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 Marine National Monument Research Permit to Anna Mikkelson, University of Hawai‘i at Mānoa, for the Research and Surveying of Sediment Activities to Determine the Impacts of Extreme Storms and Sea Level Rise on Critical Habitat and Nearshore Marine Environments

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 Anna Mikkelson, Department of Earth Sciences, University of Hawai‘i at Mānoa, for research and surveying of sediment activities to determine the impacts of extreme storms and sea level rise on critical habitat and nearshore marine environments.

BACKGROUND LAW

The BLNR, 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 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:

- Lalo (French Frigate Shoals)
- Manawai (Pearl and Hermes Atoll)
    - Manawai was not originally requested in the application but is being requested as part of their permit and is included in this submittal.

The applicant will also conduct activities outside the State of Hawai‘i at Kuaihelani

(Midway Atoll). Access will be permitted by vessel through permit PMNM-2026-005. All activities covered under this permit would be authorized to occur between May 1, 2026 and November 30, 2026. 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 will continue ongoing monitoring of the sandy islands at Lalo, to assess the impacts of recent hurricane events and accelerated sea-level rise on islands and the shallow marine environment within Papahānaumokuākea Marine National Monument. As part of this effort, the applicant will also map Sand Island at Kuaihelani to construct high-resolution elevation and imagery data to examine island elevation relative to sea-level-rise scenarios. This will allow for comparison to past sea-level rise impact projections with improved elevation data and help update risks for priority species. The applicant will also map Manawai using UAS following similar techniques to the other atolls. This information will be used to provide a complete dataset for the overall mission including for research conducted under permit PMNM-2026-005.

The proposed survey techniques will follow those in recent surveys of Lalo (2021, 2023) conducted by Dr. Haunani Kane and Dr. Sara Kahanamoku-Meyer. They include a noninvasive method to collect high-resolution aerial imagery to document change in island morphology and subsequent recovery following Hurricane Walaka. They also include collecting small samples of island and nearshore surface sediments as completed in 2023 - to learn from ongoing island recovery phase from east island and learn how sediments are shifting on other islands at Lalo.

This project consists of one expedition of approximately 23 days at sea, led by Keolohilani Lopes Jr., with planned stops at Lalo (approximately 2 days), Manawai

(approximately 5 days), and Kuaihelani (approximately 2 days), followed by return to Honolulu, access granted through permit PMNM-2026-005. Total research time is estimated at approximately 9 days, with the remaining time dedicated to transit.

Background
This project is being conducted in coordination with ongoing island monitoring and recovery research led by Dr. Haunani Kane and collaborators. Survey design, site selection, and data products are intended to ensure continuity and compatibility with existing datasets and Monument monitoring efforts.

Locations
The applicant intends to survey East Island and Tern island, and possibly the Gins, at Lalo, and Sand Island at Kuaihelani.

At East, Gin, Little Gin, and Tern Island the supplicant proposes to survey, and collect sediment samples (1/2 cup) from the beach face, and the nearshore environment. All survey and sample locations will be conducted at sites determined in collaboration with Dr. Haunani Kane, and under the guidance of the PMNM resource monitor that accompanies this project.

Minimization of Impact
All activities will be conducted using established best management practices (BMPs). sUAS flight plans can be preprogrammed to avoid culturally sensitive areas and sites of higher ecological or historical sensitivity. Surveys will focus on islands that have been previously surveyed and will follow established workflows to minimize disturbance. Anna and Dr. Habel are both certified remote pilots and have experience mapping in the Main Hawaiian Islands. Further, the applicant will work with the PMNM resource monitor on the project to assure that established drone protocols and BMPs are followed. We will also seek guidance from the PMNM before any UAS derived data is made publicly available.

In an abundance of caution and to prevent the introduction of alien invasive species, all equipment will be cleaned and disinfected prior to deployment to Papahānaumokuākea and stored in a controlled indoor environment at the University of Hawai‘i at Mānoa until departure. Ground control targets will consist of newly constructed vinyl mats (approximately 1 x 1 m) created specifically for this expedition and used only at designated sites. Ground control mats will be deployed and retrieved during surveys and will not be left in the field.

Sediment sampling will be limited to surface sediments and conducted following protocols developed by Dr. Haunani Kane and Dr. Kahanamoku-Meyer, with site selection and collection guided by Dr. Kane and the PMNM resource monitor that accompany this project. Sampling will be designed to avoid impacts to surrounding habitats. Once sediment analysis is complete, all samples will be returned by Dr. Haunani Kane and Dr. Kahanamoku-Meyer to PMNM staff under the guidance of PMNM.

All equipment will be cleaned between sites as appropriate, and all field operations will adhere to PMNM guidelines for inter-island travel, vessel operations, and UAS use.

Procedures/Methods

1.) UAS + RTK-GPS Island Surveys

High-resolution aerial imagery and topographic data will be collected using a small uncrewed aerial system (sUAS), survey-grade Global Navigation Satellite Systems (GNSS), and a total station. At each site, newly constructed vinyl ground control targets (approximately 1 × 1 m), prepared according to quarantine protocols, will be temporarily deployed on the island surface at the time of the survey and retrieved when the aerial survey is complete.

Surveys will be conducted by a field team of minimum three people. One team member will deploy and retrieve ground control targets along the island, while two team members will operate the sUAS using an automated flight plan (DroneDeploy). One operator will be responsible for launch, landing, and flight monitoring, and a second observer will maintain visual line of sight throughout the flight. Following image acquisition, ground control targets will be surveyed using GNSS with a fixed base station mounted on a tripod and a rover unit carried by the surveyor to each control point. GNSS points will be collected at geomorphic features, sediment sampling locations, and along a number of cross-shore transects (from waist-deep water and across the island, to waist deep water on the opposite side) to assess elevation accuracy and uncertainty in the sUAS-derived topography.

