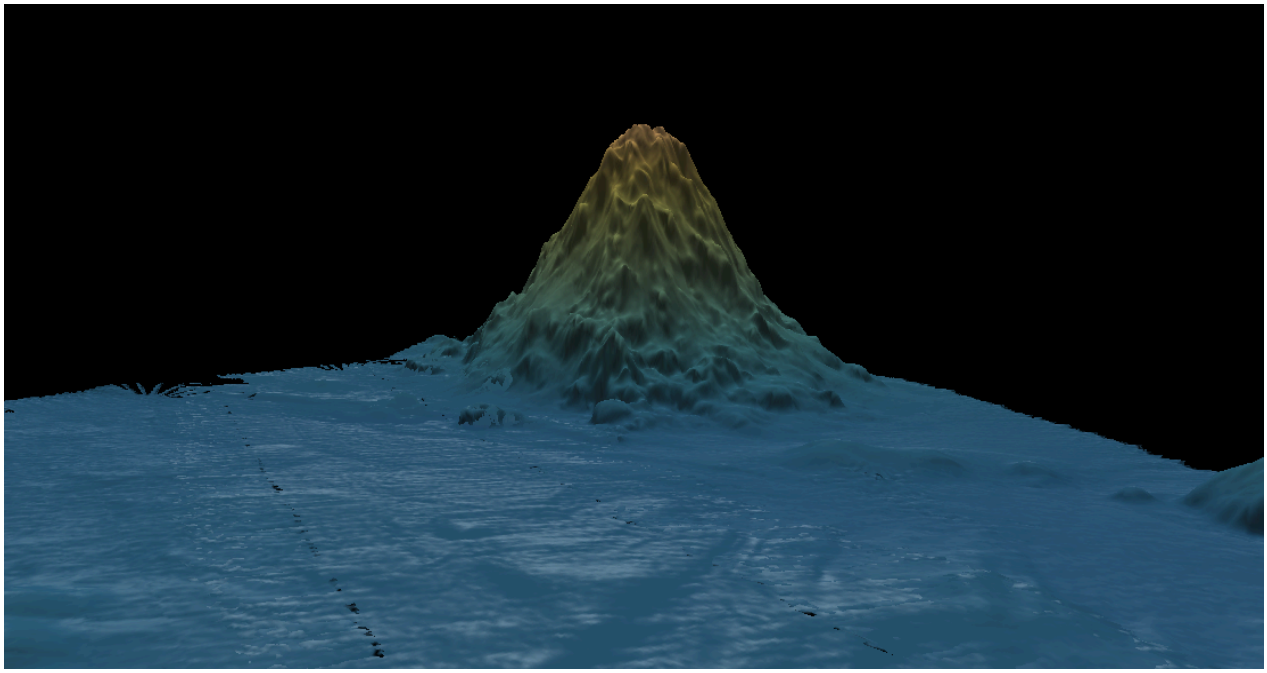
doi: 10.25923/kjrw-an87

Expedition Report: EX2404, Beyond the Blue: Papahānaumokuākea Mapping 2



Authors: Sam Candio[1], Patricia Albano[1], Charlie Wilkins[2], Treyson Gillespie[3], Margaret Hanley[3]

Affiliations:

[1] NOAA Ocean Exploration
[2] NOAA Office of Marine and Aviation Operations
[3] University Corporation for Atmospheric Research

July 1, 2025

Abstract

From July 18 - August 12, 2024, (Honolulu, Hawai'i to Honolulu, Hawai'i), NOAA Ocean Exploration conducted the Beyond the Blue: Papahānaumokuākea Mapping 2 expedition (EX2404), a mapping expedition to the Papahānaumokuākea Marine National Monument. EX2404 mapped 77,183 sq. km of seafloor, 76,072 sq. km were in the U.S. Exclusive Economic Zone in water depths greater than 200 meters. All data associated with this expedition have been archived and are publicly available through the NOAA archives.

Region of Operation: Papahānaumokuākea Marine National Monument

Ports: Honolulu, Hawai'i to Honolulu, Hawai'i

Bounding Coordinates: 159.4377664°W, 21.2179032°N, 177.7808669°E, 28.3973181°N

Expedition Dates: July 18 - August 12, 2024

Expedition Type: Mapping

Theme Keywords: Beyond the Blue, mapping, acoustic data, multibeam, split-beam, subbottom, Papahānaumokuākea

Place Keywords: Hawai'i, Papahānaumokuākea

Citation: Candio, Sam, Patricia Albano, Charlie Wilkins, Treyson Gillespie, Margaret Hanley. 2025. *Expedition Report: EX2404, Beyond the Blue: Papahānaumokuākea Mapping 2*. NOAA Ocean Exploration Expedition Rep. 24-04. NOAA Ocean Exploration, National Oceanic and Atmospheric Administration. United States. https://doi.org/10.25923/kjrw-an87.

