

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

April 22, 2022

Board of Land
and Natural Resources
Honolulu, Hawaii

Request for Authorization and Approval to Issue a Papahānaumokuākea Marine National Monument Research Permit to Dr. Richard L. Pyle, Bernice Pauahi Bishop Museum, for Access to State Waters to Conduct Research Activities Associated with Capturing Data on Environmental Parameters Related to Climatic Changes on Undersea Environments, and Biological Sampling for Undescribed Species, within the Waters of the Northwestern Hawaiian Islands

The Division of Aquatic Resources (DAR) hereby submits a request for your authorization and approval for issuance of a Papahānaumokuākea Marine National Monument Research Permit to Dr. Richard Pyle, Bernice Pauahi Bishop Museum, 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 Research 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 Island
- Necker Island (Mokumanamana)
- French Frigate Shoals (Lalo)
- Gardner Pinnacles
- Laysan Island (Kamole)
- Lisianski Island
- Maro Reef (Kamokuokamohoali'i)

The activities covered under this permit would be authorized to occur between June 3-24, 2022 and July 1-22, 2022.

BLNR-ITEM F-2

INTENDED ACTIVITIES

This project represents the completion of tasks begun on a previous NFWF-funded research project within Papahānaumokuākea Marine National Monument (PMNM), conducted during the summer 2019 NOAA Ship Rainier cruise. This activity would help PMNM by providing continuous high-resolution data (10-minute intervals) on temperature, conductivity, PAR, pH, and dissolved oxygen across multiple years (potentially indefinitely) at several sites within PMNM. These data are critical for understanding natural fluctuations in environmental conditions at depths that cannot be monitored by satellite technology or surface-deployed instruments. All data obtained from these sensors would be made publicly available for use by biologists, climatologists, and others to better understand the influences of climatic changes on undersea environments within PMNM.

The researchers propose two separate expeditions to PMNM, each of three weeks duration. Given that the previous attempt to deploy these arrays was unsuccessful due to insufficient time to identify appropriate deployment sites, and the anticipated likelihood of multiple days to locate the existing deployed array, as well as the need to scout potential future sites, the researchers are allocating sufficient time to accomplish these tasks. Moreover, the researchers have split the cruise into two legs to allow an opportunity to reconnect with PMNM personnel following the initial recovery of the first sensor array, to better inform site locations for additional arrays.

The applicant, Dr. Richard Pyle is the Senior Curator of Fishes, Director of the Center for the Exploration of Coral Reef Ecosystems (XCoRE), for Bernice Pauahi Bishop Museum. The principal investigator for the project would be Brian D. Greene, who is an Ichthyology Research Specialist & Diving Safety Officer of XCoRE for Bernice Pauahi Bishop Museum.

The researchers would complete three discrete tasks associated with capturing continuous data about environmental parameters within Papahānaumokuākea Marine National Monument (PMNM) waters, as well as compile presence/absence checklists of organisms at each dive site and collect any noteworthy species that could not be visually identified to the species level that may represent a new geographic record or undescribed species.

The first task would be to locate and recover an AML Oceanographic METRECX multi-parameter instrument cluster (approximately \$35,000) which was deployed off Lalo (French Frigate Shoals) in 2019 from the NOAA Ship Rainier as part of a multidisciplinary project funded by the National Fish and Wildlife Foundation (NFWF). This multi-sensor array, equipped with UV Biofouling Control, has been recording data on temperature, conductivity, PAR, pH, and dissolved oxygen at ten-minute intervals daily since its deployment. Once located, the researchers would recover the sensor array, download the logged data, recalibrate the sensors, change the batteries, and redeploy the array to continue monitoring into the future.

The original 2019 NFWF project purchased four of these arrays with the intention of deploying them at different locations and depths. However, due to limitations of ship days at Lalo in 2019 (resulting from the unanticipated discovery of *Chondria tumulosa* algae blooms at Pearl and Hermes Atoll, preventing the planned return visit to Lalo on the way back), the researchers were unable to deploy three of these arrays. Thus, the second task would be to deploy three additional identical sensor arrays to begin logging data on environmental parameters at different locations

and/or depths, selected in consultation with Monument researchers.

The third task would be to scout for additional sites within PMNM to deploy future arrays. Because deployment sites need to be selected carefully to capture the most useful data while simultaneously avoiding any risk of harm to the natural environment (even in the event of wave action from storms), knowing deployment sites in advance would greatly facilitate future sensor deployments of this sort, and minimize risks of events preventing deployment (as happened in 2019).

Dive time allowing, the project research divers would also compile presence/absence checklists of organisms at each dive site. While these would primarily be fishes (as they are easiest to identify visually to the species or even subspecies level), other taxa would also be noted. Of particular interest are alien and/or invasive species, including (but not limited to) *Chondria tumulosa*, which was recently described from Manawai (Pearl and Hermes Atoll) and Kuaihelani (Midway). The ultimate goal of these activities would be a published, island-by-island checklist of fishes, corals, and algae known from the deep reefs of PMNM. Any noteworthy species that could not be visually identified to the species level would be collected if they may represent a new geographic record, or an undescribed species.

Specific objectives are as followed:

- Conduct dives at the location where original sensor arrays were deployed in 2019 and bring the array back to the surface to download the data and recalibrate the sensors
- Redeploy sensors at the same site with fresh batteries to continue capturing data for the next several years
- Conduct dives at target areas to locate optimal sites to deploy the remaining three sensor arrays and identify potential sites for future arrays
- Deploy three additional arrays to continue capturing data for the next several years at additional location and/or depths TBD.
- Compile presence/absence checklists of organisms at each dive site and collect any noteworthy species that could not be visually identified to the species level if they may represent a new geographic record or an undescribed species

Purpose and Need

The purpose of the proposed activity is to recover data from an environmental multi-sensor array deployed in 2019, recalibrate and redeploy that sensor array with fresh batteries, deploy three additional identical arrays at carefully selected locations and depths, and scout for optimal sites to deploy future sensor arrays. These sensor arrays record high-resolution (logged at 10-minute intervals), long-duration (3–5 years battery life) data on temperature, conductivity, PAR, pH, and dissolved oxygen, which are important for understanding and monitoring physical environmental parameters over an extended period. Future projects would revisit these sensor arrays to recover data and recalibrate and redeploy them for ongoing data collection and 3–5-year intervals. Divers will also opportunistically compile presence/absence checklists of conspicuous organisms at sites surveyed for possible array deployment.

