

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

March 27, 2026

Board of Land  
and Natural Resources  
Honolulu, Hawaii

Request for Authorization and Approval to Issue a Papahānaumokuākea Research Permit to Keolohilani Lopes to Conduct Research Activities for a *Chondria Tumulosa* Research Project

SUMMARY

The Papahānaumokuākea Marine National Monument (PMNM) program hereby requests approval from the Board of Land and Natural Resources (BLNR) for issuance of a Papahānaumokuākea research permit to Keolohilani H. Lopes Jr., University of Hawai‘i (UH) at Mānoa for access and authorization to conduct *Chondria tumulosa* research activities in areas in Papahānaumokuākea under State of Hawai‘i jurisdiction.

BACKGROUND LAW

The Board of Land and Natural Resources, by the Department of Land and Natural Resources (DLNR) Divisions of Aquatic Resources & Forestry and Wildlife, permits certain otherwise prohibited or regulated activities on or in its lands and waters, pursuant to Hawaii Revised Statutes (HRS) § 187A-6, 183D-6, and 195D-4; Hawaii Administrative Rules (HAR) § 13-60.5-5, 13-60.5-6, 13-126-9 and 13-126-10, and all other applicable laws and regulations.

DURATION AND LOCATION

The permit, as described below, would allow entry for research activities to occur in the PMNM, including the Northwestern Hawaiian Islands (NWHI) State Marine Refuge, on or in the lands and waters (0-3 nautical miles) surrounding the following to the extent within the jurisdiction of the State of Hawai‘i:

- Manawai (Pearl and Hermes Atoll)
- Lalo (French Frigate Shoals)

The activities covered under this permit would occur over 20 days from May 1, 2026 through November 30, 2026. Activities will also take place at Kuaihelani (Midway Atoll) outside of the State of Hawai‘i. The timing of entry into the Papahānaumokuākea will depend on the availability of ship transport, schedules, and weather.

### PERSONS COVERED UNDER THIS PERMIT

18 people will be covered under this permit. All persons will be identified prior to departure, and their names and affiliations will be shared with the PMNM permit coordinators.

Keolohilani H. Lopes Jr., Researcher (Chief Sci)  
Erik Franklin, Researcher  
Matthew Dunbabin, Robotics Engineer (AUS)  
Serena Riemers, Robotics Engineer (AUS)  
Anna Baker Mikkelsen, (DEN, Green Card), Geospatial Analyst  
Shelie Hable, Geospatial Analyst  
Ethan Nash, CIMAR Marine Research Technician  
Jeff Kuwabara, Outreach Specialist/Photographer  
Jason Leonard, NOAA ONMS Research Monitor

1 – eDNA Specialist (TBD)

8 – Ship Crew (TBD)

### INTENDED ACTIVITIES

The applicant proposes to deploy two different types of small Uncrewed Marine Systems (sUMS): FloatyBoat (2), a surface vehicle, and the RangerBot (1), a submersible, and an Automated Underwater Covert Camera and Hydrophone.

#### sUMS

The sUMS will autonomously map the invasive acting macroalga *Chondria tumulosa*, and collect ancillary images and data (temperature, depth, salinity, and eDNA). Both sUMS will be equipped with RGB camera/s, hyperspectral cameras, salinity, and temperature. The FloatyBoat will be equipped with two eDNA profiler types, an active McLane profiler, and a passive (soak) system consisting of filters that will be exposed to the ocean water in situ for 10 – 30 minutes. These sUMS are small and relatively lightweight, which allows for easy deployment over the side of a small boat. The applicant intends to create the ChondriaBot program which will utilize computer vision technology in the sUMS to identify and map *C. tumulosa*. The extent of *C. tumulosa* is a major knowledge gap for PMNM resource managers that the ChondriaBot program aims to fill. ChondriaBots systems rely solely on camera systems and other passive imaging technologies and will not directly contact the substrate. The eDNA approach will consist of a passive filtration technique and the simultaneous qPCR detection of both *A. spicifera* and *C. tumulosa* designed by UH graduate researcher, Patrick Nichols. These sUMS are developed by Queensland University of Technology (QUT), where they were rigorously field tested for several years, and adapted for this specific purpose by Mr. Lopes, for the UH at Mānoa. The ChondriaBot will have an apparatus to keep filter paper submerged during operations. When the operation is complete, the filter papers will be placed in sterile tubes and put on ice. When returning from the day's operations, all eDNA filter paper samples will be stored in a Dewar.

### Automated Underwater Covert Camera and Hydrophones

The applicant proposes to have two Automated Underwater Covert Cameras and Hydrophones deployed as part of this research. These units will conduct presence absence videos of marine species and how they relate to the sound scape and disturbances. More specifically, this passive hydrophone/camera will be used to compare the soundscapes between areas with *C. tumulosa* and areas without.

### Method

The applicant proposes to conduct research in the nearshore waters at Manawai (5 days), Lalo (2 days), and Kuaihelani (2 days). Specific sites at these atolls will be determined by opportunity, MMB input, and weather conditions. Each site will be in waters deeper than 30 centimeters (1 foot). The sUMS will either be programmed to run a predetermined route or a predetermined polygon. The researchers will have the capacity to operate the sUMS for > 8 hours (change of batteries). This project aims to collect data near the fringing reef, where small boats find it too dangerous to access.

All sUMS will be deployed over the side of a small boat. The size and weight of these sUMS allow for a single person to deploy and recover. The sUMS will then autonomously run the program to locate and map *C. tumulosa*. These sUMS will also collect water quality data and collect an eDNA sample. Direct exposure to the ocean by the sterile filter paper will collect the eDNA samples from which point it will be put into vials and stored. Vessel storage will be on ice or liquid nitrogen and then taken to the expedition vessel stored in liquid nitrogen.

The applicant proposes to have two Automated Underwater Covert Camera and Hydrophones deployed for approximately 6 hours per day also deployed over the side of a small boat. Both camera-hydrophones may be deployed at two separate sites each day. The applicant will place the weighted cameras in sandy bottom areas surrounded by reefs targeting areas like spur and grooves or sandy areas between reefs.

The applicant proposes to anchor at Lalo in sandy areas near La Perouse Pinnacle.

More detailed information about the project, including pictures and diagrams of the sUMS and Automated Underwater Covert Camera and Hydrophone set-up can be found in the application (attached).

### ADHERENCE TO FINDINGS CRITERIA, BMPs, AND OTHER SAFETY PROTOCOLS:

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
- Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area
- Anchoring a vessel

### Monument Management Plan Strategies

The activities proposed by the applicant directly support the Monument Management Plan (PMNM MMP Vol. 1, 2008), including but not limited to the Alien Species Action Plan strategies AS-7: investigate methods to eventually eradicate aquatic invasive organisms already known to be present in the Monument, and conduct regular surveillance for new invasions and AS-8: conduct and facilitate research designed to answer questions regarding invasive species detection, effects on ecosystem, and alien species prevention, control, and eradication over the life of the plan.

### Best Management Practices

To safeguard Papahānaumokuākea resources the applicants will abide by all PMNM Best Management Practices (BMPs) while conducting the aforementioned activities within PMNM.