At the start of the survey, we propose deploying a water level sensor (size of a small water bottle) in waist deep water, held in place by a led weight and with a small float tied to it to find it again). The water level sensor will be retrieved at the end of the survey. This will allow us to calculate mean sea level during the survey

2.) Sediment Collection

The applicant proposes collecting samples from island surfaces and adjacent shallow nearshore environments at Gin, East, and Tern Islands following protocols applied by Dr. Kane and Dr. Kahanamoku-Meyer. The applicant proposes to collect no more than 200 sediment samples (not to exceed ½ cup volume) from the shallow marine environment (80, ½ cup volume), and modern beach face (100, ½ cup volume). Nearshore sampling will be conducted by a small team, and the team may also enter the nearshore marine environment with snorkel gear to recover sediment. The applicants will avoid contact with live corals and take great care when navigating around islands so that corals are not impacted by the work. Sampling locations will be selected in consultation with Dr. Kane and Dr. Kahanamoku-Meyer, and the accompanying PMNM resource monitor. Sediment samples will be transported in sample bags to the University of Hawai‘i for compositional analysis under the microscope, and radiocarbon dating. Upon completion of analyses, samples will be returned to PMNM under the guidance of PMNM staff including OHA, by Dr. Kane and Dr. Kahanamoku-Meyer.

More detailed information about the project can be found in the application (attached).

ADHERANCE 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

Monument Management Plan Strategies

The applicant's proposed activities directly support the Monument Management Plan (MMP) Marine Conservation Science (MCS) Action Plan Strategy MCS-1: Continue and enhance research, characterization and monitoring of marine ecosystems (PMNM MMP Vol. I, p. 122, 2008).

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.

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

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:
Questions, Comments, and Responses:

1. How will seabirds be avoided during UAS activities? Will UAS takeoff and landing only occur in areas where seabird are not present, and if so, what distance will the work occur from nesting seabirds?

   Response
   Previous UAS flights within the monument by PNMS and PMDP, and personally flown by the Chief Scientist of this expedition has suggested seabirds usually maintain a safe distance from the UAS while it is operating. Landing and launching, clear of nesting seabirds and fledgelings will be our goal to avoid disturbing them. We would like to take off and land with a 25 ft radius and operate at altitudes between 200 ft - 400 ft within visual line-of-sight. We are aware that our assigned Resource Monitor, Mr. Jason Leonard is also the Flight Commander for the NOAA PNMS UAS program to offer safety tips during operations.

2. Please provide more detail on your UAS/drone BMPs for avoiding impacts to wildlife, specifically turtles, monk seals, and seabirds. In the permit application it states that UAS surveys are non-invasive. This is untrue. UAS surveys can be extremely invasive to wildlife specifically birds if not done properly and wildlife is not taken into account. Please make sure they pilots consider the tremendous amounts of seabirds in the area. The UAS could cause bird strikes and injury, as well as flushing from nests and increases in behavior that can injure birds and chicks.

   Response
   All UAS pilots are FAA Part 107 certified and comply with the safety regulations set forth by the FAA. We have currently operated our UAS in areas of some seabird activity, like Waikiki (numerous Terns), and Kaneohe Marine Corps Base area. We do realize that the bird populations here dwarf that of PNMS and we will lean on the experience of the two UAS pilots that have flown numerous, incident free missions at most of the major atolls within PNMS, Mr. Jason Leonard and Mr. Keolohilani Lopes.

3. Please ensure that any person going to Lalo islands adheres to biosecurity protocols.

   Response
   All landing parties will adhere to biosecurity protocols, including utilizing all new clothing and footwear that has been previously frozen. We will thoroughly clean and

wipe sensitive electronic equipment with clorox wipes and soak non-electronic field gear in a bleach solution prior to departure from Oahu. We will strictly adhere to BMP20

4. 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.

5. 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.

6. Because the two permit applications appear related, it would be helpful to better understand how they fit together. How are the Lopes and Mikkelson 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: ~~9b / 5(1)(15)~~

☐ EA _____

☐ EIS _____

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

- ESA Federal Consultation
- EFH Federal Consultation

The Department has made an exemption determination for this permit in accordance 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 PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT RESEARCH PERMIT TO ANNA MIKKELSON, UNIVERSITY OF HAWAIʻI AT MĀNOA, FOR THE RESEARCH AND SURVEYING OF SEDIMENT TO DETERMINE THE IMPACTS OF EXTREME STORMS ON CRITICAL HABITAT AND NEAR SHORE MARINE ENVIRONMENTS ACTIVITIES UNDER PERMIT PMNM-2026-006")

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 his application and should be allowed to enter the NWHI State waters and to conduct the activities

therein as specified in the application with certain special instructions and conditions, which are in addition to the Papahanaumokuakea 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 BLNR 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 BLNR, that the BLNR delegate and authorize the Chairperson to approve the declaration of exemption for purposes of recordkeeping requirements of chapter 343, HRS, and chapter 11-200.1, HAR.

3. That the BLNR authorize and approve a Research Permit to Anna Mikkelson with the following special 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 BLNR, that the BLNR 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.