To adequately protect any ecosystem (particularly one as large and poorly explored as PMNM), a necessary first step for natural resource managers is to determine what organisms and habitats are present. Presence/absence checklists resulting from this project would directly address this information gap. Given the magnitude of impending threats such as climate change, it is imperative for managers to have a temporal baseline of information to be able to identify future changes to the system. This activity would help PMNM by providing continuous high-resolution data (10-minute intervals) on temperature, conductivity, PAR, pH, and dissolved oxygen across multiple years (potentially indefinitely) at several sites within the Monument. These data are critical for understanding natural fluctuations in environmental conditions at depths that cannot be monitored by satellite technology or surface-deployed instruments. All data obtained from these sensors would be made publicly available for use by biologists, climatologists, and others to better understand the influences of climatic changes on undersea environments within PMNM. Monitoring of these physical oceanographic parameters on shallow coral ecosystems directly supports **Monument Management Plan Activity MCS-1.2: Continue monitoring of shallow coral reef ecosystems**, and on deep (mesophotic) coral ecosystems directly supports **MCS-1.4: Establish and implement monitoring program for deep water ecosystems**, which specifically encourages the use of technical diving to implement this monitoring.

Compilation of species checklists is in direct support of Monument Management Plan Activities **MCS-1.1: Continue to characterize types and spatial distributions of shallow water marine habitat**, and **MCS-1.3: Map and characterize deep-water habitat**, which also notes the need for technical diving to complete this activity, and the continuing need to develop baseline inventories of biodiversity).

Given the scope of the proposed activities, there is no practicable alternative to conducting them outside of PMNM. These sensor arrays were funded by NFWF, and purpose-built to collect high-resolution environmental data within PMNM.

Research and Sampling

Collections would be limited to voucher specimens of organisms that cannot be readily identified visually underwater and may represent new geographical records and/or undescribed species. Additionally, voucher specimens would be collected of any organisms that may represent alien, invasive, or nuisance species. Because one generally cannot anticipate encounters with new records or undescribed species, this list is necessarily generic and non-specific in terms of specifying species, sizes, and locations.

No more than one (1) specimen of each taxon will be collected in cases where an abundance assessment cannot be ascertained, or less than ten (10) such specimens are present, cumulative during the course of the collection event per island, atoll, or reef. No more than three (3) specimens of each taxon will be collected if an abundance assessment of ten (10) or more such specimens is ascertained, cumulative during the course of the collection event per island, atoll or reef. If any clonal organisms that cannot be visually identified or may represent a new geographic record or new species are found, no more than half the clonal organism visually observed will be collected.

No more than three (3) clonal specimens of similar morphology will be collected if an abundance assessment of ten (10) or more of such specimens is ascertained, cumulative during the course of the collection event per island, atoll or reef.

Proposed take of specimens (new records or new species) would be kept to the bare minimum necessary for a credible and conclusive scientific documentation of the discovery. The expected number of such discoveries (and samples) is expected to be extremely small.

Generally, new species are few and far between.

The researchers would conduct dives at the location where the original sensor array was deployed, bring the array back to the surface to download data, recalibrate sensors, and redeploy at the same site with fresh batteries to continue capturing data for the next several years. Furthermore, they would conduct dives at target areas to locate optimal sites to deploy the remaining three sensor arrays, as well as identify potential sites for future arrays, and deploy the additional three arrays to continue capturing data for the next several years at additional locations and/or depths. These locations would be photo-documented to record the state of the sensor arrays and surrounding habitat at the time of deployment (allowing future comparisons) and ensure that future expeditions would be able to locate and recover the sensors and data, and redeploy them for continued monitoring and data collection. The researchers plan to deploy the remaining three arrays using the same technique as the first array: anchoring the arrays to dead limestone rock using cable ties. The researchers will use an alternate method of attaching the arrays to an 18" stake driven into the sand with a hammer, if no suitable limestone rock is available at the deployment site. *In-situ* analysis on seawater samples (50ml) would be conducted to establish a baseline of certain physical properties.

Disposition of Specimens after Collection/Analysis:

The only specimens collected will either represent new geographic records, or undescribed species. All specimens will be referenced where appropriate in peer-reviewed publications, including accession numbers of type specimens or new records which will be deposited in museum research collections at institutions such as B.P. Bishop Museum, California Academy of Sciences, United States National Museum of Natural History (a.k.a. Smithsonian Institution), Natural History Museum, London, etc. Specimens in such museum collections are readily available, in perpetuity, for any and all bona fide researchers to study.

Exceptions: potential new species will be kept alive until they can be clearly photographed in the wet lab aboard the Acadia (on the day of collection), after which time animals will be humanely euthanized. Algal specimens are kept alive in seawater until they are pressed, preserved, or frozen in the wet lab aboard the Acadia (again, on the day of collection). The algae will be euthanized humanely.

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

☒ 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

☒ Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving Monument resource

☒ Anchoring a vessel

☒ Discharging or depositing any material or matter into the Monument

☒ Touching coral, living or dead

☒ Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

The applicant would abide by the following PMNM Best Management Practices (BMPs) while conducting the aforementioned activities within the PMNM: Marine Alien Species Inspection standards for Maritime Vessels (BMP #001), Human Hazards to Seabirds Briefing (BMP #003), Best Management Practices for Boat Operations and Diving Activities (BMP #004), General Storage and Transport Protocols for Collected Samples (BMP #006), Best Practices for Minimizing the Impact of Artificial Light on Sea Turtles (BMP #009), Marine Wildlife Viewing Guidelines (BMP #010), Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment (BMP #011), Best Management Practices for Maritime Heritage Sites (BMP #017), Rodent Prevention and Inspection Standards for Permitted Vessels (BMP #018), Draft BMPs to Minimize the Spread of *Chondria tumulosa* (BMP #020).

All operations conducted by the SY Acadia will be activities permitted by the co-trustees of PMNM. All operations will be compatible with the conservation and management goals of the Monument, NOAA, USFWS, OHA, and the State of Hawai'i. Vessel and research operations will be conducted in a manner to comply with all Monument Best Management Practices and Policies as to minimize any adverse impacts.

No activities would be performed in the vicinity of known historical resources or cultural archaeological sites. If any such resources are discovered during these proposed activities, their location(s) would be noted and reported to appropriate PMNM experts and authorities, and activities would cease immediately and be continued in another area.

Deployment and redeployment of these arrays would follow all Best Management Practices (BMP; especially BMPs #001 & #011) and ensure that no live coral or potentially fragile habitat would be harmed by the presence of the sensor arrays. The arrays would be anchored to the seafloor in areas without live coral cover, using the most appropriate methods per consultation with PMNM researchers.

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 Hawaiian and Pacific Islands National Wildlife Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application was posted on the Monument Web site in the spring of 2022, 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:

1. How will arrays be anchored? Was there consultation with PMNM researchers already or is that still planned? If so, what were their suggested appropriate methods?