<b>BMP Number</b>	<b>Title</b>	<b>Download</b>
001	Marine Alien Species Inspection Standards for Maritime Vessels	<a href="#">PDF</a>
002	Protocol for Acquiring Avian Blood Samples	<a href="#">PDF</a>
003	Human Hazards to Seabirds Briefing	<a href="#">PDF</a>
004	Best Management Practices for Boat Operations and Diving Activities	<a href="#">PDF</a>
005	Protocols to Reduce Impact to the Laysan Finch	<a href="#">PDF</a>
006	General Storage and Transport Protocols for Collected Samples	<a href="#">PDF</a>
007	Best Management Practices for Terrestrial Biosecurity	<a href="#">PDF</a>
008	Seabird Protocols Necessary for Conducting Trolling Research and Monitoring in Papahānaumokuākea Marine National Monument	<a href="#">PDF</a>
009	Best Practices for Minimizing the Impact of Artificial Light on Sea Turtles	<a href="#">PDF</a>
010	Marine Wildlife Viewing Guidelines	<a href="#">PDF</a>
011	Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment, Papahānaumokuākea Marine National Monument (Monument)	<a href="#">PDF</a>
012	Precautions for Minimizing Human Impacts on Endangered Land Birds	<a href="#">PDF</a>
015	Nonnative Species Inspection Requirements at Midway Atoll	<a href="#">PDF</a>
016	Best Management Practices for Activities on Nihoa	<a href="#">PDF</a>
017	Best Management Practices for Maritime Heritage Sites	<a href="#">PDF</a>
018	Rodent Prevention and Inspection Standards for Permitted Vessels	<a href="#">PDF</a>
019	Best Management Practices for Activities on Mokumanamana (Necker Island)	<a href="#">PDF</a>
020	Best Management Practices to minimize the spread of nuisance alga	<a href="#">PDF</a>

## REVIEW PROCESS

The application was sent out for review and comment to the following scientific and cultural entities: DAR, DOFAW, Papahānaumokuākea National Marine Sanctuary (NOAA-NOS), NOAA Pacific Islands Regional Office (NOAA-NMFS), USFWS, Hawaiian and Pacific Islands National Wildlife Refuge Complex Office and Ecological Services, and the Office of Hawaiian Affairs (OHA). The application was reviewed and received questions, comments, and applicant responses as noted below:

### Review Questions, Comments, and Responses:

1. Will small boats be anchoring? If so use best management practices when anchoring small boats.

#### Response:

We don't expect to anchor but we will ensure to follow BMP 20 on the sterilization of anchor, chain, and rode if we need to.

2. Applicant (Keo Lopes) is offering eDNA training session for USFWS staff at Midway. Great shared learning opportunity as the staff there have encountered Acanthopora spicifera and Chondria tumulosa. The leads for the project and a large portion of the team have worked in the Monument before. All are familiar with the fragile ecosystems, the spread of C. tumulosa, and the strict biosecurity protocols. All of the staff listed are highly qualified to complete the proposed tasks. Would applicants still be willing to conduct Edna training session on Midway?

#### Response

Yes, we would be delighted to train the Midway staff on the newest qPCR assay developed this past October by Dr. Patrick Nichols as well as the process in general.

3. Please provide more detail on your inter-island biosecurity measures and how this will be achieved above M/V Searcher

#### Response

Our biosecurity measures will consist of 1) preventing contamination, 2) reducing contact with invasive species, 3) cleaning all gear and vessel decks between atolls with 10% bleach), 4) careful inspection of debris or algae fragments. Our main line of defense is preventing contamination, no one will bring any material from the monument into the small boats. If we do come in contact with invasive species we will make sure to wipe from our gloves and wetsuits prior to boarding the small boats again. The rest of our biosecurity measure will follow the latest version of BMP20.

4. Make sure all biosecurity protocols including within Nuisance Algae Mitigation Zones are strictly adhered to.

## Response

We will adhere to biosecurity within the Nuisance Algae Mitigation Zones and follow the BMP20 guidelines.

5. It is not entirely clear whether the ChondriaBot work is part of a broader collaborative, multi-partner effort. Is this project being carried out in collaboration with other partners or programs? If so, who are the partners and what are their roles?

## Response:

The ChondriaBot program is a unique platform that has many potential uses for many types of research beyond what we are funded to do. I have opened up lines of communication with Erik Franklin to see how these types of systems will perform in fish research. I am partnering with the SOEST Coastal Research Collaborative (CRC, Mikkelsen and Habel) to see if we can merge our data sets, submerged and aerial. The next two years of funding we will shift our focus to marine debris detection, working with PMDP to develop these systems. They (PMDP) has been providing us with information on net locations and images to get some preliminary computer vision models working to test on this expedition. Our final collaborators are the MMB. These technologies will be beneficial and immediately useful, especially the eDNA portion of this study. Overall, these collaborations are not required by the funding agency, rather they are invited to work with this project to see how best to utilize these tools in ways we may or may not have initially intended.

6. The response to question 11 in Lopes's permit appears to focus mainly on the eDNA portion of the work. Can you provide additional information on the proposed activities involving FloatyBoat, RangerBot, and the sound/camera work, including how those activities will be carried out and how they relate to the overall project?

## Response:

One FloatyBoat system is specific to the eDNA sampler to **genetically detect** invasive macroalgae. The second FloatyBoat is specifically designed for computer vision and remote sensing equipment. This surface vehicle has a downward looking camera to **visually detect** *C. tumulosa* and other invasive macroalgae. Finally, the submersible (RangerBot) has a hyperspectrometer mounted on it and it will attempt to **spectrally detect** invasive macroalgae. These systems are adaptable and the images collected will be processed to identify other targets like marine debris. The overall goal of this project is the detection of *C. tumulosa*. The sound/camera work is a project in development to try to automatically identify fish while listening to the soundscape.

7. Lopes's permit references anchoring the R/V *Searcher* at Lalo (section 5b on page 6 and the narrative at the top of page 3). In Mikkelson's permit, section 5b does not indicate anchoring, and anchoring is not otherwise mentioned. Is anchoring of the R/V *Searcher* at Lalo being requested under one permit, or both?

## Response:

The Lopes' permit requests anchoring at Lalo to save fuel and it should read the same for the Mikkelsen permit. I would like to request all ship requests be handled on the Lopes permit. Lopes is chartering the R/V *Searcher* and the CRC (Mikkelsen) are collaborators for the project. I wasn't sure how to handle the two permits on the same charter vessel.

8. Both projects appear to involve the same vessel, but the vessel-related requests do not appear to be described the same way in each permit. Are the vessel operations and requests associated with the R/V *Searcher* the same for both permits, or are there differences between the two projects that should be noted?

Response:

Both projects are on the same vessel, on the same expedition, and require the same vessel operation requests. The Mikkelsen research requires terrestrial access for high precision GPS and drone deployments. The decision to put these two projects on different permit requests was 1) timing, because Lopes' permit was approved for 2025, we thought it would be certain it would be easier to get approved for 2026 with few changes. 2) I never requested terrestrial access before and because the funding for the ship is coming from the robotics project, I thought it best to insure we get the Lopes permit approved. Because we are a small R/V we may have to assist each other with both projects so we are all included in both permits.

9. Because the two permit applications appear related, it would be helpful to better understand how they fit together. How are the Lopes and Mikkelsen permits related operationally? For example, are they part of the same broader effort using the same vessel and coordinated field activities, or are they separate projects that only share certain logistics?

Response:

Independently, the Mikkelsen project is focused on centimeter scale elevation models to use in sea level rise research. This work utilizes high precision gps and aerial drones. This data can and will also be integrated to the submerged image data acquired by the Lopes robotics to integrate these two datasets together. It sounds simple in theory, but extremely difficult in practice. This work will be of great benefit for all aspects of research conducted at these sites. Our field activities are heavily coordinated during this expedition. The goals of each permit differ - the Lopes permit focuses on robotics and Chondria detection, while the Mikkelsen permit focuses on mapping islands and continuing ongoing research with Dr. Haunani Kane and Sara Kahanamoku-Mayer. Because the fieldwork overlaps (in space and time), we have additionally set out to use this opportunity to generate combined high resolution and accurate terrestrial and marine maps, and pending land access in the Mikkelsen permit, use the on land GPS to help locate and orient the robotics data processing to tie it together into one data product. All in all the permits function independently but working together pending the approval of both permits would benefit both projects.

## ENVIRONMENTAL COMPLIANCE

Are there other relevant/necessary permits or environmental reviews that have or will be issued with regard to this project? (e.g., HRS chapters 183C, 343; MMPA, ESA) Yes  No

If so, please list or explain:

- The Department has made an exemption determination for this permit as necessary for the applicant and team on this project 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 PAPA HĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO KEOLOHILANI LOPES, UNIVERSITY OF HAWAI‘I AT MĀNOA, FOR ACCESS TO STATE WATERS TO CONDUCT CHONDRIA TUMULOSA RESEARCH UNDER PERMIT PMNM-2026-005”)
- National Environmental Policy Act Categorical Exemption B9

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

If so, please summarize past permits:

The applicant received a permit in 2025 but the trip was modified and delayed to 2026.

Have there been any a) violations: Yes  No   
b) late/incomplete post-activity reports: Yes  No

involving any of the applicant agencies or personnel?

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

If yes, please explain.