For further information, direct inquiries to:

NOAA Ocean Exploration
1315 East-West Hwy, SSMC3 RM 2313
Silver Spring, MD 20910
Email: ex.expeditioncoordinator@noaa.gov

Table of Contents

1. Introduction

NOAA Ocean Exploration is dedicated to exploring the unknown ocean, unlocking its potential through scientific discovery, technological advancements, and data delivery. By working closely with partners across public, private, and academic sectors, we are filling gaps in our basic understanding of the marine environment. This allows us, collectively, to protect ocean health, sustainably manage our marine resources, accelerate our national economy, better understand our changing environment, and enhance appreciation of the importance of the ocean in our everyday lives.

With priority placed on exploration of deep waters and the waters of the U.S. Exclusive Economic Zone (EEZ), NOAA Ocean Exploration applies the latest tools and technologies to explore previously unknown areas of the ocean, making discoveries of scientific, economic, and cultural value. By making collected data publicly available in increasingly innovative and accessible ways, we provide a unique and centralized national resource of critical ocean information. And, through live exploration video, online resources, training and educational opportunities, and public events, we share the excitement of ocean exploration with people around the world and inspire and engage the next generation of ocean scientists, engineers, and leaders.

NOAA Ocean Exploration uses NOAA Ship *Okeanos Explorer* to conduct much of this work. Data collected by NOAA Ocean Exploration on NOAA Ship *Okeanos Explorer* in the Papahānaumokuākea Marine National Monument will contribute to the *Beyond the Blue: Illuminating the Pacific* campaign; a multiyear, multipartner cooperative research and exploration campaign in U.S. and international waters throughout the remote Pacific Islands. Data and information collected during this campaign are intended to expand the footprint of coastal and ocean mapping, exploration, and characterization throughout the Pacific Islands region. Throughout the duration of *Beyond the Blue*, NOAA Ocean Exploration and campaign partners will work to create and maintain meaningful relationships to improve collaboration across the U.S. government, with local communities, and other stakeholders through thoughtful engagement, inclusive collaboration, and public-private partnerships. Building upon previous work in the region, including the 2015 - 2017 Campaign to Address Pacific monument Science, Technology, and Ocean NEeds (CAPSTONE) and work sponsored by NOAA Ocean Exploration through the Ocean Exploration Cooperative Institute (OECI) and Ocean Exploration Trust, this campaign is intended to provide a foundation of publicly accessible information relevant to a variety of sectors and communities, all with the aim of building our collective knowledge of the Pacific Islands region.

NOAA Ocean Exploration's expeditions on *Okeanos Explorer* contribute to the National Strategy for Mapping, Exploring, and Characterizing the United States Exclusive Economic Zone and Seabed 2030.

2. Expedition Overview

From July 18 to August 12, 2024, NOAA Ocean Exploration and partners conducted a telepresence-enabled ocean exploration expedition on *Okeanos Explorer* to collect critical baseline information and improve knowledge about unexplored and poorly understood deepwater areas of the Papahānaumokuākea Marine National Monument. Previous expeditions in this region include EX2403.

During the 26 days at sea, 77,183 sq. km of bathymetric data were collected (see **Figure 1**), 76,072 sq km were within US Waters deeper than 200 meters. Section 5 provides details about the expedition schedule. A station log detailing the location of each operation conducted is provided as a supplemental file to this expedition report. Names, responsibilities, and affiliations of science team members are in **Appendix A**.

