & Survey technician;
Kristian McDonald, Coastal Geologist & Drone operator;
Aloha Kapon, Coastal Geologist & ROV operator
Shacles Chong, Videographer
Brad Kaaleleo Wong, Cultural specialist, Office of Hawaiian Affairs
Up to 1 TBD Researcher
7 Makani ‘Olu Crew TBD

2. Specific Site Location(s): (Attach copies of specific collection locations): Nihoa and Lalo (French Frigate Shoals) – East island, Gin islets, Tern Island

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

3a. For each of the permits listed, identify any permit violations or any permit that was suspended, amended, modified or revoked for cause. Explain the circumstances surrounding the violation or permit suspension, amendment, modification or revocation.

4. Funding sources (Attach copies of your budget, specific to proposed activities under this permit and include funding sources. See instructions for more information): Vessel operations are funded by the Office of Hawaiian Affairs

5. Time frame:

Activity start: Tentative May 12
Activity completion: Tentative May 27

Dates actively inside the Monument:

From: Tentative May 14

To: Tentative May 25

Describe any limiting factors in declaring specific dates of the proposed activity at the time of application: Office of Hawaiian Affairs travel restrictions and COVID-19 protocols and issues

Personnel schedule in the Monument:

6. Indicate (with attached documentation) what insurance policies, bonding coverage, and/or financial resources are in place to pay for or reimburse the Monument trustees for the necessary search and rescue, evacuation, and/or removal of any or all persons covered by the permit from the Monument:

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

- Vessel
 Aircraft

Provide Vessel and Aircraft information: SSV Makani 'Olu, Marimed Foundation

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

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

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

Vessel name: Makani 'Olu

Vessel owner: Marimed Foundation

Captain's name: Matt Claybaugh and Harry Sprague

IMO#: DLZ065030497

Vessel ID#: 1113517

Flag: U.S.

Vessel type: Steel hull, three masted staysail schooner

Call sign: WDA6945

Embarkation port: Kāneʻohe Bay

Last port vessel will have been at prior to this embarkation: Heʻeia Kea Boat Harbor

Length: 96'

Gross tonnage: 68

Total ballast water capacity volume (m3): N/A

Total number of ballast water tanks on ship: N/A

Total fuel capacity: 421g

Total number of fuel tanks on ship: 2

Marine Sanitation Device: Yes

Type: Holding Tank

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

Makani Olu is outfitted with holding tanks and will only discharge in compliance with Monument regulations

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

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

VMS Email:

Inmarsat ID#:

* Individuals MUST ENSURE that a type-approved VMS unit is installed and that its automatic position reports are being properly received by the NOAA OLE system prior to the issuance of a permit. To make sure your VMS is properly configured for the NOAA OLE system, please contact NOAA OLE at (808) 725-6110 or (808) 725-6100.

* PERMITS WILL NOT BE ISSUED TO INDIVIDUALS ENTERING THE MONUMENT VIA VESSEL UNTIL NOAA OLE HAS CONTACTED THE MONUMENT PERMIT COORDINATOR WITH A 'POSITIVE CHECK' READING.

10. Tender information:

On what workboats (tenders) will personnel, gear and materials be transported within the Monument? List the number of tenders/skiffs aboard and specific types of motors:

2 - 12FT rigid inflatables with Yamaha 20HP 4 stroke engines

Additional Information for Land Based Operations

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

12. Room and board requirements on island:

13. Work space needs:

DID YOU INCLUDE THESE?

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