We have three arrays remaining to be deployed. The first of four was deployed in 2019 and was affixed to dead coral in an open sandy area using large cable ties (see photo). We plan to change the batteries and re-deploy this array, so there will be a total of four that are deployed. We consulted with PMNM researchers prior to the deployment of the first array in 2019, and we will continue those discussions prior to deploying the remaining three. At present, we plan to deploy the remaining three arrays using the same technique as the first array: anchoring them to dead limestone rock using cable ties. We've also considered using an 18" stake driven into the sand with a hammer if no suitable limestone rock is available in the deployment site. Our primary contact has been Dr. Randall Kosaki and his team, but we are happy to discuss ideas with any other PMNM researcher who is interested in the data and/or the deployment details.

2. Is it possible to get a diagram or a photo of the sensor array set-ups?

Yes, see below, and also sent as a separate JPG file.



3. What is the range of depths where the arrays will be anchored and/or specimens will be collected?

Our original plan in 2019 was to deploy the arrays at four different depths, ranging from 10 to 100 meters. We are tentatively maintaining that plan, but this is subject to change depending on the results of initial scouting dives, and based on feedback from PMNM researchers concerning their preference for where the data should be collected.

4. Is the ship's wet lab an open or closed system?

It is a closed system. No discharge of any chemicals or seawater or any other fluids will occur within the monument.

5. Will the organisms be processed (preserved, fixed, or sacrificed before the moves to the next location/island/atoll?

Yes, they will.

Environmental Compliance:

NEPA / HEPA: (check-one)

- ☒ Categorical Exclusion / Exempt Class: 5
☐ EA
☐ EIS

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

- 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)) is currently underway. The outcome of this review may require the applicant to adhere to other NMFS-prescribed conditions. Such conditions would be reflected in the PMNM permit, prior to issuance.
- A request is currently underway to the National Marine Fisheries Service (NMFS) to cover all proposed activities under PMNM's programmatic ESA Section 7 informal consultation. The outcome of this consultation may require the applicant to adhere to other NMFS-prescribed conditions. Such conditions would be reflected in the PMNM permit, prior to issuance.

The Department has made an exemption determination for this permit in accordance with Chapter 343, HRS, and Chapter 11-200.1, HAR. See Attachment ("DECLARATION OF EXEMPTION FROM THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT UNDER THE AUTHORITY OF CHAPTER 343, HRS AND CHAPTER 11-200.1 HAR, FOR A PAPAĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR. RICHARD L. PYLE, BERNICE PAUHI BISHOP MUSEUM, FOR ACCESS TO STATE WATERS TO CONDUCT RESEARCH ACTIVITIES ASSOCIATED WITH CAPTURING DATA ON ENVIRONMENTAL PARAMETERS RELATED TO CLIMATIC CHANGES ON UNDERSEA ENVIRONMENTS, AND BIOLOGICAL SAMPLING FOR UNDESCRIBED SPECIES, WITHIN THE WATERS OF THE NORTHWESTERN HAWAIIAN ISLANDS UNDER PERMIT PMNM-2022-004")

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 ☒

STAFF OPINION:

DAR staff is of the opinion that Applicant has properly demonstrated valid justifications for their 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 review and accept the declaration of exemption for purposes of recordkeeping requirements of chapter 343, HRS, and chapter 11-200.1, HAR.
3. That the Board authorize and approve a Research Permit to Dr. Richard L. Pyle, Bernice Pauahi Bishop Museum, for Access to State Waters to Conduct Research Activities Associated with Capturing Data on Environmental Parameters Related to Climatic Changes on Undersea Environments, and Biological Sampling for Undescribed Species, within the Waters of the Northwestern Hawaiian Islands, with the following special conditions:
 - a. This permit is not to be used for nor does it authorize the sale of collected organisms. Under this permit, the authorized activities must be for noncommercial purposes not involving the use or sale of any organism, by-products, or materials collected within the Monument for obtaining patent or intellectual property rights.
 - b. The permittee may not convey, transfer, or distribute, in any fashion (including, but not limited to, selling, trading, giving, or loaning) any coral, live rock, or organism collected under this permit without the express written permission of the Co-Trustees.
 - c. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocols or BMP attached to this permit.
 - d. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.
 - e. 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.
 - f. 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.
 - g. No fishing is allowed in State Waters except as authorized under State law for subsistence, traditional and customary practices by Native Hawaiians.

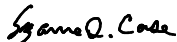
- h. The permittee is required to follow all applicable Federal, State, and County laws with respect to the COVID-19 emergency response that apply at the time of departure and return. In issuance of this permit, the State of Hawaii is not otherwise monitoring or regulating permittee's compliance with 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

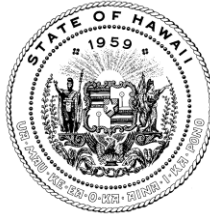


Suzanne D. Case, Chairperson
Board of Land and Natural Resources

Attachments:

- 1) Declaration of Exemption ("DE") from the Preparation of an Environmental Assessment under the Authority of Chapter 343, HRS & Chapter 11-200.1 HAR
- 2) PMNM Application
- 3) CIS Form (to be attached at the BLNR Meeting on April 22, 2022)

DAVID Y. IGE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

ROBERT K. MASUDA
FIRST DEPUTY

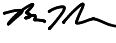
M. KALEO MANUEL
DEPUTY DIRECTOR - WATER

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 22, 2022

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 11-200.1 HAR, FOR A PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO DR. RICHARD L. PYLE, BERNICE PAUHI BISHOP MUSEUM, FOR ACCESS TO STATE WATERS TO CONDUCT RESEARCH ACTIVITIES ASSOCIATED WITH CAPTURING DATA ON ENVIRONMENTAL PARAMETERS RELATED TO CLIMATIC CHANGES ON UNDERSEA ENVIRONMENTS, AND BIOLOGICAL SAMPLING FOR UNDESCRIBED SPECIES, WITHIN THE WATERS OF THE NORTHWESTERN HAWAIIAN ISLANDS UNDER PERMIT PMNM-2022-004.

The following permitted activities are found to be exempted from preparation of an environmental assessment under the authority of Chapter 343, HRS and Chapter 11-200.1, HAR:

Project Title: Papahānaumokuākea Marine National Monument Research Permit to Dr. Richard Pyle, Bernice Pauahi Bishop Museum, for Access to State Waters to Conduct Research Activities Associated With Capturing Data on Environmental Parameters Related to Climatic Changes on Undersea Environments, and Biological Sampling for Undescribed Species, within the Waters of The Northwestern Hawaiian Islands.