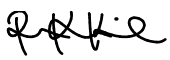
12. To mitigate risk of spreading *Chondria tumulosa* within the monument and Main Hawaiian Islands, the permittee will follow the Best Management Practices to Minimize the Spread of Nuisance Alga (BMP #20).

Respectfully submitted,

Brian J. Neilson, Administrator

Division of Aquatic Resources

APPROVED FOR SUBMITTAL



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

OMB Control # 0648-0548
Expiration Date: 01/31/2027

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 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

OMB Control # 0648-0548
Expiration Date: 01/31/2027

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: Anna Mikkelsen
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 (French Frigate Shoals) and Kuaihelani (Midway)

Estimated number of individuals (including Applicant) to be covered under this permit: 16

Estimated number of days in Papahānaumokuākea: 23

Description of proposed activities: (complete these sentences):

a.) The proposed activity would…

is a continuation of ongoing monitoring of the sandy islands at Lalo, to assess the impacts of recent hurricane events and accelerated sea-level rise on islands and the shallow marine environment within Papahānaumokuākea Marine National Monument. As part of this effort, we also propose mapping Sand Island at Kuaihelani to construct high-resolution elevation and imagery data to examine island elevation relative to sea-level-rise scenarios. This will allow for comparison to past sea-level rise impact projections with improved elevation data and help update risks for priority species.

The proposed survey techniques will follow those in recent surveys of Lalo (2021, 2023) conducted by Dr. Haunani Kane and Dr. Sara Kahanamoku-Meyer. They include a non-invasive method to collect high-resolution aerial imagery to document change in island morphology and subsequent recovery following Hurricane Walaka. They also include collecting small samples of island and nearshore surface sediments as completed in 2023 - to learn from ongoing island recovery phase from east island and learn how sediments are shifting on other islands at Lalo. The data collected improves the understanding of island recovery and resiliency under rising sea levels and can help inform PMNM managers on critical habitats for priority species (e.g., monk seals, turtles, sea birds)

This project consists of one expedition of approximately 23 days at sea, led by Keolohilani Lopes Jr., with planned stops at Lalo (approximately 2 days), Manawai (approximately 5 days), and Kuaihelani (approximately 2 days), followed by return to Honolulu. Total research time is estimated at approximately 9 days, with the remaining time dedicated to transit.

b.) To accomplish this activity we would ….

To accomplish this activity, we would require temporary land access at Lalo for East Island, Tern Island, and the Gins, and for Sand Island at Kuaihelani. The proposed work will use a small uncrewed aerial system (UAS/drone) to collect high-quality aerial imagery, paired with survey-grade GNSS measurements. These data will be used to create accurate maps and elevation products showing island shape and height.

In addition, small sediment samples will be collected from island surfaces and nearby shallow marine environments to document sediment composition and movement following Hurricane Walaka. These data will help characterize how sediments are redistributed across islands during the recovery process. All equipment and workflows will follow established best management practices and monument guidelines.

c.) This activity would help Papahānaumokuākea by …

The mapping and sediment data collected will be comparable to prior surveys conducted in 2021 and 2023, allowing changes in island condition and elevation to be evaluated through time and improving understanding of how these islands respond to storms and sea-level rise. This work directly supports ongoing research led by Dr. Haunani Kane and collaborators by adding additional field-based surveys to extend existing time series and provide important ground-truth data for satellite-derived shoreline and island monitoring approaches. These field observations will improve interpretation of remote sensing products and strengthen their application for Monument-wide monitoring of island change.

By comparing island elevation and morphology across sites and through time, including among atoll settings within the Monument, this project aims to improve our understanding of island vulnerability, resilience, and recovery potential, and to support informed habitat and species management under increasing storminess and projected sea-level rise.

Collectively, this activity supports key elements of the Lalo Resiliency Plan by advancing (3) observations and monitoring, (4) research, (5) observational tools (improving remote sensing-derived products), and (6) communication (in sharing data, documenting change, publication of data and findings), and by improving understanding of where island recovery is possible and where management attention may be most effectively focused to maintain critical island habitats within Papahānaumokuākea.

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Other information or background:
This project is being conducted in coordination with ongoing island monitoring and recovery research led by Dr. Haunani Kane and collaborators. Survey design, site selection, and data products are intended to ensure continuity and compatibility with existing datasets and Monument monitoring efforts.

OMB Control # 0648-0548
Expiration Date: 01/31/2027

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Mikkelsen, Anna, B

Title: Mrs.

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

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

UH Mānoa Earth Sciences/ attn. Anna B. Mikkelsen
[redacted]

[redacted]

Fax: N/A

[redacted]

For students, major professor's name, telephone and email address:
Dr. Charles Fletcher, [redacted]

3. Affiliation (institution/agency/organization directly related to the proposed project):
University of Hawai'i at Mānoa, School of Ocean and Earth Science and Technology (SOEST), Department of Earth Sciences

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 Scientist)
Erik Franklin, Researcher
Matthew Dunbabin, Robotics Engineer (AUS)
Serena Riemers, Robotics Engineer (AUS)
Anna Baker Mikkelsen, (DEN, Green Card), Geospatial Analyst, sUAS pilot
Shellie Habel, Geospatial Analyst, sUAS pilot
Jason Leonard, Resource Protection Monitor (PNMS/NOAA)
Jeff Kuwabara, Outreach Specialist/Photographer

2 – Field Techs (TBD)
6 – Ships Crew

Section B: Project Information

5a. Project location(s):