#### STAFF OPINION

Department staff are of the opinion that the Lopes permit is justified under HAR chapter 13-60.5 criteria and should be allowed to enter state lands and waters in the Monument as indicated, and to conduct the activities as specified, subject to the PMNM Permit General Conditions, and the indicated special instructions, conditions, and protocols to be observed. Staff recommends that the BLNR approve the application as indicated below.

#### MONUMENT MANAGEMENT BOARD OPINION

The seven members of the Monument Management Board (MMB) were consulted and are of the opinion that the applicant has met permit procedures and criteria under the findings of Presidential Proclamation 8031, 71 Fed. Reg. 36,443 (2006) as required, and the research activities may be conducted subject to completion of all compliance requirements recommended

below. The MMB concurs with any special conditions recommended by DLNR staff. The MMB determined that a Resource Monitor be assigned to this permit and a NOAA ONMS staff person will fill this role.

RECOMMENDATIONS:

That the Board of Land and Natural Resources

- A. Approve the proposed permit for Keolohilani Lopes according to the form of the Application (Attachment 1) and authorize and approve entry to State lands and waters of the PMNM, with the following conditions:
1. That the BLNR declare that the anticipated actions to be undertaken under this permit will have little or no significant effect on the environment except consistently with the activities covered in the 2008 Final Environmental Assessment (FEA) and FONSI. Any activities not covered in the FEA shall be addressed by the declaration of exemption from the preparation of an environmental assessment (attached).
  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 permittee provide, as required under the Papahānaumokuākea permit general terms and conditions, a summary of their findings under this PMNM access, including but not limited to, any initial findings to the DLNR for use at educational institutions and outreach events. Any unexpected results and anomalous encounters should be included in a report or future permit applications to the BLNR to allow proper evaluation of research efforts in future permitting decisions.
  4. That all persons covered under this permit shall abide by and obey all Papahānaumokuākea permit general conditions and protocols, unless otherwise specifically permitted, exempted, or excluded under the terms and conditions.
  5. 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 Papahānaumokuākea for obtaining patent or intellectual property rights.
  6. 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.

7. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocol attached to the permit.
8. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.
9. 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 with the exception of boats utilized in operations that are land-based for extended periods of time.
10. 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.
11. No fishing is allowed in State Waters except as authorized under State law for subsistence, traditional and customary practices by Native Hawaiians.
12. To mitigate risk of spreading *Chondria tumulosa* within the monument and Main Hawaiian Islands, the permittee will follow the Best Management Practices to Minimize the Spread of Nuisance Alga (BMP #20).

Respectfully submitted,



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Brian J. Neilson, Administrator  
Division of Aquatic Resources

APPROVED FOR SUBMITTAL



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Ryan K. P. Kanaka'ole, Acting Chairperson  
Board of Land and Natural Resources

Attachments:

- 1) Application
- 2) Declaration of Exemption (“DE”) from the Preparation of an Environmental Assessment under the Authority of Chapter 343, HRS & Chapter 11-200.1 HAR

**Papahānaumokuākea**  
RESEARCH Permit Application

This Permit Application (and associated Instructions) are to propose activities to be conducted in the Papahānaumokuākea Marine National Monument and Papahānaumokuākea National Marine Sanctuary (collectively referred to as Papahānaumokuākea hence forth). 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.

Any or all of the information within this application may be posted to the Papahānaumokuākea website informing the public on projects proposed to occur in Papahānaumokuākea.

Completed permit applications may be emailed to [nwhipermit@noaa.gov](mailto:nwhipermit@noaa.gov) or mailed to:  
NOAA/Inouye Regional Center  
NOS/ONMS/PMNM/Attn: Permit Coordinator  
1845 Wasp Blvd, Building 176  
Honolulu, HI 96818

**INCOMPLETE APPLICATIONS WILL NOT BE CONSIDERED**

## **Papahānaumokuākea 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. While a permit application has been received, it has not been fully reviewed nor approved by the Monument Management Board to date. Papahānaumokuākea's permit process also ensures that all environmental reviews are conducted prior to the issuance of a Papahānaumokuākea permit.

### **Summary Information**

**Applicant Name:** Keolohilani H. Lopes Jr

**Affiliation:** University of Hawai'i at Mānoa

**Permit Category:** Research

**Proposed Activity Dates:** May 1, 2026 through November 30, 2026

**Proposed Method of Entry (Vessel/Plane):** R/V Searcher

**Proposed Locations:** Lalo, Manawai, Kuaihelani

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

16

**Estimated number of days in Papahānaumokuākea:** 25

**Description of proposed activities:** (complete these sentences):

a.) The proposed activity would...

do two things, 1) advance the remote sensing of coral reef ecosystems, and 2) provide unprecedented, large scale, presence/absence data to PNMS resource managers. 3) Collect imagery for use in a Hawaiian reef fish specific computer vision dataset. To accomplish these goals, we will deploy two different models of small Uncrewed Marine Systems (sUMS). We have two individual surface vehicles (FloatyBoat) (8a), one submersible (RangerBot) (8b), and an Automated Underwater Covert Camera and Hydrophone (AUCCH)(8d). The three unique sUMS, 1) eDNA, 2) computer vision, and 3) hyperspectral camera, are designed to work autonomously in collaboration to collect data, specifically to identify the invasive acting macroalga *Chondria tumulosa*. Ancillary data collected by these robotic systems include, temp, salinity, and eDNA samples. One surface sUMS is equipped with a McLane eDNA profiler (8c) which is capable of collecting multiple samples per deployment. The second surface sUMS is equipped with a computer vision camera system trained to detect the invasive-acting *C. tumulosa*. Finally, the submersible sUMS is equipped with internally mounted cameras and a hyperspectral imager. All three sUMS are light weight for easy deployment over the side of a small boat. Additionally, we will have two Automated Underwater Covert Camera and Hydrophone systems that will be deployed for approximately 6 hours per day. We will set these weighted cameras in sandy bottom areas surrounded by reefs. These cameras will be deployed at the start of the day and retrieved at the end of the field day.

These camera systems will be utilized for the collection of presence absence videos of marine species and how they relate to the sound scape and disturbances. More specifically, this passive hydrophone/camera will be used to compare the soundscapes between areas with *C. tumulosa* and areas without.

Finally, snorkelers will be deployed during robotic operations to collect photo/video images to expand a computer vision dataset specifically built for the automated detection of Hawaiian reef fish. This project will provide valuable imagery to increase the capacity and accuracy of the automated counting of fish. These snorkelers will be equipped with small cameras and/or GoPro style sport cameras.

We also request land access to Kuaihelani (Midway) for land based robotics deployments and FWS training of these equipment if they desire.

This project would consist of one expedition of ~25 DAS which will stop at Lalo (~2 days), then Manawai (~7 days), and finally Kuaihelani (~2 days). We will return directly to Honolulu after our final field day at Kuaihelani. We estimate a total 11 days of research with 14 days of transit (~25 DAS). Tentative itinerary below:

<u>Date</u>	<u>Port/Island</u>	<u>Departure Time</u>	<u>Distance</u>
March 2026	Kewalo Basin Inspection		
June 2, 2026	Load SEARCHER		
June 3, 2026	Depart Kewalo for Lalo	1600	490 nm @ 8knots 62hours
June 4, 2026	Transit to Lalo		
June 5, 2026	Transit to Lalo		
June 6, 2026	Transit to Lalo	Arrive Lalo 0600 Anchor between La Persouse and Tern and deploy skiffs.	
June 7, 2026	Lalo Full Day		
June 8, 2026	Depart Lalo & Transit to Manawai	Depart Lalo by first light 0600	579 nm @ 7.5-8 knots 72 - 78 hours
June 9, 2026	Transit to Manawai		
June 10, 2026	Transit to Manawai		
June 11, 2026		Arrive Manawai 0800 Deploy Marine Robotics	
June 12, 2026	Manawai Field work	Field Work	

June 13, 2026	Manawai Field work	Field Work	
June 14, 2026	Depart Manawai & Transit to Kuaihelani	Depart Manawai 1900	80nm @ 7.5knots 10-11hrs
June 15, 2026	Arrive Kuaihelani	Arrive 0600	
June 16, 2026	At dock Kuaihelani		
June 17, 2026	Depart Kuahelani transit to Honolulu	0800	1145nm @ 7.5 knots 153hrs - 6.5days
June 18, 2026	Transit to Honolulu		
June 19,2026	Transit to Honolulu		
June 20, 2026	Transit to Honolulu		
June 21, 2026	Transit to Honolulu		
June 22, 2026	Transit to Honolulu		
June 23, 2026	Transit to Honolulu		
June 24, 2026	Arrive Kewalo basin Harbor	Arrive 1700	
June 25, 2026	Offload SEARCHER		

b.) To accomplish this activity we would ....  
 deploy sUMS from small boats in the areas of interest. We will also deploy the hydrophones in the beginning of the day and retrieve them prior to returning to the ship. Snorkelers will be deployed intermittently throughout the work day.

c.) This activity would help Papahānaumokuākea by ...  
 providing comprehensive maps of *C. tumulosa* location throughout Manawai in addition to oceanographic, eDNA, and soundscape data which will aid in the management of PNMS. Second, this project will employ new technologies of data collection and field test the newly developed eDNA protocol for the simultaneous detection of both *A. spicifera* and *C. tumulosa*. This eDNA analysis will allow for a single qPCR test to detect the presence of both species of concern for PNMS. In general, these technologies will advance the biogeographical data collection of the resources in PNMS and the state of Hawai'i.