Permit Number: PMNM-2022-004

Project Description: Dr. Richard Pyle would complete three discrete tasks associated with capturing continuous data about environmental parameters within Papahānaumokuākea Marine National Monument (PMNM) waters, as well as compile presence/absence checklists of organisms at each dive site and collect any noteworthy species that could not be visually identified to the species level that may represent a new geographic record or undescribed species. The applicant, Dr. Richard Pyle is the Senior Curator of Fishes, Director of the Center for the Exploration of Coral Reef Ecosystems

(XCoRE), for Bernice Pauahi Bishop Museum. The principal investigator for the project would be Brian D. Greene, who is an Ichthyology Research Specialist & Diving Safety Officer of XCoRE for Bernice Pauahi Bishop Museum.

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The activities covered under this permit would be authorized to occur between June 3-24, 2022 and July 1-22, 2022.

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Purpose and Need

The purpose of the proposed activity is to recover data from an environmental multi-sensor array deployed in 2019, recalibrate and redeploy that sensor array with fresh batteries, deploy three additional identical arrays at carefully selected locations and depths, and scout for optimal sites to deploy future sensor arrays. These sensor arrays record high-resolution (logged at 10-minute intervals), long-duration (3–5 years battery life) data on temperature, conductivity, PAR, pH, and dissolved oxygen, which are important for understanding and monitoring physical environmental parameters over an extended period. Future projects would revisit these sensor arrays to recover data and recalibrate and redeploy them for ongoing data collection and 3–5-year intervals. Divers will also opportunistically compile presence/absence checklists of conspicuous organisms at sites surveyed for possible array deployment.

To adequately protect any ecosystem (particularly one as large and poorly explored as PMNM), a necessary first step for natural resource managers is to determine what organisms and habitats are present. Presence/absence checklists resulting from this project would directly address this information gap. Given the magnitude of impending threats such as climate change, it is imperative for managers to have a temporal baseline of information to be able to identify future changes to the system. This activity would help PMNM by providing continuous high-resolution data (10-minute intervals) on temperature, conductivity, PAR, pH, and dissolved oxygen across multiple years (potentially indefinitely) at several sites within the Monument. These data are critical for understanding natural fluctuations in environmental conditions at depths that cannot be monitored by satellite technology or surface-deployed instruments. All data obtained from these sensors would be made publicly available for use by biologists, climatologists, and others to better understand the influences of climatic changes on undersea environments within PMNM. Monitoring of these physical oceanographic parameters on shallow coral ecosystems directly supports **Monument Management Plan Activity MCS-1.2: Continue monitoring of shallow coral reef ecosystems**, and on deep (mesophotic) coral ecosystems directly supports **MCS-1.4: Establish and implement monitoring program for deep water ecosystems**, which specifically encourages the use of technical diving to implement this monitoring.

Compilation of species checklists is in direct support of Monument Management Plan Activities **MCS-1.1: Continue to characterize types and spatial distributions of shallow water marine habitat**, and **MCS-1.3: Map and characterize deep-water habitat**, which also notes the need for technical diving to complete this activity, and the continuing need to develop baseline inventories of biodiversity).

Given the scope of the proposed activities, there is no practicable alternative to conducting them outside of PMNM. These sensor arrays were funded by NFWF, and purpose-built to collect high-resolution environmental data within PMNM.

Research and Sampling

Collections would be limited to voucher specimens of organisms that cannot be readily identified visually underwater and may represent new geographical records and/or undescribed species. Additionally, voucher specimens would be collected of any organisms that may represent alien, invasive, or nuisance species. Because one generally cannot anticipate encounters with new records or undescribed species, this list is necessarily generic and non-specific in terms of specifying species, sizes, and locations.

No more than one (1) specimen of each taxon will be collected in cases where an abundance assessment cannot be ascertained, or less than ten (10) such specimens are present, cumulative during the course of the collection event per island, atoll, or reef. No more than three (3) specimens of each taxon will be collected if an abundance assessment of ten (10) or more such specimens is ascertained, cumulative during the course of the collection event per island, atoll or reef. If any clonal organisms that cannot be visually identified or may represent a new geographic record or new species are found, no more than half the clonal organism visually observed will be collected. No more than three (3) clonal specimens of similar morphology will be collected if an abundance assessment of ten (10) or more of such specimens is ascertained, cumulative during the course of the collection event per island, atoll or reef.

Proposed take of specimens (new records or new species) would be kept to the bare minimum necessary for a credible and conclusive scientific documentation of the discovery. The expected number of such discoveries (and samples) is expected to be extremely small. Generally, new species are few and far between.

The researchers would conduct dives at the location where the original sensor array was deployed, bring the array back to the surface to download data, recalibrate sensors, and redeploy at the same site with fresh batteries to continue capturing data for the next several years. Furthermore, they would conduct dives at target areas to locate optimal sites to deploy the remaining three sensor arrays, as well as identify potential sites for future arrays, and deploy the additional three arrays to continue capturing data for the next several years at additional locations and/or depths. These locations would be photo-documented to record the state of the sensor arrays and surrounding habitat at the time of deployment (allowing future comparisons) and ensure that future expeditions would be able to locate and recover the sensors and data, and redeploy them for continued monitoring and data collection. The researchers plan to deploy the remaining three arrays using the same technique as the first array: anchoring the arrays to dead limestone rock using cable ties. The researchers will use an alternate method of attaching the arrays to an 18” stake driven into the sand with a hammer, if no suitable limestone rock is available at the deployment site. *In-situ* analysis on seawater samples (50ml) would be conducted to establish a baseline of certain physical properties.

Disposition of Specimens after Collection/Analysis:

The only specimens collected will either represent new geographic records, or undescribed species. All specimens will be referenced where appropriate in peer-reviewed publications, including accession numbers of type specimens or new records which will be deposited in museum research collections at institutions such as B.P. Bishop Museum, California Academy of Sciences, United States National Museum of Natural History (a.k.a. Smithsonian Institution), Natural History

Museum, London, etc. Specimens in such museum collections are readily available, in perpetuity, for any and all bona fide researchers to study.

Exceptions: potential new species will be kept alive until they can be clearly photographed in the wet lab aboard the Acadia (on the day of collection), after which time animals will be humanely euthanized. Algal specimens are kept alive in seawater until they are pressed, preserved, or frozen in the wet lab aboard the Acadia (again, on the day of collection). The algae will be euthanized humanely.