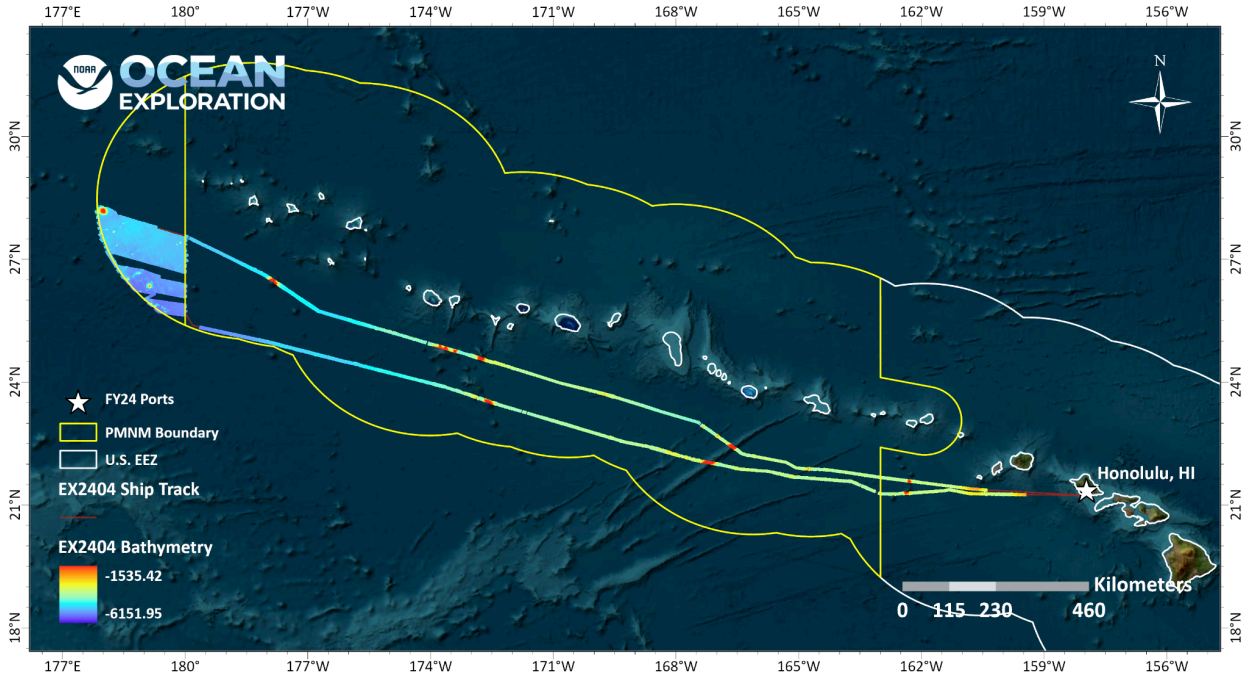


Figure 1. Overview of ship track and bathymetric data collected during EX2404. All depths are in meters.

2.1 Rationale for Exploration

As part of the planning for this expedition, NOAA Ocean Exploration collaborated with the ocean science and management communities to assess exploration needs and data gaps in unknown and poorly known areas of the Papahānaumokuākea Marine National Monument. To define the operating area for this expedition, we considered the NOAA Ocean Exploration conducted 2024 call for input and known priorities from resource managers.

The deepwater regions offshore Hawai'i are rich environments, home to deep-sea corals, chemosynthetic communities, and other sensitive habitats, as well as marine geohazards that threaten coastal communities with earthquakes, landslides, and tsunamis. Among these environments are vast energy resources in the form of seafloor minerals, wind, and waves.

Mapping and exploring these deep waters results in critical baseline information that can be integrated into Beyond the Blue campaign core datasets to help guide wise use of living marine resources and habitats, inform ocean energy and mineral resource decisions, and improve offshore natural hazard assessments.

Data and information from this expedition will inform deep-sea management plans for habitat areas of particular concern, marine protected areas, and national marine sanctuaries, support local scientists and managers seeking to understand and manage deep-sea resources, and stimulate subsequent exploration, research, and management activities.

2.2 Objectives

EX2404 addressed scientific themes and priority areas put forward by NOAA scientists and partners and the broad ocean science and management communities. The primary objective of the expedition was to explore deepwater areas within the Papahānaumokuākea Marine National Monument to provide baseline information to support science and management needs. Briefly, this expedition sought to:

- Collect high-resolution bathymetry in areas with no or low-quality mapping data.
- Acquire a foundation of sonar and oceanographic data to better understand the characteristics of the water column and fauna that live there.
- Identify, map, and explore the diversity and distribution of benthic habitats, including potential fish habitats, deep-sea coral and sponge communities, and chemosynthetic communities.
- Engage a broad spectrum of the scientific community and the public in telepresence-based exploration.

- Provide a foundation of publicly accessible data and information products to spur further exploration, research, and management activities.

A full list of expedition objectives is in "EX2404 Project Instructions: Beyond the Blue: Papahānaumokuākea Mapping 2" (Candio, 2024).