We also are offering a two-hour eDNA training session for the FWS staff which includes the operation of the robotic sampling methodologies. This training is useful to

get hands on training of the most recent eDNA sampling for qPCR of *A. specifera* and *C. tumulosa*.

**Other information or background:**

These sUMS are currently being operated in waters off of Oahu and in an abundance of caution to preventing the spread of AIS we will follow BMP 20 guidelines prior to deployment within PNMS. The sUMS will receive a thorough decontamination and rinsing 30 days prior to expedition departure. The sUMS will then remain at the UH Manoa campus in Sherman Lab Rm 238 which consists of no algae, no plant material, or other potential contaminants.

## **Section A - Applicant Information**

### **1. Applicant**

Name (last, first, middle initial): Lopes Jr., Keolohilani, H.

Title: Mr.

**1a. Intended field Principal Investigator (See instructions for more information):**  
Keolohilani H. Lopes Jr.

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

Phone:

Fax:

Email:

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

**3. Affiliation (institution/agency/organization directly related to the proposed project):**  
University of Hawai'i at Mānoa, Natural Resource and Environmental Management

**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):**

Keolohilani H. Lopes Jr., Researcher (Chief Sci)

Erik Franklin, Researcher

Matthew Dunbabin, Robotics Engineer (AUS)

Serena Riemers, Robotics Engineer (AUS)

Anna Baker Mikkelsen, (DEN, Green Card), Geospatial Analyst

Shelie Hable, Geospatial Analyst

Jason Leonard, Resource Protection Monitor (PNMS/NOAA)

Ethan Nash, CIMAR Marine Research Technician

Jeff Kuwabara, Outreach Specialist/Photographer

3 – Field Techs (TBD)

6 – Ships Crew



## **Section B: Project Information**

### **5a. Project location(s):**

- |  |  |
|--|--|
| <input type="checkbox"/> Nihoa Island                                | <input type="checkbox"/> Land-based            |
| <input type="checkbox"/> Mokumanamana (Necker Island)                | <input type="checkbox"/> Land-based            |
| <input checked="" type="checkbox"/> Lalo (French Frigate Shoals)     | <input type="checkbox"/> Land-based            |
| <input type="checkbox"/> ‘Ōnūnui and ‘Ōnuiki (Gardner Pinnacles)     | <input type="checkbox"/> Land-based            |
| <input type="checkbox"/> Kamokuokamohoali‘i (Maro Reef)              | <input type="checkbox"/> Land-based            |
| <input type="checkbox"/> Kamole (Laysan Island)                      | <input type="checkbox"/> Land-based            |
| <input type="checkbox"/> Kapou (Lisianski Island)                    | <input type="checkbox"/> Land-based            |
| <input checked="" type="checkbox"/> Manawai (Pearl and Hermes Atoll) | <input type="checkbox"/> Land-based            |
| <input checked="" type="checkbox"/> Kuaihelani (Midway Atoll)        | <input checked="" type="checkbox"/> Land-based |
| <input type="checkbox"/> Hōlanikū (Kure Atoll)                       | <input type="checkbox"/> Land-based            |
| <input type="checkbox"/> Outer Sanctuary Zone                        |  |
| <input type="checkbox"/> Other                                       |  |

### **Ocean Based**

- |   |                                     |
|---|-------------------------------------|
| <input type="checkbox"/> Shallow water            | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> Shallow water            | <input type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> Shallow water            | <input type="checkbox"/> Deep water |
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| <input checked="" type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input checked="" type="checkbox"/> Shallow water | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> Shallow water            | <input type="checkbox"/> Deep water |
| <input type="checkbox"/> Deep water               | <input type="checkbox"/> Deep water |

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:

The primary locations of interest are Manawai and Kuaihelani, our ‘control’ site is Lalo. We intend to deploy these sUMS in the shallow waters of these atolls on the backreef and forereef where *C. tumulosa* is thought to be. We will deploy sUMS at Lalo to collect data from *C. tumulosa* free sites, system checks and calibrations. The eDNA collections here will monitor the presence/absence of *C. tumulosa* at Lalo. We also request terrestrial access to Kuaihelani for shore based robotic deployments and potential FWS eDNA training.

### **5b. Check all applicable regulated activities proposed to be conducted in**

#### **Papahānaumokuākea:**

- Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving resource of Papahānaumokuākea
- 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 Papahānaumokuākea
- Touching coral, living or dead
- Possessing fishing gear except when stowed and not available for immediate use during passage without interruption through Papahānaumokuākea

- Attracting any living resource of Papahānaumokuākea
- 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

**6. Purpose/Need/Scope *State purpose of proposed activities:***

The ChondriaBot program will utilize computer vision technology in small autonomous uncrewed marine systems to identify and map *C. tumulosa*. The extent of *C. tumulosa* is a major gap in knowledge for PMNM resource managers that the ChondriaBot program aims to fill. ChondriaBots systems rely solely on camera systems and other passive imaging technologies and will not directly contact the substrate. The project consists of two types of sUMS named FloatyBoat (8a) and a submersible called the RangerBot (8b), see ‘Procedures and Methods’ section for specifications. Ancillary data collected by these sUMS are salinity, depth, temperature, and eDNA collected on filter paper. Our eDNA approach will consist of a passive filtration technique and the simultaneous qPCR detection of both *A. spicifera* and *C. tumulosa* designed by former UH researcher, Patrick Nichols. These sUMS are developed by Queensland University of Technology (QUT) and adapted for this specific purpose by Mr. Lopes, for the University of Hawai‘i at Mānoa. The ChondriaBot will have passive eDNA filter paper attached underwater during operations. When the operation is complete, the filter papers will be placed in sterile tubes and put on ice. When returning from the day’s operations, all eDNA filter paper samples will be processed that evening or frozen.

The ChondriaBot and RangerBot locomotion and autonomy have been rigorously field tested for almost a decade and we expect no problems in its operations.

\*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.  
N/A

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 Papahānaumokuākea:**

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 Papahānaumokuākea?

Parameters for the sUMS can be preprogrammed to avoid culturally sensitive sites as well as natural and historic areas of higher sensitivity. We can also map these same sites to digitally preserve them if PMNM Management identifies this as an ancillary project they would like us complete. These sUMS are noninvasive in design and will not come in contact with any natural resources of PMNM.

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 Papahānaumokuākea’s cultural, natural and historic resources, qualities, and ecological integrity, any indirect, secondary, or cumulative effects of the activity, and the duration of such effects?

This project is noninvasive and will collect data to manage *C. tumulosa* and it can enhance the qualities of PMNM by digitally capturing images for perpetuity

c. Is there a practicable alternative to conducting the activity within Papahānaumokuākea? If not, explain why your activities must be conducted in Papahānaumokuākea.

*Chondria tumulosa* is a problem plaguing PMNM. It is currently isolated within PMNM boundaries and only located at the Northern most atolls within PMNM. This project will extend our knowledge of the extent of *C. tumulosa* at Manawai by surveying areas inaccessible by other traditional survey methods. These robotic systems are designed to work in both shallow and deep areas which will allow for more expansive and detailed data that is currently state-of-the-art. The data collected will result in detailed benthic maps at relatively large scales, larger than conventional SCUBA surveys allow.