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

- ☒ 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
- ☒ Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving Monument resource
- ☒ Anchoring a vessel
- ☒ Discharging or depositing any material or matter into the Monument
- ☒ Touching coral, living or dead
- ☒ Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

The applicant would abide by the following PMNM Best Management Practices (BMPs) while conducting the aforementioned activities within the PMNM: Marine Alien Species Inspection standards for Maritime Vessels (BMP #001), Human Hazards to Seabirds Briefing (BMP #003), Best Management Practices for Boat Operations and Diving Activities (BMP #004), General Storage and Transport Protocols for Collected Samples (BMP #006), Best Practices for Minimizing the Impact of Artificial Light on Sea Turtles (BMP #009), Marine Wildlife Viewing Guidelines (BMP #010), Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment (BMP #011), Best Management Practices for Maritime Heritage Sites (BMP #017), Rodent Prevention and Inspection Standards for Permitted Vessels (BMP #018), Draft BMPs to Minimize the Spread of *Chondria tumulosa* (BMP #020).

All operations conducted by the SY Acadia will be activities permitted by the co-trustees of PMNM. All operations will be compatible with the conservation and management goals of the Monument, NOAA, USFWS, OHA, and the State of Hawai'i. Vessel and research operations will be conducted in a manner to comply with all Monument Best Management Practices and Policies as to minimize any adverse impacts.

No activities would be performed in the vicinity of known historical resources or cultural archaeological sites. If any such resources are discovered during these proposed activities, their location(s) would be noted and reported to appropriate PMNM experts and authorities, and activities would cease immediately and be continued in another area.

Deployment and redeployment of these arrays would follow all Best Management Practices (BMP; especially BMPs #001 & #011) and ensure that no live coral or potentially fragile habitat would be harmed by the presence of the sensor arrays. The arrays would be anchored to the seafloor in areas without live coral cover, using the most appropriate methods per consultation with PMNM researchers.

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 Hawaiian and Pacific Islands National Wildlife Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application was posted on the Monument Web site in the spring of 2022, 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:

1. How will arrays be anchored? Was there consultation with PMNM researchers already or is that still planned? If so, what were their suggested appropriate methods?

We have three arrays remaining to be deployed. The first of four was deployed in 2019, and was affixed to dead coral in an open sandy area using large cable ties (see photo). We plan to change the batteries and re-deploy this array, so there will be a total of four that are deployed. We consulted with PMNM researchers prior to the deployment of the first array in 2019, and we will continue those discussions prior to deploying the remaining three. At present, we plan to deploy the remaining three arrays using the same technique as the first array: anchoring them to dead limestone rock using cable ties. We've also considered using an 18" stake driven into the sand with a hammer, if no suitable limestone rock is available in the deployment site. Our primary contact has been Dr. Randall Kosaki and his team, but we are happy to discuss ideas with any other PMNM researcher who is interested in the data and/or the deployment details.

2. Is it possible to get a diagram or a photo of the sensor array set-ups?

Yes, see below, and also sent as a separate JPG file.



3. What is the range of depths where the arrays will be anchored and/or specimens will be collected?

Our original plan in 2019 was to deploy the arrays at four different depths, ranging from 10 to 100 meters. We are tentatively maintaining that plan, but this is subject to change depending on the results of initial scouting dives, and based on feedback from PMNM researchers concerning their preference for where the data should be collected.

4. Is the ship's wet lab an open or closed system?

It is a closed system. No discharge of any chemicals or seawater or any other fluids will occur within the monument.

5. Will the organisms be processed (preserved, fixed, or sacrificed before the moves to the next location/island/atoll?

Yes, they will.

Environmental Compliance:

NEPA / HEPA: (check-one)

- ☒ Categorical Exclusion / Exempt Class: 5
☐ EA

☐ EIS

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

- 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)) is currently underway. The outcome of this review may require the applicant to adhere to other NMFS-prescribed conditions. Such conditions would be reflected in the PMNM permit, prior to issuance.
- A request is currently underway to the National Marine Fisheries Service (NMFS) to cover all proposed activities under PMNM's programmatic ESA Section 7 informal consultation. The outcome of this consultation may require the applicant to adhere to other NMFS-prescribed conditions. Such conditions would be reflected in the PMNM permit, prior to issuance.

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 ☒

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 §11-200.1-15, HAR, including the criteria used to determine significance under §11-200.1-13, 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 methodology used throughout the permit period, the categorical exemption determination here will treat all planned activities as a single action under §11-200.1-10, 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 capturing data on environmental parameters related to climatic changes on undersea environments, and biological sampling for undescribed species, 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 §11-200.1-16 (a) (2), 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), items #1, #13 and #15, which includes, respectively, “conducting surveys or collecting data on existing environmental conditions (e.g., noise, air quality, water flow, water quality, etc.)”, “research that the Department declares is designed specifically to monitor, conserve, or enhance native species or native species' habitat” and “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 applicant would abide by the PMNM Best Management Practices (BMPs) as listed in earlier section above while conducting the aforementioned activities within the PMNM.

As discussed below, no significant disturbance to any environmental resource is anticipated. Thus, so long as the below considerations are met, the general exemption types 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.” §11-200.1-15 (d), HAR. 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. §11-200.1-13, HAR.

Collections would be limited to voucher specimens of organisms that cannot be readily identified visually underwater and may represent new geographical records and/or undescribed species. Proposed take of specimens (new records or new species) would be kept to the bare minimum necessary for a credible and conclusive scientific documentation of the discovery. The expected number of such discoveries (and samples) is expected to be extremely small. Generally, new species are few and far between. No more than one (1) specimen of each taxon will be collected in cases where an abundance assessment cannot be ascertained, or less than ten (10) such specimens are present, cumulative during the course of the collection event per island, atoll, or reef. No more than three (3) specimens of each taxon will be collected if an abundance assessment of ten (10) or more such specimens is ascertained, cumulative during the course of the collection event per island, atoll or reef. If any clonal organisms that cannot be visually identified or may represent a new geographic record or new species are found, no more than half the clonal organism

visually observed will be collected. No more than three (3) clonal specimens of similar morphology will be collected if an abundance assessment of ten (10) or more of such specimens is ascertained, cumulative during the course of the collection event per island, atoll or reef. The researchers plan to deploy the remaining three arrays using the same technique as the first array: anchoring the arrays to dead limestone rock using cable ties. The researchers will use an alternate method of attaching the arrays to an 18” stake driven into the sand with a hammer, if no suitable limestone rock is available at the deployment site. These locations would be photo-documented to record the state of the sensor arrays and surrounding habitat at the time of deployment (allowing future comparisons) and ensure that future expeditions would be able to locate and recover the sensors and data, and redeploy them for continued monitoring and data collection. With that 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 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 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 have a Minimal or No Significant Effect on the Environment. 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 11-200.1 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
RESEARCH Permit Application