		Ocean Based	
☐ Nihoa Island	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Mokumanamana (Necker Island)	☐ Land-based	☐ Shallow water	☐ Deep water
X Lalo (French Frigate Shoals)	X Land-based	X Shallow water	☐ Deep water
☐ ʻŌnūnui andʻŌnuiki (Gardner Pinnacles)	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Kamokuokamohoaliʻi (Maro Reef)	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Kamole (Laysan Island)	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Kapou (Lisianski Island)	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Manawai (Pearl and Hermes Atoll)	☐ Land-based	☐ Shallow water	☐ Deep water
X Kuaihelani (Midway Atoll)	X Land-based	X Shallow water	☐ Deep water
☐ Hōlanikū (Kure Atoll)	☐ Land-based	☐ Shallow water	☐ Deep water
☐ Outer Sanctuary Zone			☐ Deep water
☐ 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:

Lalo (East Island, Gin Island and Tern Island) and Kuaihelani (Sand Island). We intend to survey East Island and Tern island, and possibly the Gins, at Lalo, and Sand Island at Kuaihelani.

At East, Gin, Little Gin, and Tern Island we propose to survey, and collect sediment samples (1/2 cup) from the beach face, and the nearshore environment. We will follow best management practices for moving between islands, boat operations and unmanned aerial systems. All survey and sample locations will be conducted at sites determined in collaboration with Dr. Haunani Kane, and under the guidance of the PMNM resource monitor that accompany this project.

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 purpose of this project is to extend ongoing monitoring of island and nearshore change at Lalo by collecting additional UAS imagery, GNSS survey data, and sediment samples to expand the ongoing monitoring time-series. This project aims to quantify island recovery, morphodynamics, and resilience following Hurricane Walaka and under continued sea-level rise. The need for this work is established through previous surveys and the Lalo Resiliency Plan (for example (3) observations and monitoring, (4) research, and (5) observational tools (improving remote sensing-derived products)).

Sandy islands at Lalo, and East Island in particular, provide a rare and valuable field setting to observe island recovery processes following extreme disturbance. Continued monitoring at this site allows post-storm recovery, sediment redistribution, and elevation change to be directly observed through time. These observations help inform management of habitat for priority species (e.g., turtles and monk seals) and provide insight into how other low-lying islands within Papahānaumokuākea may respond to future storms and rising sea levels. This project represents a continuation and strengthening of ongoing research to understand island risk, resiliency, and recovery within PMNM. All data will be collected using the same methods and workflows as previous efforts (2018, 2021, 2023), led by Dr. Chip Flecther (2018) and Dr. Haunani Kane (2021 & 2023). Resulting datasets will be archived and shared to support long-term monitoring and management across the Monument.

As this expedition proposes a stop a Kuaihelani, we propose conducting this same survey protocol at Sand Island in addition to islands at Lalo. This will enable us to create a image mosaic and elevation model of the island to understand its elevation, risk and resilience relative to sea-level rise scenarios.

*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.

We do not plan to specifically target protected species. However, we will be using a drone to collect imagery of the islands, and nearshore environment, thus our images may ultimately capture endangered species.

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?

All activities will be conducted using established best management practices. sUAS flight plans can be preprogrammed to avoid culturally sensitive areas and sites of higher ecological or historical sensitivity. Surveys will focus on islands that have been previously surveyed and will follow established workflows to minimize disturbance. Anna and Dr. Habel are both certified remote pilots and have experience mapping in the main hawaiian islands. We will work with the PMNM resource monitor on our project to assure that we make every effort to follow established drone protocols and best management practices. We will also seek guidance from the PMNM before any UAS derived data is made publicly available.

In an abundance of caution and to prevent the introduction of alien invasive species, all equipment will be cleaned and disinfected prior to deployment to Papahānaumokuākea and stored in a controlled indoor environment at the University of Hawai‘i at Mānoa until departure. Ground control targets will consist of newly constructed vinyl mats (approximately 1 x 1 m) created specifically for this expedition and used only at designated sites. Ground control matts will be deployed and retrieved during surveys and will not be left in the field.

Sediment sampling will be limited to surface sediments and conducted following protocols developed by Dr. Haunani Kane and Dr. Kahanamoku-Meyer, with site selection and collection guided by Dr. Kane and the PMNM resource monitor that accompany this project. Sampling will designed to avoid impacts to surrounding habitats. Once sediment analysis is complete, all samples will be returned by Dr. Haunani Kane and Dr. Kahanamoku-Meyer to PMNM staff under the guidance of PMNM.

All equipment will be cleaned between sites as appropriate, and all field operations will adhere to PMNM guidelines for inter-island travel, vessel operations, and UAS use.

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?

The UAS and GPS surveys are non-invasive. Sediment sampling is limited to surface sediments and designed to collect the minimum material necessary, resulting in as minimal a temporary disturbance as possible. The information gained will support improved planning and management for the persistence of low-lying island habitats across PMNM as hurricane impacts intensify and sea level continues to rise.

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

There is no practicable alternative to conducting this work within Papahānaumokuākea. The research addresses questions specific to the persistence, disturbance, and recovery of the islands within the Monument under increasing hurricane intensity and sea-level rise. These processes cannot be adequately studied outside PMNM. East Island, in particular, provides a unique case to understand post-storm recovery and island resiliency

Field activities are limited to four islands at Lalo, and Sand Island at Kuaihelani, with findings applicable to similar sandy islands throughout the Monument. The results can help directly inform management of critical habitats to priority species, including evaluation of future habitat stability and potential adaptation strategies.

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?