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

There are no adverse impacts of this study and this research will provide valuable data that can be used for the management of PMNM. Ancillary data like salinity, temperature, turbidity, and eDNA will also provide high resolution data for historic archives and researchers.

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

This project is intended to be the final step in our proof of concept of these sUMS. We will be able to survey 3 to 4 sites a day which will generate enough data to determine the ‘successes of these systems to identify and map *C. tumulosa*. Upon successful completion it is our intention to upscale this program and continue surveys in future years.

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

I am a trained PMNM resource monitor and a former affiliate of PMNM for 6 years and have been conducting research in PMNM for nearly 12 years. I have also been trained in the use of these sUMS. I will use this experience and expertise to avoid and mitigate potential issues as well as have safeguards in place for any potential situation. I have also published 2 peer reviewed journal articles on PNMS ecological systems for fish behavior on SCUBA surveys and a paper specifically on the proliferation of *C. tumulosa*. I have also co-authored several papers on these subjects.

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. We currently have possession of all robotic systems and we have been awarded the funding required for the ship charter.

h. Explain how your methods and procedures are appropriate to achieve the proposed activity's goals in relation to their impacts to Papahānaumokuākea's cultural, natural and historic resources, qualities, and ecological integrity.

This project will be collecting two primary data types 1) images and electronic sensor data (benthic photos, hyperspectral imagery data, temperature data, salinity data). 2) eDNA filter paper/cotton swabs. The eDNA collected will be by an active method where water is pumped through the filter in situ through the McLane eDNA profiler machine, from which the eDNA filter paper will be retrieved and eventually frozen. The passive method of eDNA collection will consist of exposing a filter to the ocean water with no active pumping. A filter soak directly in the ocean. These eDNA filters will be retrieved and eventually frozen at the end of the day. No sea water will be collected. All eDNA sampling will be conducted in situ.

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

The Searcher regularly deploys into PMNM and is compliant.

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 the issuance of a permit for the activities inappropriate.

## 8. Procedures/Methods:

### a) FloatyBoat –



Dimensions (m) Length x Width	1.95m x 1.1m
Height above waterline	0.45m
Draft, with fins	0.24m
Weight (kg)	~16kg
Endurance (h)	2 hours
Survey Speed	2 m/s
Operational Envelope (tested)	Winds, max 36 knots

**b) RangerBot –**



Dimensions (m) Length x Width x Height	0.75 x 0.44 x 0.33
Weight (kg)	16kg
Endurance (h)	6 hours
Survey Speed	0.3 – 0.6 m/s
Operational Envelope (tested)	Winds, max 36 knots

**c) McLane Labs eDNA Profiler (Internally mounted on sUMS)**



**Robotic Cartridge Sampling Instrument**

**Application:**  
 The Robotic Cartridge Sampling Instrument (RoCSI), is a biomolecular sampler that performs in-situ sample collection and preservation onto 0.22 µm or 0.45 µm Sterivex® filter cartridges. RoCSI features high sample count capabilities in a compact, 6,000 m rated instrument.

Cartridges are stored on a continuous sample belt and are rotated into position for sampling or injecting preservative. The compact size and user-defined sample capacity make the RoCSI ideal for vehicle integration, long-term mooring systems, buoy mounts, bottom landers and ship-board applications.

**Features:**  
 Suitable for collection of genetic material, environmental DNA (eDNA) and other fine particulates or microorganisms. Supervised sampling (pressure and flow rates) is programmed to process samples. Automated cleaning of the intake fluid path for contamination mitigation. Compact size for deployment in AUVs or ROVs.

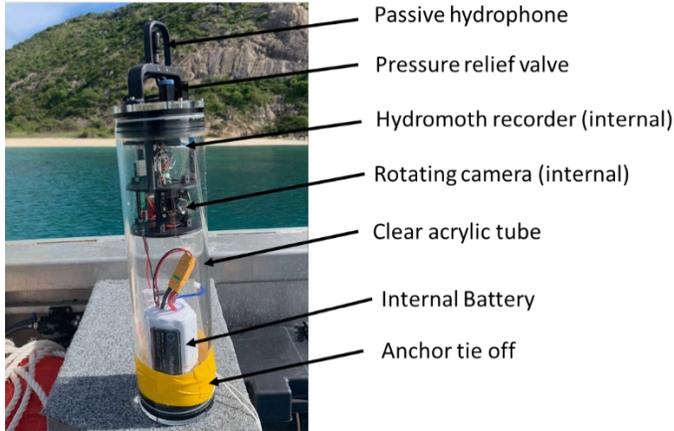
**RoCSI Specifications:**

Dimensions:	17 cm x 18 cm x 53 cm (6.7 in x 7.08 in x 20.86 in)
Weight in air:	15.5 kg (34 lbs)
Weight in seawater:	10 kg (22 lbs)
Depth rating:	6000 m
Bulkhead connectors:	Subconn MCBHM 8-pin male for 12V power
Communications:	USB to a Windows® interface or RS-232 (for adaptive sampling)
Power supply:	12 V DC / 2 A nominal; 16 V max 0.4-0.7 A current at 12 V
Electronics Housing:	Titanium
Pump:	Peristaltic pump

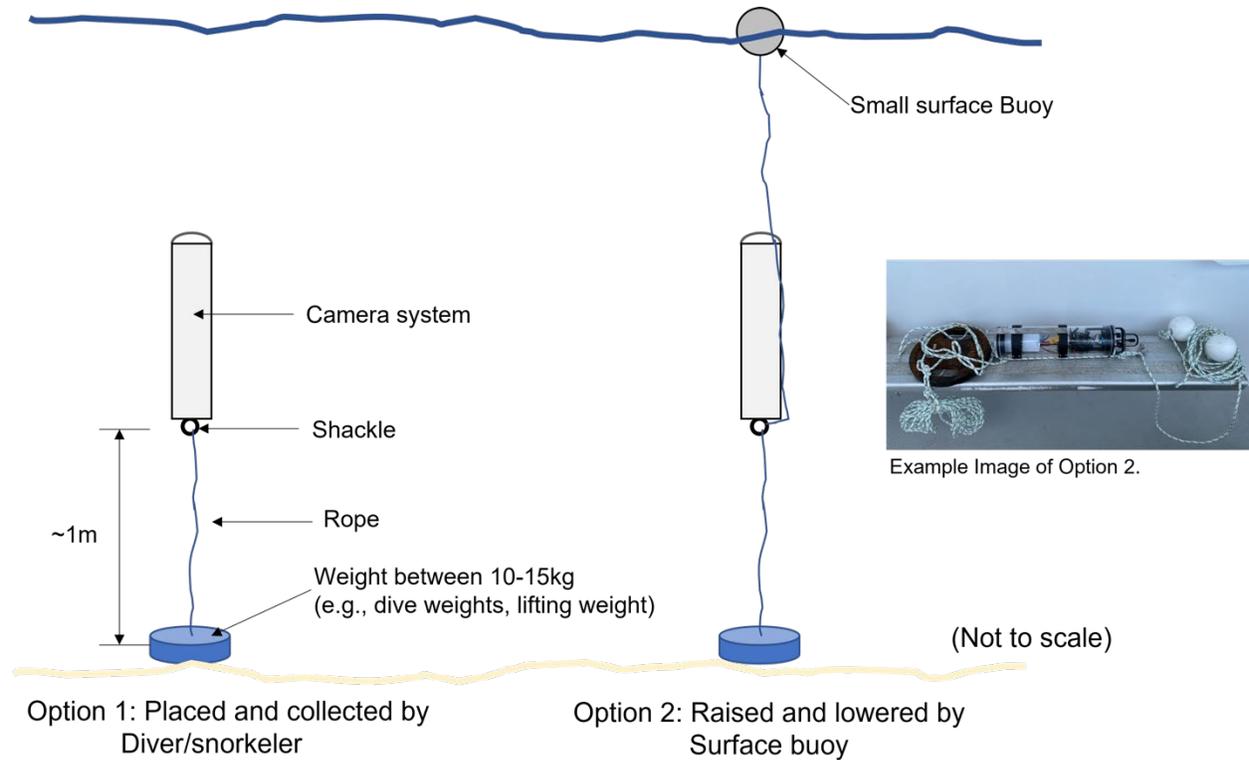
- Technology transfer from the National Oceanography Centre to McLane Research Laboratories, Inc.
  - Patents: Robidart, J. J. Wyatt, R. Brown (2021) Autosampler device and method for autonomous UK Patent Application 210592.7
  - For more information about this product visit [mclanelabs.com](http://mclanelabs.com).
- Selected References:**
- National Oceanography Centre annual report, p. 24-25, 3-36.
  - 3400 m depth deployment in Autosub6000 on the Mirabilis expedition for EU Horizon 2020 project IMARIS.
  - Surface RoCSI measures DNA from microbes across the western Atlantic (Bermuda and along the US coast) - *OME* journal article.
  - 12 August 2022: 895 James Cook JC27 bathythermograph (Autosub 6, with NERC Project C140 and EU project IMARIS) and benchtop (part of EU Horizon 2020 project AtlanticCO2).