3. Methodology

The primary systems used throughout EX2404 to accomplish objectives were:

- Sonar systems (Kongsberg EM 304 multibeam sonar, Knudsen 3260 sub-bottom profiler, Simrad EK60 and EK80 split-beam sonars, and Teledyne acoustic Doppler current profilers) to conduct seabed and water column mapping operations.
- A high-bandwidth satellite connection to provide real-time ship-to-shore communications (telepresence).

The following sections further detail the equipment and procedures used by NOAA Ocean Exploration during expeditions on *Okeanos Explorer*.

3.1 Acoustic Operations

Acoustic operations included Kongsberg EM 304 multibeam sonar, Simrad EK60 and EK80 split-beam sonar, Knudsen 3260 sub-bottom profiler, and acoustic Doppler current profiler (ADCP) data collection to map the seafloor, sub-seafloor, and water column. Standard survey operations include concurrent collection of multibeam, split-beam, and sub-bottom sonar data synchronized using a Kongsberg Synchronization Unit (K-Sync) with the EM 304 set as the master. The ADCPs were secured during standard surveying operations due to interference with other sonars, but were used to collect data when entering and exiting port.

Mapping operations were planned to maximize edge matching of existing data or to fill data gaps in areas with incomplete bathymetric coverage. In regions with no existing data, lines were optimized for potential discoveries and to complete relatively large continuous areas to support interpretation of features from bathymetry and backscatter. Targeted mapping operations were conducted at the southwestern extent of the Papahānaumokuākea Marine National Monument, primarily focused on the eastern side of the antimeridian (**Figure 2**). Mapping operations occurred 24 hours/per day.

More information about general equipment calibration procedures, data collection, processing, reporting, and archiving is in the "NOAA Ocean Exploration Deepwater Exploration Mapping Procedures Manual" (Hoy et al. 2020).

3.1.1 Equipment and Data Collection Methods

Detailed descriptions of mapping equipment, annual calibrations, and capabilities on *Okeanos Explorer* are in the "NOAA Ship *Okeanos Explorer* Mapping Systems Readiness Report 2024" (Candio et al. 2024). Any deviations from the readiness report are noted in the following sections.

Supplemental files may be added to the readiness report throughout the year if changes to the equipment are made, such as mid-season calibrations. Users of mapping data from EX2404 should refer to the 2024 readiness report to see if any supplemental files report changes that may affect their analysis.

3.1.1.1 Multibeam Sonar

Okeanos Explorer is equipped with a 26 kHz Kongsberg EM 304 MKII multibeam sonar. The multibeam sonar was used to collect seafloor bathymetry, seafloor backscatter, and water column backscatter. Bathymetric and seafloor backscatter data are stored in .kmall files as beam-averaged backscatter values and as full time-series values (snippets) within each beam. Water column backscatter data are stored separately in .kmwcd files.

Throughout the expedition, mapping watchstanders monitored multibeam data quality in real time by. Ship speed was adjusted to maintain data quality and sounding density as necessary, and line spacing was planned to ensure one-quarter to one-third swath-width overlap between lines, depending on the environmental conditions and impact on the quality of the outer swath regions. Maximum angles in the Seafloor Information System (SIS) were generally left open (70°/70°) during transit to maximize data collection and were adjusted on the port and starboard sides to ensure the best data quality and coverage. If outer beams were returning obviously spurious soundings (e.g., due to attenuation or low grazing angle), beam angles were gradually reduced and monitored closely until a high-quality swath was obtained.

Real-time surface sound speed values were provided by a Reson SV70 sound velocity probe mounted in close proximity to the EM 304 transducer and were monitored in SIS for deviations from the values determined by sound speed casts. Sound speed profiles were collected every six hours or more frequently as dictated by local oceanographic conditions.

Vessel positioning and attitude was measured by Applanix POS MV V5 and Kongsberg Seapath 380 positioning systems during data collection. This redundancy allows for either system to be the primary source of positioning/attitude for the multibeam data in the event that one of them fails. Positioning/attitude data were applied to the multibeam data in real time and were stored in .kmall files. The primary system applied in post-processing is noted in the processing logs.

3.1.1.2 Sub-Bottom Profiler

Okeanos Explorer is equipped with a Knudsen 3260 sub-bottom profiler with a central frequency of 3.5 kHz. This sonar was used to collect echogram images of shallow geological layers underneath the seafloor to a maximum depth of approximately 80 m below the seafloor. Phase, range, and gain were monitored and optimized for data collection. New files were created when changes were made to pulse lengths and/or power settings.