The management value of the data produced by this project outweighs its impacts on Monument resources. This work will provide information on hurricane impacts and post-storm recovery of island and nearshore habitats at Lalo. These data will improve our understanding of formation and recovery of islands and are broadly applicable across the Monument. All methods are designed to minimize impacts to Monument resources, and sample return will be coordinated with PMNM staff in a culturally appropriate manner.

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

The fieldwork component of this research is the minimum to obtain all necessary data, and this specific workflow has been conducted hundreds of times on Oʻahu. We anticipate spending approximately 6-8 hrs each at East Island and Tern Island to collect sediment samples and conduct the GPS and drone survey. If time and logistics allow, we will conduct a shorter survey of Gin and Little Gin (approximately 3 hrs. per island).

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

Anna Mikkelsen (University of Hawaiʻi at Mānoa Graduate Researcher & UAS Operator): Anna Mikkelsen is a PhD student in the Department of Earth Sciences at the University of Hawaiʻi at Mānoa, advised by Dr. Chip Fletcher, focusing on monitoring and modeling coastal change in Hawaiʻi. She earned her M.S. in Earth Sciences from UH Mānoa (2021) and worked as a geospatial analyst with a focus on satellite-derived shoreline monitoring and field-based coastal surveys using uncrewed aerial systems (UAS) and GNSS. She is an FAA-certified UAS pilot and has conducted coastal surveys across Oʻahu, including leading weekly UAS surveys of Waikīkī for over two years using the same methods as proposed for this project. She has authored two peer-reviewed papers on reef-lined coastlines and co-authored one on shoreline erosion projections. Anna participated in the planned RAMP cruise in 2018 aboard the NOAA ship Hiʻialakai, completing two days of survey work around Niʻihau. Through this proposed project, she will work in coordination with Dr. Haunani Kane and Dr. Sara Kahanamoku-Meyer to support ongoing monitoring at Lalo and to improve understanding of reef-island change and response to rising sea levels.

Dr. Shellie Habel (University of Hawaiʻi at Mānoa & Hawaiʻi Sea Grant College Program, Coastal Geologist/Hydrologist. Dr. Shellie Habel is a coastal geologist and hydrologist at the University of Hawaiʻi at Mānoa and the Hawaiʻi Sea Grant College Program, where she works with the Coastal Research Collaborative. She earned her PhD in geology and geophysics from the University of Hawaiʻi at Mānoa. Her research focuses on groundwater processes, coastal geology, and the interactions between sea-level rise, coastal flooding, and shoreline change, with an emphasis on applied science that supports coastal planning and decision-making in Hawaiʻi.
Dr. Habel has authored multiple peer-reviewed publications on groundwater modeling and coastal hydrology in Hawaiʻi and has extensive field experience across the Main Hawaiian Islands and remote Pacific locations. Her fieldwork includes participation as a research assistant on multiple Schmidt Ocean Institute R/V *Falkor* expeditions, including a 36-day bathymetric mapping cruise in Papahānaumokuākea Marine National Monument and a 20-day expedition to the Hawaiian and Line Islands focused on reconstructing ancient sea-level change. She has also served as a mission scientist aboard the *Pisces V* submersible, conducting dives off Oʻahu to collect samples of paleo coral reef structures and pillow basalts. Her field experience includes aerial data collection, ship-based observations, submersible operations, and coastal investigations to support geologic and hydrologic analyses of coastal systems.
Dr. Habel's work combines field observations, numerical modeling, and geospatial analysis to assess coastal hazards and infrastructure vulnerability. She is an FAA-

certified UAS pilot and regularly collaborates with government agencies and research institutions to translate scientific findings into actionable coastal management and hazard mitigation strategies.

Keolohilani (Junior researcher, HIMB, PhD student NREM, Chief Scientist)
Keo is a trained PMNM resource monitor and a former affiliate (Field Technician/RCUH) of PMNM for 6 years and have participated in ~13 expeditions into the PNMS over the past 13 years, covering a wide range of SCUBA based projects. He has published two peer reviewed journal articles on PNMS ecological systems for fish behavior on SCUBA surveys and a paper specifically on the proliferation of *C. tumulosa*. He has also co-authored several papers on these subjects. Keo will use this experience and expertise to avoid and mitigate potential issues as well as have safeguards in place for any potential situation. Keo is a FAA certified drone pilot

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 gear needed for this field effort. The Chief Scientist, Keolohilani Lopes Jr., has been awarded the funding required for the ship charter. The funding is currently being processed by the University of Hawai‘i at Mānoa fiscal office. The total funding awarded for this project is in excess of $1 million.

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.

Our survey protocol follows previous monitoring efforts at Lalo, and are designed to be as non-invasive as at all possible. Two data types will be collected: 1) UAS aerial imagery & GPS point locations, and 2) sediment samples.
The UAS and GPS survey are non-invasive and enable 3D reconstructions and high-resolution imagery of island and nearshore environments. These types of data cannot be acquired from remotely sensed satellite imagery.

Sediment sampling will follow protocols developed by Dr. Haunani Kane and Dr. Sara Kahanamoku-Meyer and previously implemented within the Monument. Samples are small (1/2 cup), spatially distributed, and collected under guidance of the resource monitor that accompanies this project, to do everything we can to minimize any disturbance. This data collection will allow understand the dynamics between sediment production at reefs and sediment delivery to adjacent islands. Comparisons to data collected in 2018, 2021, and 2023 will provide baselines for detecting changes in island and reef sediment sources following Hurricane Walaka.