NOTE: *This Permit Application (and associated Instructions) are to propose activities to be conducted in the Papahānaumokuākea Marine National Monument. The Co-Trustees are required to determine that issuing the requested permit is compatible with the findings of Presidential Proclamation 8031. Within this Application, provide all information that you believe will assist the Co-Trustees in determining how your proposed activities are compatible with the conservation and management of the natural, historic, and cultural resources of the Papahānaumokuākea Marine National Monument (Monument).*

ADDITIONAL IMPORTANT INFORMATION:

- Any or all of the information within this application may be posted to the Monument website informing the public on projects proposed to occur in the Monument.
- In addition to the permit application, the Applicant must either download the Monument Compliance Information Sheet from the Monument website OR request a hard copy from the Monument Permit Coordinator (contact information below). The Monument Compliance Information Sheet must be submitted to the Monument Permit Coordinator after initial application consultation.
- Issuance of a Monument permit is dependent upon the completion and review of the application and Compliance Information Sheet.

INCOMPLETE APPLICATIONS WILL NOT BE CONSIDERED

Send Permit Applications to:
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: *Richard L. Pyle*

Affiliation: *Bernice Pauahi Bishop Museum*

Permit Category: *Research*

Proposed Activity Dates: *June 3-24, 2022 & July 1-22, 2022*

Proposed Method of Entry (Vessel/Plane): *Vessel - SY Acadia*

Proposed Locations: *Nihoa Island, Necker Island, French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan Island, Lisianski Island.*

Estimated number of individuals (including Applicant) to be covered under this permit: *11*

Estimated number of days in the Monument: *42*

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...

The proposed activity would complete three discrete tasks associated with capturing continuous data about environmental parameters within Papahānaumokuākea Marine National Monument (PMNM) waters. The first task is to locate and recover an AML Oceanographic METRECX multi-parameter instrument cluster (approximately \$35,000) deployed off Lalo (French Frigate Shoals) in 2019 from the NOAA Ship Rainier as part of a multidisciplinary project funded by the National Fish and Wildlife Foundation (NFWF). This multi-sensor array, equipped with UV Biofouling Control, has been recording data on temperature, conductivity, PAR, pH, and dissolved oxygen at ten-minute intervals daily since its deployment. Once located, we would recover the sensor array, download the logged data, recalibrate the sensors, change the batteries, and redeploy the array to continue monitoring into the future.

The original NFWF project purchased four of these arrays with the intention of deploying them at different locations and depths. However, due to limitations of ship days at Lalo in 2019 (resulting from the unanticipated discovery of Chondria tumulosa algae blooms at Pearl and Hermes Atoll, preventing the planned return visit to Lalo on the way back), we were unable to deploy three of these arrays. Thus, the second task of the proposed activity would be to deploy these additional three identical sensor arrays to begin logging data on

these environmental parameters at different locations and/or depths, selected in consultation with Monument researchers.

Because of the potential importance of capturing this sort of high-resolution environmental data for monitoring and managing purposes within PMNM, the third task of the proposed activity is to scout for additional sites within PMNM to deploy future arrays. Because deployment sites need to be selected carefully to capture the most useful data while simultaneously avoiding any risk of harm to the natural environment (even in the event of wave action from storms), knowing deployment sites in advance will greatly facilitate future sensor deployments of this sort, and minimize risks of events preventing deployment (as happened in 2019).

Dive time allowing, the project research divers will also compile presence/absence checklists of organisms at each dive site. While these will primarily be fishes (as they are easiest to identify visually to the species or even subspecies level), other taxa will also be noted. Of particular interest are alien and/or invasive species, including (but not limited to) Chondria tumulosa, which was recently described from Manawai (Pearl and Hermes Atoll). The ultimate goal of this activity will be a published, island-by-island checklist of fishes, corals, and algae known from the deep reefs of PMNM. Any noteworthy species that cannot be visually identified to the species level may be collected if they may represent a new geographic record, or an undescribed species.

- b.) To accomplish this activity we would

To accomplish this activity we would conduct dives at the location where the original sensor array was deployed, bring the array back to the surface to download data, recalibrate sensors, and redeploy at the same site with fresh batteries to continue capturing data for the next several years. Furthermore, we will conduct dives at target areas to locate optimal sites to deploy the remaining three sensor arrays, as well as identify potential sites for future arrays, and deploy the additional three arrays to continue capturing data for the next several years at additional locations and/or depths.

Deployment and redeployment of these arrays would follow all Best Management Practices (BMP; especially BMPs #001 & #011), and ensure that no live coral or potentially fragile habitat would be harmed by the presence of the sensor arrays. The arrays will be anchored to the seafloor in areas without live coral cover, using the most appropriate methods per consultation with PMNM researchers. These locations will be photo-documented to record the state of the sensor arrays and surrounding habitat at the time of deployment (allowing future comparisons), and ensure that future expeditions will be able to locate and recover the sensors and data, and redeploy them for continued monitoring and data collection. In-situ analysis on seawater samples (50ml) will be conducted to establish a baseline of certain physical properties. Presence/absence checklists of fishes and other organisms will be compiled at each site surveyed for possible array deployment.

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

This activity would help PMNM by providing continuous high-resolution data (10-minute intervals) on temperature, conductivity, PAR, pH, and dissolved oxygen across multiple years (potentially indefinitely) at several sites within PMNM. These data are critical for understanding natural fluctuations in environmental conditions at depths that cannot be

monitored by satellite technology or surface-deployed instruments. All data obtained from these sensors would be made publicly available for use by biologists, climatologists, and others to better understand the influences of climatic changes on undersea environments within PMNM.

In order to adequately protect any ecosystem (particularly one as large and poorly explored as PMNM), a necessary first step for natural resource managers is to determine what organisms and habitats are present. Presence/absence checklists resulting from this project will directly address this information gap. Given the magnitude of impending threats such as climate change, it is imperative for managers to have a temporal baseline of information to be able to identify future changes to the system. We are at risk of losing some of these species to climate change before we even realize that they exist.