Specifications subject to change without notice • 01/24 • [www.mclanelabs.com](http://www.mclanelabs.com)  
 Tel: +1 508-495-6000 • Email: [mclane@mclanelabs.com](mailto:mclane@mclanelabs.com) • [www.mclanelabs.com](http://www.mclanelabs.com)

**d) Automated Underwater Covert Camera and Sound Recorder**



Acrylic tube length	400 mm
Overall length (without anchoring rope)	~500 mm
Diameter	115 mm
Weight	~ 2.7 kg
Buoyancy	~ 1.5 kg
Battery	14.8V 15.6 Ah Lithium Ion
Onboard computer/storage	Raspberry Pi
Camera	USB camera (configurable 1080p and 4k)
Recording time	Fully customizable (typically record 1 min every 10 min, or 2 min every 15min.)



**Figure c: Automated Underwater Covert Camera and Hydrophone**

Research will be conducted at Manawai (est. 7 days) and Lalo (1 or 2 Days). Specific sites at these two atolls will be determined by opportunity and weather conditions. Each site will be in waters deeper than 30 centimeters (1 foot). The sUMS will either be programmed to run a predetermined route, or a predetermined polygon. We have the capacity to operate the sUMS for > 8 hours (change of batteries). This project aims to collect data near the fringing reef, where small boats find it too dangerous to access.

All sUMS will be deployed over the side of any small boat. The size and weight of these sUMS allow for a single person to deploy and recover. The sUMS will then autonomously run the program to locate and map *C. tumulosa*. These sUMS will also collect water quality data and collect an eDNA sample. Direct exposure to the ocean by the sterile filter paper will collect the eDNA samples from which point it will be put into vials and stored. Any samples returned for future analysis will be frozen.

**NOTE: If land or marine archeological activities are involved, contact the Papahānaumokuākea 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):**

We propose the collection of environmental DNA samples at each site. This consists of filtering ~2L of seawater and testing the filters on the research vessel.

Common name:  
eDNA

Scientific name:  
N/A

# & size of specimens:  
Approximately 300 samples

Collection location:  
Lalo, Manawai, Kuaihelani

Whole Organism  Partial Organism

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

All eDNA filter paper samples collected will be sent to UH Manoa Lab Services for analysis and the filter paper are destroyed during processing and disposed of by the UH Manoa Lab Services.

**9c. Will the organisms be kept alive after collection?**  Yes  No  
N/A

• General site/location for collections:  
Subsurface water ~1' below the sUMS

• Is it an open or closed system?  Open  Closed  
N/A

• Is there an outfall?  Yes  No  
N/A

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

• Will organisms be released?  
N/A

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

The samples will leave the monument with the eDNA filters contained individually in a sealed sample vial and frozen.

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

All eDNA analysis and results will be made publicly available and a special effort will be made to get this information to the Chondria Working Group. We continue to work with the Chondria Working group to maintain collaboration.

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

Three customized sUMS will be used, two ChondriaBot's (one eDNA and one Computer Vision) and the RangerBot and the sensor packages will be utilized as described above. We will also conduct daily deployments of the Automated Underwater Covert Camera and Hydrophone system.

**12b. List all Hazardous Materials you propose to take to and use within Papahānaumokuākea:**

Lithium-Ion Batteries, Clorox Bleach (sanitize gear between atolls)

**13. Describe any fixed installations and instrumentation proposed to be set in Papahānaumokuākea:**

N/A

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

1 year for data analysis and 2 years for publication/s

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

**Lopes, K. H. Jr**, Miura, T., Hauk, B., Kosaki, R., Leonard, J., & Hunter, C. (2023). Rapid expansion of the invasive-like red macroalga, *Chondria tumulosa* (Rhodophyta), on the coral reefs of the Papahānaumokuākea Marine National Monument. *Journal of Phycology*, 59, 1107–1111. <https://doi.org/10.1111/jpy.13369>

Fraiola, K.M.S., Miura, T., Martinez, J., **Lopes, K.H.**, Amidon, F., Torres-Pérez, J., Spalding, H.L., Williams, T., So, K., Sachs, E., Kosaki, R.K., 2023. Using commercial high-resolution satellite imagery to monitor a nuisance macroalga in the largest marine protected area in the USA. *Coral Reefs* 42, 253–259. <https://doi.org/10.1007/s00338-022-02336-6>

Beyer, L., Miura, T., Fraiola, K., Spalding, H.L., Williams, T.M., Martinez, J., Kosaki, R.K., **Lopes, K.H.**, 2025. Assessment of the spatial distribution of *Chondria tumulosa*, a nuisance macroalga at Manawai in Papahānaumokuākea Marine National Monument using high-resolution satellite imagery. *J. Phycol.* jpy.70025. <https://doi.org/10.1111/jpy.70025>

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

**DID YOU INCLUDE THESE?**

- Applicant CV/Resume/Biography
- Intended field Principal Investigator CV/Resume/Biography
- Electronic or Hard Copy of Application with Signature
- Statement of information you wish to be kept confidential
- Material Safety Data Sheets for Hazardous Materials

#### PRA Burden Statement

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995 unless the information collection has a currently valid OMB Control Number. The approved OMB Control Number for this information collection is 0648-0548. Without this approval, we could not conduct this information collection. Public reporting for this information collection is estimated to be approximately 5 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. All responses to this information collection are required to obtain services or benefits. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to NOAA/Inouye Regional Center NOS/ONMS/PMNM Attn: Permit Coordinator, [nwhipermit@noaa.gov](mailto:nwhipermit@noaa.gov).

#### Privacy Act Statement

**Authority:** The collection of this information is authorized under 5 U.S.C. § 301 (Departmental regulations), 5 U.S.C. § 552a (Records maintained on individuals), 15 U.S.C. § 1512 (Powers and duties of Department), 54 U.S.C. § 320301 *et seq.* (*Antiquities Act*), 16 U.S.C § 1801 *et seq.* (*Magnuson-Stevens Fishery Conservation and Management Act*), 16 U.S.C. § 742f (*Powers of Secretaries of the Interior and Commerce*), 16 U.S.C. § 742l (*Enforcement authority for the protection of fish and wildlife resources*), 16 U.S.C. § 1431 *et seq.* (*National Marine Sanctuaries Act*), and 50 CFR 404 *et seq.* (Papahānaumokuākea Marine National Monument regulations).

**Purpose:** The collection of information such as names, addresses, contact information, professional qualifications, completed permit application form, and supporting project information is required in order for Papahānaumokuākea Marine National Monument agency staff to review and render decisions on requests to conduct certain activities in the Monument and to inform management actions (e.g., emergency response and enforcement) or decision making in the Monument.

**Routine Uses:** Disclosure of this information is permitted under the Privacy Act of 1974 (5 U.S.C. § 552a), to be shared with the Department of Commerce staff for work-related purposes, and the Department of Interior and the State of Hawaii to ensure the permitting requirements and processes of all three entities are sufficiently coordinated and to ensure applicants for permits for Monument activities require only a single application and receive one, combined agency permit. Disclosure of this information is also subject to all of the published routine uses as identified in the Privacy Act System of Records Notices (SORNs) COMMERCE/DEPT-23, Information Collected Electronically in Connection with Department of Commerce Activities, Events, and Programs, NOAA-11, Contact Information for Members of the Public Requesting or Providing Information Related to NOAA's Mission, and NOAA-12, Marine Mammals, Endangered and Threatened Species, Permits and Authorizations Applicants.