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:

1.) UAS + RTK-GPS island surveys

High-resolution aerial imagery and topographic data will be collected using a small uncrewed aerial system (sUAS), survey-grade GNSS and a total station. At each site, newly constructed vinyl ground control targets (approximately 1 × 1 m), prepared according to quarantine protocols, will be temporarily deployed on the island surface at the time of the survey and retrieved when the aerial survey is complete.

Surveys will be conducted by a field team of minimum three people. One team member will deploy and retrieve ground control targets along the island, while two team members will operate the sUAS using an automated flight plan (DroneDeploy). One operator will be responsible for launch, landing, and flight monitoring, and a second observer will maintain visual line of sight throughout the flight. Following image acquisition, ground control targets will be surveyed using GNSS with a fixed base station mounted on a tripod and a rover unit carried by the surveyor to each control point. GNSS points will be collected at geomorphic features, sediment sampling locations, and along a number of cross-shore transects (from waist-deep water and across the island, to waist deep water on the opposite side) to assess elevation accuracy and uncertainty in the sUAS-derived topography.

At the start of the survey, we propose deploying a water level sensor (size of a small water bottle) in waist deep water, held in place by a led weight and with a small float tied to it to find it again). The water level sensor will be retrieved at the end of the survey. This will allow us to calculate mean sea level during the survey.

2.) Sediment collection (in collaboration with Dr. Haunani Kane and Dr. Sara Kahanamoku-Meyer)

We propose to collect sediment samples from island surfaces and adjacent shallow nearshore environments at Gin, East, and Tern Islands following protocols applied by Dr. Kane and Dr. Kahanamoku-Meyer. Following the previous sampling, we plan to collect no more than 200 sediment samples (not to exceed ½ cup volume) from the shallow marine environment (80, ½ cup volume), and modern beach face (100, ½ cup volume). Nearshore sampling will be conducted by a small team, and the team may also enter the nearshore marine environment with snorkel gear to recover sediment. We will follow the protocols from the PMNM Boating and Diving BMP. We will avoid contact with live corals and take great care when navigating around islands so that corals are not impacted by our work. Sampling locations will be selected in consultation with Dr. Kane and Dr. Kahanamoku-Meyer, and the accompanying PMNM resource monitor.

Sediment samples will be transported in sample bags to the University of Hawai‘i for compositional analysis under the microscope, and radiocarbon dating. Upon completion

of analyses, samples will be returned to PMNM under the guidance of PMNM staff including the OHA, by Dr. Kane and Dr. Kahanamoku-Meyer.

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 will not collect any living specimens however we do anticipate collecting skeletal reef derived material in the beach and nearshore sediment samples. Anticipated organisms include sand-sized fragments of unidentified coral species, red calcareous algae, green calcareous algae (Halimeda), mollusks, and foraminifera (e.g. Amphistigena)

Common name:
N/A

Scientific name:
N/A

& size of specimens:
Not to exceed 200 samples, each approximately ½ cup in size.

Collection location:
Gin, East, and Tern Island

☐ Whole Organism ☒ Partial Organism

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

Specimens will be returned to PMNM staff under the guidance of PMNM. Dr. Haunani Kane and Dr. Sara Kahanamoku-Meyer, who will be analyzing the sediment samples, will ensure that samples are returned to PMNM staff in a protocol similar to that of their 2023 sediment samples. The Office of Hawaiian Affairs will be consulted for cultural guidance.

9c. Will the organisms be kept alive after collection? ☐ **Yes** ☐ **No**
No live organisms will be sampled

• General site/location for collections:
Gin, East, Tern Island

• 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?

Sediment samples will be stored in sample bags and transported out of the monument on the chartered vessel.

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

We are working in close collaboration with Dr. Haunani Kane and Dr. Sara Kahanamoku-Meyer. We are in contact to ensure the data collected here follow the same protocols as previous surveys, so that these surveys can work in conjunction and extend existing projects already underway. The proposed data collection will generate additional three-dimensional data products that will support ongoing monitoring efforts and improve understanding of island change within Papahānaumokuākea. They will additionally provide a ground-control datapoint to assess the accuracy of remotely sensed data products, and enable improvements in these products. All results, imagery, and derived products will be shared with collaborating teams and provided to PMNM, and will be made publicly available under the guidance of PMNM staff to ensure that culturally or ecologically sensitive imagery is not released.

12a. List all specialized gear and materials to be used in this activity:
GNSS Survey equipment (tripod, survey rod, survey ribbon, 2 x Emlid Reach RS2+ RTK GNSS units, canvas targets, brunton compass, and rover.)
Total station gear (total station that will be mounted on a tripod, and a rod with a prism)
Tide gauge (water level sensor that records temperature, water depth and salinity), lead weight to hold it in place and a small float to identify its location after the survey is complete.)
Drone (lithium batteries, iPad). Drone make and model TBD, we are working to acquire a “Blue Drone”
Miscellaneous tools (handheld GPS, notebooks, walkie talkies, cameras, measuring tape, etc)
Snorkeling gear (mask, fins)
Small shovel
Sample bags, sharpie pen, ½ measure, and vials

12b. List all Hazardous Materials you propose to take to and use within Papahānaumokuākea:
Lithium-ion batteries for drone and GPS.
10 % bleach to clean equipment between islands and atolls.
An SDS is attached for both lithium-ion batteries and bleach.

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:
Sample analysis, data analysis, and write-up/publication of information will be completed within 24 months of the proposed research cruise.