Other information or background: *This project represents the completion of tasks begun on a previous project within PMNM (NFWF-funded research project, including the summer 2019 NOAA Ship Rainier cruise).*

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): *Pyle, Richard L.*

Title: *Senior Curator of Fishes, Director of the Center for the Exploration of Coral Reef Ecosystems (XCoRE), Bernice Pauahi Bishop Museum*

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

*Brian D. Greene, Ichthyology Research Specialist & Diving Safety Officer of XCoRE
Bernice Pauahi Bishop Museum*

SEE ORIGINAL APPLICATION FOR CONTACT INFO

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

SEE ORIGINAL APPLICATION FOR CONTACT INFO

Phone: SEE ORIGINAL APPLICATION FOR CONTACT INFO

Fax: SEE ORIGINAL APPLICATION FOR CONTACT INFO

Email: SEE ORIGINAL APPLICATION FOR CONTACT INFO

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

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

Bernice Pauahi Bishop Museum

4. Additional persons to be covered by permit. List all personnel roles and names (if known at time of application) here (e.g. John Doe, Research Diver; Jane Doe, Field Technician):

Brian D. Greene, Principal Investigator, B. P. Bishop Museum

Dr. Randall Kosaki, Primary Research Diver

Guy A. S. Dodwell, Captain & Research Diver, SY Acadia (SEE ORIGINAL APPLICATION FOR CONTACT INFO)

Roseanna C. Asher-Relf, 1st Mate & Research Diver, SY Acadia (SEE ORIGINAL APPLICATION FOR CONTACT INFO)

Samuel D. Dews, Medical Officer & Research Support Diver, SY Acadia

Mark C. Rohr, Research Support Diver, SY Acadia

Rachel Rohr, Topside Research Support, SY Acadia

Research Support/Chef - TBD, SY Acadia

(2) Alternate Research Diver - TBD, B. P. Bishop Museum

5a. Project location(s):

Ocean Based

<input checked="" type="checkbox"/> Necker Island	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Necker Island (Mokumanamana)	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> French Frigate Shoals	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Gardner Pinnacles	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Maro Reef	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Laysan Island	<input type="checkbox"/> Land-based	<input checked="" type="checkbox"/> Shallow water	<input type="checkbox"/> Deep water
<input checked="" type="checkbox"/> Lisianski Island, Neva Shoal	<input type="checkbox"/> Land-based	<input checked="" 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"/> Monument Expansion Area			
<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: *NA*

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 purpose of the proposed activity is to recover data from an environmental multi-sensor array deployed in 2019, recalibrate and redeploy that sensor array with fresh batteries, deploy three additional identical arrays at carefully selected locations and depths, and scout for optimal sites to deploy future sensor arrays. These sensor arrays record high-resolution (logged at 10-minute intervals), long-duration (3–5 years battery life) data on temperature, conductivity, PAR, pH, and dissolved oxygen, which are important for understanding and monitoring physical environmental parameters over an extended period. Future projects would revisit these sensor arrays to recover data and recalibrate and redeploy them for ongoing data collection and 3–5-year intervals. Divers will also opportunistically compile presence/absence checklists of conspicuous organisms at sites surveyed for possible array deployment.

*Considering the purpose of the proposed activities, do you intend to film / photograph federally protected species beyond the protocols provided in PMNM Best Management Practices (<https://www.papahanaumokuakea.gov/permit/bestmanagement.html>)? Yes ☐ No ☒

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

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?

No activities will be performed in the vicinity of known historical resources or cultural archaeological sites. If any such resources are discovered in the course of these proposed activities, their location(s) will be noted and reported to appropriate PMNM experts and authorities, our activities will cease immediately, and will be continued in another area.

Deployment and redeployment of these arrays would follow all Best Management Practices (BMP; especially BMPs #001 & #011), and ensure that no live coral or potentially fragile habitat would be harmed by the presence of the sensor arrays. The arrays will be anchored to the seafloor in areas without live coral cover, using the most appropriate methods per consultation with PMNM researchers.

All sensor array deployment locations (and prospective future deployment sites) will be photo-documented to record the state of the sensor arrays and surrounding habitat at the time of deployment (allowing future comparisons), and ensure that future expeditions will be able to locate and recover the sensors and data, and redeploy them for continued monitoring and data collection.

Finally, we recognize that all natural resources are also cultural resources. Thus, we will minimize our proposed take of specimens (new records or new species) to the bare minimum necessary for a credible and conclusive scientific documentation of the discovery. The expected number of such discoveries (and samples) is expected to be extremely small. Generally, new species are few and far between. During our focused efforts to characterize PMNM's MCEs over the last ten years, we have an average discovery rate of fewer than one new species of fish per year, and approximately two to three new species of algae per year.

- 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?

All operations conducted by the SY Acadia will be activities permitted by the co-trustees of PMNM. All operations will be compatible with the conservation and management goals of the Monument, NOAA, USFWS, OHA, and the State of Hawai'i.

This activity would help PMNM by providing continuous high-resolution data (10-minute intervals) on temperature, conductivity, PAR, pH, and dissolved oxygen across multiple years (potentially indefinitely) at several sites within the Monument. These data are critical for understanding natural fluctuations in environmental conditions at depths that cannot be monitored by satellite technology or surface-deployed instruments. All data obtained from these sensors would be made publicly available for use by biologists, climatologists, and others to better understand the influences of climatic changes on undersea environments

*within PMNM. Monitoring of these physical oceanographic parameters on shallow coral ecosystems directly supports **Monument Management Plan Activity MCS-1.2: Continue monitoring of shallow coral reef ecosystems**, and on deep (mesophotic) coral ecosystems directly supports **MCS-1.4: Establish and implement monitoring program for deep water ecosystems**, which specifically encourages the use of technical diving to implement this monitoring.*

*Compilation of species checklists is in direct support of Monument Management Plan Activities **MCS-1.1: Continue to characterize types and spatial distributions of shallow water marine habitat**, and **MCS-1.3: Map and characterize deep-water habitat**, which also notes the need for technical diving to complete this activity, and the continuing need to develop baseline inventories of biodiversity).*

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.

Given the scope of the proposed activities, there is no practicable alternative to conducting them outside of PMNM. These sensor arrays were funded by NFWF, and purpose-built to collect high-resolution environmental data within PMNM.

d. How does the end value of the activity outweigh its adverse impacts on Monument cultural, natural and historic resources, qualities, and ecological integrity?

Continuous high-resolution data on temperature, conductivity, PAR, pH, and dissolved oxygen will be of great value to PMNM researchers and managers. Vessel and research operations will be conducted in a manner to comply with all Monument Best Management Practices & Policies as to minimize any adverse impacts.

Given that we will not be in the vicinity of known historical and cultural sites (and, as noted above, will immediately cease activities and move if any are noted), adverse impacts to such resources are not expected.

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

We propose two separate expeditions to PMNM, each of three weeks duration. Given that our previous attempt to deploy these arrays was unsuccessful due to insufficient time to identify appropriate deployment sites, and the anticipated likelihood of multiple days to locate the existing deployed array, as well as the need to scout potential future sites, we are allocating sufficient time to accomplish these tasks. Moreover, we have split the cruise into two legs to allow an opportunity to reconnect with PMNM personnel following the initial recovery of the first sensor array, to better inform site locations for additional arrays.