3.1.1.3 Split-Beam Sonars

Okeanos Explorer is equipped with a suite of five Simrad EK60 and EK80 split-beam sonars: three general purpose transceivers (GBTs), the 18, 120, and 200 kHz sonars, and two wide-band transceivers (WBTs), the 38 and 70 kHz sonars. These quantitative scientific echosounders were calibrated to identify the target strength of water column acoustic reflectors (e.g., deep scattering layers, fish, gas bubbles from seeps), providing additional information about water column characteristics and anomalies.

Calibrations were performed during EX2401, and these calibration values were most appropriate for the EX2404 dataset. The calibration files are archived with the sonar data, and the calibration report is available as a supplemental file to the 2024 mapping readiness report (Candio, 2024).

The split-beam sonars were used continuously throughout EX2404 during mapping operations.

3.1.1.4 Acoustic Doppler Current Profiler

Okeanos Explorer is equipped with two acoustic Doppler current profilers (ADCPs), a Teledyne Workhorse Mariner (300 kHz) and a Teledyne Ocean Surveyor (38 kHz). Depending on environmental conditions, the 300 kHz system provides ocean current data to a depth of approximately 70 m, and the 38 kHz system provides data to a depth of approximately 1,200 m.

3.1.2 Data Processing and Quality Assessment Methods

3.1.2.1 Multibeam Sonar Bathymetry and Seabed Backscatter

Full-resolution multibeam files (.kmall) were imported into QPS Qimera and then processed and cleaned of noise and artifacts. Outlier soundings were removed using multiple methods, including automatic filtering and/or manual cleaning with the swath and subset editing tools. The default sound speed scheduling method used was “Nearest-in-Time.” If another method was used, it was noted in the multibeam processing log that is archived with the dataset. Gridded digital terrain models were created using the weighted moving average algorithm and were exported in multiple formats using QPS Fledermaus. Daily bathymetric surfaces were created and sent to shore.

A final quality check of the data was performed on shore prior to submission to the archive. This involved additional fine cleaning of soundings and minimization of residual artifacts from sound speed biases and field-cleaning errors.

Each line of cleaned full-resolution data was exported to a .gsf file (Level-01 data). The processed and cleaned files were used to create a static surface in QPS Qimera. This final surface was re-projected to the field geographic WGS84 reference frame in QPS Fledermaus and saved as an .sd file for archiving. Using QPS Fledermaus, this .sd bathymetric grid file was then exported as ASCII .xyz, color .tif, floating point .tif, and Google Earth .kmz files. The .gsf files were used to create daily backscatter mosaics using QPS Fledermaus FMGT.

All products maintain horizontal referencing to WGS84 (G1762) and vertical referencing to the assumed mean waterline (based on the waterline measured during the annual shakedown expedition). The draft values for *Okeanos Explorer* used during the expedition are in **Table 1** for the purpose of further post-processing, if desired by the user. Positioning data files for post-processing be requested by sending an email to ex.expeditioncoordinator@noaa.gov.

Table 1. *Okeanos Explorer*'s draft at the beginning and end of EX2404.

Location	Start of Expedition (07/17/2024)	End of Expedition (08/13/2024)
Forward	16' 6.5''	15' 8.5''
Aft Starboard	15' 6''	14' 6''
Aft Port	15' 0''	14' 11''

3.1.2.2 Multibeam Sonar — Water Column

EM 304 water column files (.kmwcd) were reviewed in QPS FM Midwater or Qimera for anomalies (e.g., gas seeps and hydrothermal plumes). No anomalies were observed during this expedition.

3.1.2.3 Split-Beam Sonars

No anomalies were observed during this expedition. Calibration reports and files are archived with the split-beam data.

3.1.2.4 Sub-Bottom Profiler

Using Natural Resources Canada's SEGYJp2 software, the raw files (.sgy) from the sub-bottom profiler were processed for gain to produce the clearest image of sub-bottom layers. The gain processed files were converted to jpeg images (.jpg) and shapefile tracklines (.shp).

3.1.2.5 Sound Speed

Raw sound speed profiles collected from expendable bathythermographs (XBTs) were processed using HydrOffice Sound Speed Manager and archived as .asvp files.

3.1.3 Data Collection and Processing Software

Table 3 provides a list of the data collection and processing software versions used during EX2404.

Table 3. Versions of data collection and processing software used during EX2404.