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

RU Moskvichev, AB **Mikkelsen**, TR Anderson, SF Vitousek, JC Nicolow, and CH Fletcher. "Wave Driven Cross Shore and Alongshore Transport Reveal More Extreme Projections of Shoreline Change in Island Environments." Scientific Reports 15, no. 1 (2025): 10794. https://doi.org/10.1038/s41598-025-95074-y.

AB **Mikkelsen**, KK McDonald, J Kalksma, ZH Tyrrell, CH Fletcher. "Three years of weekly DEMs, aerial orthomosaics and surveyed shoreline positions at Waikīkī Beach, Hawai'i". Scientific Data 11, 324 (2024). https://doi.org/10.1038/s41597-024-03160-z

AB Mikkelsen, TR Anderson, S Coats, CH Fletcher. "Complex drivers of reef-fronted beach change**." Marine Geology** *446*, 106770 (2022). doi.org/10.1016/j.margeo.2022.106770

AB **Mikkelsen**, *et al.* "Resolving uncertainty in satellite-derived shorelines of a reef-lined beach using high spatiotemporal resolution topographic surveys" (in revision, submitted 10/2024)

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.

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 HAWAIʻI | KA MOKUʻĀINA ʻO HAWAIʻI
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. KANAKAʻOLE
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. Kanakaʻole, Acting 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 ANNA MIKKELSON, UNIVERSITY OF HAWAIʻI AT MĀNOA, FOR THE RESEARCH AND SURVEYING OF SEDIMENT TO DETERMINE THE IMPACTS OF EXTREME STORMS ON CRITICAL HABITAT AND NEAR SHORE MARINE ENVIRONMENTS ACTIVITIES UNDER PERMIT PMNM-2026-006

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 Anna Mikkelson, University of Hawaiʻi at Mānoa, for the Research and Surveying of Sediment Activities to Determine the Impacts of Extreme Storms and Sea Level Rise on Critical Habitat and Nearshore Marine Environments

Permit Number:
PMNM-2026-006

Project Description:
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:

- Lalo (French Frigate Shoals)
- Manawai (Pearl and Hermes Atoll)
    - Manawai was not originally requested in the application but is being requested as part of their permit and is included in the BLNR submittal.

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. Access will be permitted by vessel through permit PMNM-2026-005. The timing of entry into the Papahānaumokuākea will depend on the availability of ship transport, schedules, and weather.

INTENDED ACTIVITIES:

The applicant will continue ongoing monitoring of the sandy islands at Lalo, to assess the impacts of recent hurricane events and accelerated sea-level rise on islands and the shallow marine environment within Papahānaumokuākea Marine National Monument. As part of this effort, the applicant will also map Sand Island at Kuaihelani to construct high-resolution elevation and imagery data to examine island elevation relative to sea-level-rise scenarios. This will allow for comparison to past sea-level rise impact projections with improved elevation data and help update risks for priority species. The applicant will also map Manawai using UAS following similar techniques to the other atolls. This information will be used to provide a complete dataset for the overall mission including for research conducted under permit PMNM-2026-005.

The proposed survey techniques will follow those in recent surveys of Lalo (2021, 2023) conducted by Dr. Haunani Kane and Dr. Sara Kahanamoku-Meyer. They include a noninvasive method to collect high-resolution aerial imagery to document change in island morphology and subsequent recovery following Hurricane Walaka. They also include collecting small samples of island and nearshore surface sediments as completed in 2023 - to learn from ongoing island recovery phase from east island and learn how sediments are shifting on other islands at Lalo.

This project consists of one expedition of approximately 23 days at sea, led by Keolohilani Lopes Jr., with planned stops at Lalo (approximately 2 days), Manawai (approximately 5 days), and Kuaihelani (approximately 2 days), followed by return to Honolulu, access granted through permit PMNM-2026-005. Total research time is estimated at approximately 9 days, with the remaining time dedicated to transit.

<u>Method</u>
1.) UAS + RTK-GPS Island Surveys
High-resolution aerial imagery and topographic data will be collected using a small uncrewed aerial system (sUAS), survey-grade Global Navigation Satellite Systems (GNSS), and a total station. At each site, newly constructed vinyl ground control targets (approximately 1 × 1 m), prepared

according to quarantine protocols, will be temporarily deployed on the island surface at the time of the survey and retrieved when the aerial survey is complete.

1. UAS surveys

Surveys will be conducted by a field team of minimum three people. One team member will deploy and retrieve ground control targets along the island, while two team members will operate the sUAS using an automated flight plan (DroneDeploy). One operator will be responsible for launch, landing, and flight monitoring, and a second observer will maintain visual line of sight throughout the flight. Following image acquisition, ground control targets will be surveyed using GNSS with a fixed base station mounted on a tripod and a rover unit carried by the surveyor to each control point. GNSS points will be collected at geomorphic features, sediment sampling locations, and along a number of cross-shore transects (from waist-deep water and across the island, to waist deep water on the opposite side) to assess elevation accuracy and uncertainty in the sUAS-derived topography.