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 (Pyle), principal investigator (Greene), and primary research diver (Kosaki) all have extensive experience working in PMNM on prior expeditions and cruises. We worked directly with the manufacturer of the sensor arrays to optimize them for use in this context, and we deployed the single array in 2019 as part of the previous NFWF project. The applicant (Pyle) was the lead investigator of that earlier project. Additional research divers and ship crew have extensive experience working in protected and environmentally sensitive regions

elsewhere in the Pacific, and the vessel is designed and equipped to ensure minimal impact to the natural environment.

- 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 sensor arrays and associated power supplies (~\$150,00 total) have already been purchased with prior funding from NFWF. The vessel expenses and participant time have already been committed. All funding associated with this project has already been secured.

- 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.

Based on prior experience both within PMNM and in other similarly protected and sensitive locations, all members of this team (including ship crew) are extremely familiar with appropriate practices and protocols to ensure minimal impact on the natural environment. The specific methods used to recover, deploy, and scout locations will be conducted in full accordance with Best Management Practices (especially BMPs #001 & #011).

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

Yes, SY Acadia will be equipped with an approved mobile transceiver unit as required.

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

There are no other factors that would make issuance of a permit inappropriate under the Proclamation and its Findings section. Vessel and research operations will be conducted in a manner to comply with all Monument Best Management Practices & Policies.

The sample sizes needed are very small, the information potentially gained is invaluable to managers, and the people recruited to staff this project are among the very best in the world when it comes to characterization of deep reefs.

8. Procedures/Methods:

We will conduct dives at the location where the original sensor array was deployed, bring the array back to the surface to download data, recalibrate sensors, and redeploy at the same site with fresh batteries to continue capturing data for the next several years. Furthermore, we will conduct dives at target areas to locate optimal sites to deploy the remaining three sensor arrays, as well as identify potential sites for future arrays, and deploy the additional three arrays to continue capturing data for the next several years at additional locations and/or depths.

Deployment and redeployment of these arrays would follow all Best Management Practices (BMP; especially BMPs #001 & #011), and ensure that no live coral or potentially fragile habitat would be harmed by the presence of the sensor arrays. The arrays will be anchored to the seafloor in areas without live coral cover, using the most appropriate methods per consultation with PMNM researchers. These locations will be photo-documented to record the state of the sensor arrays and surrounding habitat at the time of deployment (allowing future comparisons), and ensure that future expeditions will be able to locate and recover the sensors and data, and redeploy them for continued monitoring and data collection. In-situ analysis on

seawater samples (50ml) will be conducted to establish a baseline of certain physical properties.

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

Noted.

9a. Collection of specimens - collecting activities (would apply to any activity): organisms or objects (List of species, if applicable, attach additional sheets if necessary):

Collections will be limited to voucher specimens of organisms that cannot be readily identified visually underwater, and may represent new geographical records and/or undescribed species. Additionally, voucher specimens will be collected of any organisms that may represent alien, invasive, or nuisance species.

Because one generally cannot anticipate encounters with new records or undescribed species, this list is necessarily generic and non-specific in terms of specifying species, sizes, and locations.

No more than one (1) specimen of each taxon will be collected in cases where an abundance assessment cannot be ascertained, or less than ten (10) such specimens are present, cumulative during the course of the collection event per island , atoll, or reef. No more than three (3) specimens of each taxon will be collected if an abundance assessment of ten (10) or more such specimens is ascertained, cumulative during the course of the collection event per island , atoll or reef. If any clonal organisms that cannot be visually identified or may represent a new geographic record or new species are found, no more than half the clonal organism visually observed. Will be collected. No more than three (3) clonal specimens of similar morphology will be collected if an abundance assessment of ten (10) or more of such specimens is ascertained, cumulative during the course of the collection event per island, atoll or reef.

Common name:

Scientific name:

& size of specimens:

Collection location:

☐ Whole Organism ☐ Partial Organism

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

The only specimens collected will either represent new geographic records, or undescribed species. All specimens will be referenced where appropriate in peer-reviewed publications, including accession numbers of type specimens or new records which will be deposited in museum research collections at institutions such as B.P. Bishop Museum, California Academy of Sciences, United States National Museum of Natural History (a.k.a. Smithsonian Institution), Natural History Museum, London, etc. Specimens in such museum

collections are readily available, in perpetuity, for any and all bona fide researchers to study.

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

Exceptions: Potential new species will be kept alive until they can be clearly photographed in the wet lab aboard the Acadia (on the day of collection), after which time animals will be humanely euthanized. Algal specimens are kept alive in seawater until they are pressed, preserved, or frozen in the wet lab aboard the Acadia (again, on the day of collection). The algae will be euthanized humanely.

• General site/location for collections:

• Is it an open or closed system? ☐ Open ☐ Closed

• Is there an outfall? ☐ Yes ☐ No

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

• Will organisms be released?

No.

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

Frozen (fish, algae), pressed (algae), or preserved in fixative (fish, algae).

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

All data collected from sensor arrays will be made publicly available. No other persons (to our best knowledge) are conducting similar research within PMNM. Thus, it is unlikely that this project will result in duplicative sampling.

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

Diving equipment

Underwater camera gear (including lights)

Hand nets

Zipper-closure bags

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

SY Acadia carries diesel fuel #2 to power its John Deere 6068 SFM85 main engine. A Safety Data Sheet is provided as an attachment to this application.

Chlorine bleach for gear disinfection per PMNM BMPs

10% formalin

13. Describe any fixed installations and instrumentation proposed to be set in the Monument:

AML Oceanographic METRECX multi-parameter instrument clusters, providing continuous high-resolution data (10-minute intervals) on temperature, conductivity, PAR, pH, and dissolved oxygen across multiple years (potentially indefinitely) at several sites within PMNM.

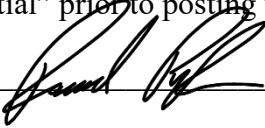
14. Provide a time line for sample analysis, data analysis, write-up and publication of information:

Initial Data Capture and sensor array (re) deployment: June-July 2022.
Data sharing from recovered and redeployed sensor array: August 2022.
Ongoing data capture of (re)deployed sensor arrays: 2025-2027.
Publication of any new species descriptions: 2022-2024
Publication of island-by-island fish checklists: 2023

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

Because we have not yet recovered the first deployed sensor array, there are no publications directly related to the proposed project. The applicant and research team can provide multiple publications to other research activities we have conducted within PMNM.

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 

1 February 2022
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