**Disclosure:** Furnishing this information is voluntary; however, failure to provide complete and accurate information will prevent the review and rendering of a decision on the permit request.

JOSH GREEN, M.D.  
GOVERNOR | KE KIA'ĀINA

SYLVIA LUKE  
LIEUTENANT GOVERNOR | KA HOPE KIA'ĀINA



STATE OF HAWAII | KA MOKU'ĀINA 'O HAWAI'I  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
1151 PUNCHBOWL STREET  
HONOLULU, HAWAII 96813

DAWN N.S. CHANG  
CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCES  
COMMISSION ON WATER RESOURCE  
MANAGEMENT

RYAN K.P. KANAKA'OLE  
FIRST DEPUTY

CIARA W. K. KAHAHANE  
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

March 27, 2026

TO: Division of Aquatic Resources File

THROUGH: Ryan K. P. Kanaka'ole, Acting Chairperson

Handwritten signature of Ryan K. P. Kanaka'ole.

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

Handwritten signature of Brian J. Neilson.

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 PAPAĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO KEOLOHILANI LOPES, UNIVERSITY OF HAWAII AT MĀNOA, FOR ACCESS TO STATE WATERS TO CONDUCT *CHONDRIA TUMULOSA* RESEARCH UNDER PERMIT PMNM-2026-005.

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

Project Title:

Papahānaumokuākea Marine National Monument Research Permit to Keolohilani Lopes to Conduct Research Activities for a *Chondria Tumulosa* Research Project

Permit Number:

PMNM-2026-005

Project Description:

The permit, as described below, would allow entry for research activities to occur in the Papahānaumokuākea Marine National Monument (PMNM), including the Northwestern Hawaiian Islands (NWHI) State Marine Refuge, on or in the lands and waters (0-3 nautical miles) surrounding the following to the extent within the jurisdiction of the State of Hawai'i:

- Manawai (Pearl and Hermes Atoll)

- Lalo (French Frigate Shoals)

The activities covered under this permit would occur over 23 days from May 1, 2026 through November 30, 2026. Activities will also take place at Kuaihelani (Midway Atoll) outside of the State of Hawai‘i. The timing of entry into PMNM will depend on the availability of ship transport, schedules, and weather.

### **INTENDED ACTIVITIES:**

The applicant proposes to deploy two different types of small Uncrewed Marine Systems (sUMS), FloatyBoat (2), a surface vehicle, and the RangerBot (1), a submersible, and an Automated Underwater Covert Camera and Hydrophone.

#### sUMS

The sUMS will autonomously map the invasive acting macroalga *Chondria tumulosa* (*C. tumulosa*), and collect ancillary images and data (temperature, depth, salinity, and eDNA). Both sUMS will be equipped with RGB camera/s, hyperspectral cameras, salinity, and temperature. The FloatyBoat will be equipped with two eDNA profiler types, an active McLane profiler, and a passive (soak) system consisting of filters that will be exposed to the ocean water in situ for 10 – 30 minutes. These sUMS are small and relatively light weight which allows for easy deployment over the side of a small boat. The applicant intends to create the ChondriaBot program which will utilize computer vision technology in the sUMS to identify and map *C. tumulosa*. The extent of *C. tumulosa* is a major gap in knowledge for PMNM resource managers that the ChondriaBot program aims to fill. ChondriaBots systems rely solely on camera systems and other passive imaging technologies and will not directly contact the substrate. The eDNA approach will consist of a passive filtration technique and the simultaneous qPCR detection of both *Acanthopora spicifera* (*A. spicifera*) and *C. tumulosa* designed by UH graduate researcher, Patrick Nichols. These sUMS are developed by Queensland University of Technology, where it was rigorously field tested for several years, and adapted for this specific purpose by Mr. Lopes, for the UH at Mānoa. The ChondriaBot will have an apparatus to keep filter paper submerged during operations. When the operation is complete, the filter papers will be placed in sterile tubes and put on ice. When returning from the day’s operations, all eDNA filter paper samples will be stored into a Dewar.

#### Automated Underwater Covert Camera and Hydrophones

The applicant proposes to have two Automated Underwater Covert Camera and Hydrophones deployed as part of this research. These units will conduct presence absence videos of marine species and how they relate to the sound scape and disturbances. More specifically, this passive hydrophone/camera will be used to compare the soundscapes between areas with *C. tumulosa* and areas without.

#### Method

The applicant proposes to conduct research in the nearshore waters at Manawai (5 days), Lalo (2 days), and Kuaihelani (2 days). Specific sites at these atolls will be determined by opportunity, MMB input, and weather conditions. Each site will be in waters deeper than 30 centimeters (1 foot).

The sUMS will either be programmed to run a predetermined route, or a predetermined polygon. The researchers will have the capacity to operate the sUMS for > 8 hours (change of batteries). This project aims to collect data near the fringing reef, where small boats find it too dangerous to access.

All sUMS will be deployed over the side of a small boat. The size and weight of these sUMS allow for a single person to deploy and recover. The sUMS will then autonomously run the program to locate and map *C. tumulosa*. These sUMS will also collect water quality data and collect an eDNA sample. Direct exposure to the ocean by the sterile filter paper will collect the eDNA samples from which point it will be put into vials and stored. Vessel storage will be on ice or liquid nitrogen and then taken to the expedition vessel to be stored in liquid nitrogen.

The applicant proposes to have two Automated Underwater Covert Camera and Hydrophones deployed for approximately 6 hours per day also deployed over the side of a small boat. Both camera-hydrophones may be deployed at two separate sites each day. The applicant will place the weighted cameras in sandy bottom areas surrounded by reefs targeting areas like spur and grooves or sandy areas between reefs.

The applicant proposes to anchor at Lalo in sandy areas near La Pérouse Pinnacle.

More detailed information about the project, including pictures and diagrams of the sUMS and Automated Underwater Covert Camera and Hydrophone set-up can be found in the application.

#### **ADHERENCE TO FINDINGS CRITERIA, BMPs, AND OTHER SAFETY PROTOCOLS:**

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
- Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area
- Anchoring a vessel

#### Monument Management Plan Strategies

The activities proposed by the applicant directly support the Monument Management Plan (PMNM MMP Vol. 1, 2008), including but not limited to the Alien Species Action Plan strategies AS-7: investigate methods to eventually eradicate aquatic invasive organisms already known to be present in the Monument, and conduct regular surveillance for new invasions and AS-8: conduct and facilitate research designed to answer questions regarding invasive species detection, effects on ecosystem, and alien species prevention, control, and eradication over the life of the plan.

#### Best Management Practices

To safeguard Monument resources, the permittee will abide by all Monument Best Management Practices (BMPs) while conducting the activities within the Monument.

<b>BMP Number</b>	<b>Title</b>	<b>Download</b>
001	Marine Alien Species Inspection Standards for Maritime Vessels	<a href="#">PDF</a>
002	Protocol for Acquiring Avian Blood Samples	<a href="#">PDF</a>
003	Human Hazards to Seabirds Briefing	<a href="#">PDF</a>
004	Best Management Practices for Boat Operations and Diving Activities	<a href="#">PDF</a>
005	Protocols to Reduce Impact to the Laysan Finch	<a href="#">PDF</a>
006	General Storage and Transport Protocols for Collected Samples	<a href="#">PDF</a>
007	Best Management Practices for Terrestrial Biosecurity	<a href="#">PDF</a>
008	Seabird Protocols Necessary for Conducting Trolling Research and Monitoring in Papahānaumokuākea Marine National Monument	<a href="#">PDF</a>
009	Best Practices for Minimizing the Impact of Artificial Light on Sea Turtles	<a href="#">PDF</a>
010	Marine Wildlife Viewing Guidelines	<a href="#">PDF</a>
011	Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment, Papahānaumokuākea Marine National Monument (Monument)	<a href="#">PDF</a>
012	Precautions for Minimizing Human Impacts on Endangered Land Birds	<a href="#">PDF</a>
015	Nonnative Species Inspection Requirements at Midway Atoll	<a href="#">PDF</a>
016	Best Management Practices for Activities on Nihoa	<a href="#">PDF</a>
017	Best Management Practices for Maritime Heritage Sites	<a href="#">PDF</a>
018	Rodent Prevention and Inspection Standards for Permitted Vessels	<a href="#">PDF</a>
019	Best Management Practices for Activities on Mokumanamana (Necker Island)	<a href="#">PDF</a>
020	Best Management Practices to minimize the spread of nuisance alga	<a href="#">PDF</a>

## **REVIEW PROCESS**

The application was sent out for review and comment to the following scientific and cultural entities (for review of activities in which the entities are not themselves an applicant): Department of Land and Natural Resources (DLNR) Division of Aquatic Resources (DAR), DLNR Division of Forestry and Wildlife (DOFAW), National Oceanic and Atmospheric Administration (NOAA) Office of National Marine Sanctuaries (NOAA-ONMS), NOAA National Marine Fisheries Service (NOAA-NMFS), United States Fish and Wildlife Service (USFWS) Refuges, USFWS Ecological Services, and the Office of Hawaiian Affairs (OHA). The application was reviewed and received questions, comments and applicant responses as noted below:

Review Questions, Comments, and Responses:

1. Will small boats be anchoring? If so use best management practices when anchoring small boats.

Response:

We don't expect to anchor but we will ensure to follow BMP 20 on the sterilization of anchor, chain, and rode if we need to.