At the start of the survey, we propose deploying a water level sensor (size of a small water bottle) in waist deep water, held in place by a led weight and with a small float tied to it to find it again). The water level sensor will be retrieved at the end of the survey. This will allow us to calculate mean sea level during the survey

2. Sediment Collection

The applicant proposes collecting samples from island surfaces and adjacent shallow nearshore environments at Gin, East, and Tern Islands following protocols applied by Dr. Kane and Dr. Kahanamoku-Meyer. The applicant proposes to collect no more than 200 sediment samples (not to exceed ½ cup volume) from the shallow marine environment (80, ½ cup volume), and modern beach face (100, ½ cup volume). Nearshore sampling will be conducted by a small team, and the team may also enter the nearshore marine environment with snorkel gear to recover sediment. The applicants will avoid contact with live corals and take great care when navigating around islands so that corals are not impacted by the work. Sampling locations will be selected in consultation with Dr. Kane and Dr. Kahanamoku-Meyer, and the accompanying PMNM resource monitor. Sediment samples will be transported in sample bags to the University of Hawai‘i for compositional analysis under the microscope, and radiocarbon dating. Upon completion of analyses, samples will be returned to PMNM under the guidance of PMNM staff
including OHA, by Dr. Kane and Dr. Kahanamoku-Meyer.

More detailed information about the project can be found in the application.

ADHERANCE 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

Monument Management Plan Strategies

The applicant's proposed activities directly support the Monument Management Plan (MMP) Marine Conservation Science (MCS) Action Plan Strategy MCS-1: Continue and enhance research, characterization and monitoring of marine ecosystems (PMNM MMP Vol. I, p. 122, 2008).

Best Management Practices

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

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

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): Hawai'i Division of Aquatic Resources, DOFAW, Papahānaumokuākea National Marine Sanctuary (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO); USFWS, Hawaiian and Pacific Islands National Wildlife Refuge Complex Office; and the Office of Hawaiian Affairs (OHA). The application was reviewed and received questions, comments and applicant responses as noted below:

Questions, Comments, and Responses:

1. How will seabirds be avoided during UAS activities? Will UAS takeoff and landing only occur in areas where seabird are not present, and if so, what distance will the work occur from nesting seabirds?

   Response
   Previous UAS flights within the monument by PNMS and PMDP, and personally flown by the Chief Scientist of this expedition has suggested seabirds usually maintain a safe distance from the UAS while it is operating. Landing and launching, clear of nesting seabirds and fledgelings will be our goal to avoid disturbing them. We would like to take off and land with a 25 ft radius and operate at altitudes between 200 ft - 400 ft within visual line-of-sight. We are aware that our assigned Resource Monitor, Mr. Jason Leonard is also the Flight Commander for the NOAA PNMS UAS program to offer safety tips during operations.

2. Please provide more detail on your UAS/drone BMPs for avoiding impacts to wildlife, specifically turtles, monk seals, and seabirds. In the permit application it states that UAS surveys are non-invasive. This is untrue. UAS surveys can be extremely invasive to wildlife specifically birds if not done properly and wildlife is not taken into account. Please make sure they pilots consider the tremendous amounts of seabirds in the area. The UAS could cause bird strikes and injury, as well as flushing from nests and increases in behavior that can injure birds and chicks.

   Response
   All UAS pilots are FAA Part 107 certified and comply with the safety regulations set forth by the FAA. We have currently operated our UAS in areas of some seabird activity, like Waikiki (numerous Terns), and Kaneohe Marine Corps Base area. We do realize that the bird populations here dwarf that of PNMS and we will lean on the experience of the two UAS pilots that have flown numerous, incident free missions at most of the major atolls within PNMS, Mr. Jason Leonard and Mr. Keolohilani Lopes.

3. Please ensure that any person going to Lalo islands adheres to biosecurity protocols.

   Response
   All landing parties will adhere to biosecurity protocols, including utilizing all new clothing

and footwear that has been previously frozen. We will thoroughly clean and wipe sensitive electronic equipment with clorox wipes and soak non-electronic field gear in a bleach solution prior to departure from Oahu. We will strictly adhere to BMP20

4. 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.

5. 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.

6. Because the two permit applications appear related, it would be helpful to better understand how they fit together. How are the Lopes and Mikkelson 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.
Since this permit involves an activity that is precedent to a later planned activity, i.e., the same study methodology used throughout the permit period, the categorical exemption determination here will treat all planned activities as a single action under §11-200.1-7, HAR.

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

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

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

3. Cumulative Impacts of Actions in the Same Place and Impacts with Respect to the Potentially Particularly Sensitive Environment Will Not be Significant.
Even where a categorical exemption appears to include a proposed action, the action cannot be declared exempt if "the cumulative impact of planned successive actions in the same place, over time, is significant, or when an action that is normally insignificant in its impact on the environment may be significant in a particularly sensitive environment." HAR § 11-200.1-8(b). To gauge whether a significant impact or effect is probable, an exempting agency must consider every phase of a proposed action, any expected primary and secondary consequences, the long-term and short-term effects of the action, the overall and cumulative effect of the action, and the sum effects of an action on the quality of the environment. HAR § 11-200.1-12. Examples of actions which commonly have a significant effect on the environment are listed under HAR § 11-200.1-12.

The cumulative impacts of this permit, in conjunction with a proposed permit (PMNM-2026-005) on the same expedition, have been considered. No deleterious effects have been observed from

previous expeditions, with similar types of sediment research and techniques, such as prior permits issued to Dr. Haunani Kane). Significant cumulative impacts are not anticipated because of this activity, and numerous safeguards further ensure that the potentially sensitive environment of the project area will not be significantly affected. All activities will be conducted in a manner compatible with the management direction of the Monument Proclamation in that the activities do not diminish, but rather enhance monument resources, qualities, and ecological integrity, or have any indirect, secondary, cultural, or cumulative effects. The joint permit review process did not reveal any anticipated indirect or cumulative impacts, nor did it raise any cultural concerns that would occur because of these activities.

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

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

Conclusion
Upon consideration of the permit to be approved by the Board of Land and Natural Resources, the potential effects of the above-mentioned 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.