2. Applicant (Keo Lopes) is offering eDNA training session for USFWS staff at Midway. Great shared learning opportunity as the staff there have encountered *Acanthopora spicifera* and *Chondria tumulosa*. The leads for the project and a large portion of the team have worked in the Monument before. All are familiar with the fragile ecosystems, the spread of *C. tumulosa*, and the strict biosecurity protocols. All of the staff listed are highly qualified to complete the proposed tasks. Would applicants still be willing to conduct Edna training session on Midway?

Response

Yes, we would be delighted to train the Midway staff on the newest qPCR assay developed this past October by Dr. Patrick Nichols as well as the process in general.

3. Please provide more detail on your inter-island biosecurity measures and how this will be achieved above M/V Searcher

Response

Our biosecurity measures will consist of 1) preventing contamination, 2) reducing contact with invasive species, 3) cleaning all gear and vessel decks between atolls with 10% bleach), 4) careful inspection of debris or algae fragments. Our main line of defense is preventing contamination, no one will bring any material from the monument into the small boats. If we do come in contact with invasive species we will make sure to wipe from our gloves and wetsuits prior to boarding the small boats again. The rest of our biosecurity measure will follow the latest version of BMP20.

4. Make sure all biosecurity protocols including within Nuisance Algae Mitigation Zones are strictly adhered to.

Response:

We will adhere to biosecurity within the Nuisance Algae Mitigation Zones and follow the BMP20 guidelines.

5. It is not entirely clear whether the ChondriaBot work is part of a broader collaborative, multi-partner effort. Is this project being carried out in collaboration with other partners or programs? If so, who are the partners and what are their roles?

Response:

The ChondriaBot program is a unique platform that has many potential uses for many types of research beyond what we are funded to do. I have opened up lines of communication with Erik Franklin to see how these types of systems will perform in fish research. I am partnering with the SOEST Coastal Research Collaborative (CRC, Mikkelsen and Habel) to see if we can merge our data sets, submerged and aerial. The next two years of funding we will shift our focus to marine debris detection, working with PMDP to develop these systems. They (PMDP) has been providing us with information on net locations and images to get some preliminary computer vision models working to test on this expedition. Our final collaborators are the MMB. These technologies will be beneficial and immediately useful, especially the eDNA portion of this study. Overall, these collaborations are not required by the funding agency, rather they are invited to work with this project to see how best to utilize these tools in ways we may or may not have initially intended.

6. The response to question 11 in Lopes's permit appears to focus mainly on the eDNA portion of the work. Can you provide additional information on the proposed activities involving FloatyBoat, RangerBot, and the sound/camera work, including how those activities will be carried out and how they relate to the overall project?

Response:

One FloatyBoat system is specific to the eDNA sampler to **genetically detect** invasive macroalgae. The second FloatyBoat is specifically designed for computer vision and remote sensing equipment. This surface vehicle has a downward looking camera to **visually detect** *C. tumulosa* and other invasive macroalgae. Finally, the submersible (RangerBot) has a hyperspectrometer mounted on it and it will attempt to **spectrally detect** invasive macroalgae. These systems are adaptable and the images collected will be processed to identify other targets like marine debris. The overall goal of this project is the detection of *C. tumulosa*. The sound/camera work is a project in development to try to automatically identify fish while listening to the soundscape.

7. Lopes's permit references anchoring the R/V *Searcher* at Lalo (section 5b on page 6 and the narrative at the top of page 3). In Mikkelsen's permit, section 5b does not indicate anchoring, and anchoring is not otherwise mentioned. Is anchoring of the R/V *Searcher* at Lalo being requested under one permit, or both?

Response:

The Lopes' permit requests anchoring at Lalo to save fuel and it should read the same for the Mikkelsen permit. I would like to request all ship requests be handled on the Lopes permit. Lopes is chartering the R/V *Searcher* and the CRC (Mikkelsen) are collaborators for the project. I wasn't sure how to handle the two permits on the same charter vessel.

8. Both projects appear to involve the same vessel, but the vessel-related requests do not appear to be described the same way in each permit. Are the vessel operations and requests associated with the R/V *Searcher* the same for both permits, or are there differences between

the two projects that should be noted?

Response:

Both projects are on the same vessel, on the same expedition, and require the same vessel operation requests. The Mikkelsen research requires terrestrial access for high precision GPS and drone deployments. The decision to put these two projects on different permit requests was 1) timing, because Lopes' permit was approved for 2025, we thought it would be certain it would be easier to get approved for 2026 with few changes. 2) I never requested terrestrial access before and because the funding for the ship is coming from the robotics project, I thought it best to insure we get the Lopes permit approved. Because we are a small R/V we may have to assist each other with both projects so we are all included in both permits.

9. Because the two permit applications appear related, it would be helpful to better understand how they fit together. How are the Lopes and Mikkelsen permits related operationally? For example, are they part of the same broader effort using the same vessel and coordinated field activities, or are they separate projects that only share certain logistics?

Response:

Independently, the Mikkelsen project is focused on centimeter scale elevation models to use in sea level rise research. This work utilizes high precision gps and aerial drones. This data can and will also be integrated to the submerged image data acquired by the Lopes robotics to integrate these two datasets together. It sounds simple in theory, but extremely difficult in practice. This work will be of great benefit for all aspects of research conducted at these sites. Our field activities are heavily coordinated during this expedition. The goals of each permit differ - the Lopes permit focuses on robotics and Chondria detection, while the Mikkelsen permit focuses on mapping islands and continuing ongoing research with Dr. Haunani Kane and Sara Kahanamoku-Mayer. Because the fieldwork overlaps (in space and time), we have additionally set out to use this opportunity to generate combined high resolution and accurate terrestrial and marine maps, and pending land access in the Mikkelsen permit, use the on land GPS to help locate and orient the robotics data processing to tie it together into one data product. All in all the permits function independently but working together pending the approval of both permits would benefit both projects.

## ENVIRONMENTAL COMPLIANCE

NEPA / HEPA: (check-one)

- Categorical Exclusion / Exempt Class: B9 / 5
- EA
- EIS

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

- ESA Federal Consultation
- EFH Federal Consultation

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

If so, please summarize past permits:

N/A

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.  
The activities are for a single project that potentially spans 20 days but with only one entry into the Monument. Therefore, the activities associated with this permit are treated as one single action with one Monument permit.
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 research activities proposed by the permittee for the research of *Chondria tumulosa*.

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 #13, #15, and #16, and (Part 2), item #4, which includes, respectively, “research that the Department declares is designed specifically to monitor, conserve, or enhance native species or native species' habitat,” “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,” “research to identify, monitor, control, or eradicate introduced species,” and “experimental management actions that the Department declares are designed specifically to monitor, conserve, or enhance native species or native species' habitat.”

The permittee and team would follow Monument Best Management Practices (BMPs) to mitigate threats activities could have on protected species and the surrounding environment.

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.

The parameters for the sUMS can be preprogrammed to avoid culturally sensitive sites as well as natural and historic areas of higher sensitivity. These sUMS are non-impact in design and are expected to stay within the water column and not have contact with any natural resources of the Monument. At this time there are no planned successive actions related to this project.

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 and other applicable laws.

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.