Software	Purpose	Version
SIS	EM 304	5.12.2
EK80	EK suite	23.6.2
EchoControl	Knudsen	4.09
UHDAS	ADCPs	14.04
AMVERSEAS	Autolaunch XBT	9.3
WinMK21	XBT	3.0.2
K-Sync	Synchronization	1.9.0
Qimera	Bathymetry	2.6.2
FMGT	Backscatter	7.11.1
FM Midwater	Water Column	7.9.4
Sound Speed Manager	Sound Speed Profiles	2024.0.3
NRCan (SegJp2)	Sub-Bottom	1.0
Fledermaus 7	Visualization/Data Analysis	7.8.12

3.5 Sun Photometer Measurements

NOAA Ocean Exploration gathers limited at-sea measurements aboard *Okeanos Explorer* to support a NASA-led, long-term research effort that assesses marine aerosols. As time allowed on cloud-free days, onboard personnel collected georeferenced sun photometer measurements for the Maritime Aerosol Network (MAN) component of the Aerosol Robotic Network (AERONET). AERONET is a network of sun photometers that measure atmospheric aerosol properties around the world. MAN complements AERONET by conducting sun photometer measurements on ships of opportunity to monitor aerosol properties over the global ocean.

4. Environmental Compliance

Pursuant to the National Environmental Policy Act (NEPA), NOAA Ocean Exploration is required to include in its planning and decision-making processes appropriate and careful consideration of the potential environmental consequences of actions it proposes to fund, authorize, and/or conduct. The companion manual (NOAA 2017) for NOAA Administrative Order 216-6A: Compliance with the National Environmental Policy Act, et al. describes the agency's specific procedures for NEPA compliance.

An environmental review memorandum was completed for all *Okeanos Explorer* expeditions in 2024 in accordance with Section 4 of the companion manual in the form of a categorical exclusion worksheet. Based on this review, a categorical exclusion was determined to be the appropriate level of NEPA analysis necessary, as no extraordinary circumstances existed that required the preparation of an environmental assessment or environmental impact statement. NOAA Ocean Exploration is preparing a programmatic environmental assessment to cover future expeditions.

This project was conducted under NOAA Ocean Exploration Best Management Practices (BMPs), Essential Fish Habitat (EFH) consultation dated April 1, 2024, Endangered Species Act (ESA) Programmatic Letter of Concurrence dated March 14, 2022 and subsequent revision dated May 4, 2023, National Environmental Protection Act (NEPA) Categorical Exclusion (CE) dated May 28, 2024, and Papahānaumokuākea Marine National Monument permit PMNM-2024-001 dated January 1-December 31, 2024. These documents have been submitted with this report as supplemental files. A list of all supplemental files that are or will be available with this expedition report can be found in **Appendix B**.

5. Schedule

Table 4 provides a day by day breakdown of EX2404.

Table 4. EX2404 schedule.

Date (UTC)	Activity
7/17	Mobilization in Honolulu, Hawai'i.
7/18	Departure, commence transit mapping towards Papahānaumokuākea.
7/19 - 7/24	Transit mapping.
7/25 - 8/5	Focused mapping operations within Papahānaumokuākea.
8/6 - 8/11	Transit mapping.
8/12	Arrival in Honolulu, Hawai'i.

Date (UTC)	Activity
8/13	Mission team departure

6. Results

This section details the results of EX2404. Metrics for the expedition's major scientific work are in **Table 5**. A station log detailing the location of each operation conducted is provided as a supplemental file to this expedition report.

Table 5. Summary of scientific metrics for EX2404.

Metrics	Totals
Days at Sea	26
Days at Sea in U.S. Waters	26
Linear km Mapped by EM 304	4,467
Sq. km Mapped by EM 304	77,183
Sq. km Mapped by EM 304 in U.S. Waters	76,072
Ship CTD Casts	0
XBT Casts	91

NOAA Ocean Exploration mapped 77,183 sq. km of seafloor during the 26 days at sea for EX2404. Of the 77,183 sq. km mapped, 76,072 sq. km was deeper than 200 m and within the U.S. Exclusive Economic Zone and Territorial Sea.

Focused mapping operations were conducted in the southwestern extent of the U.S. EEZ, within the expansion area of the Papahānaumokuākea Marine National Monument. Data collection was planned to mitigate the effects of crossing the antimeridian on acquisition and processing softwares, with the majority of the data collected in the eastern hemisphere (**Figure 2)**.

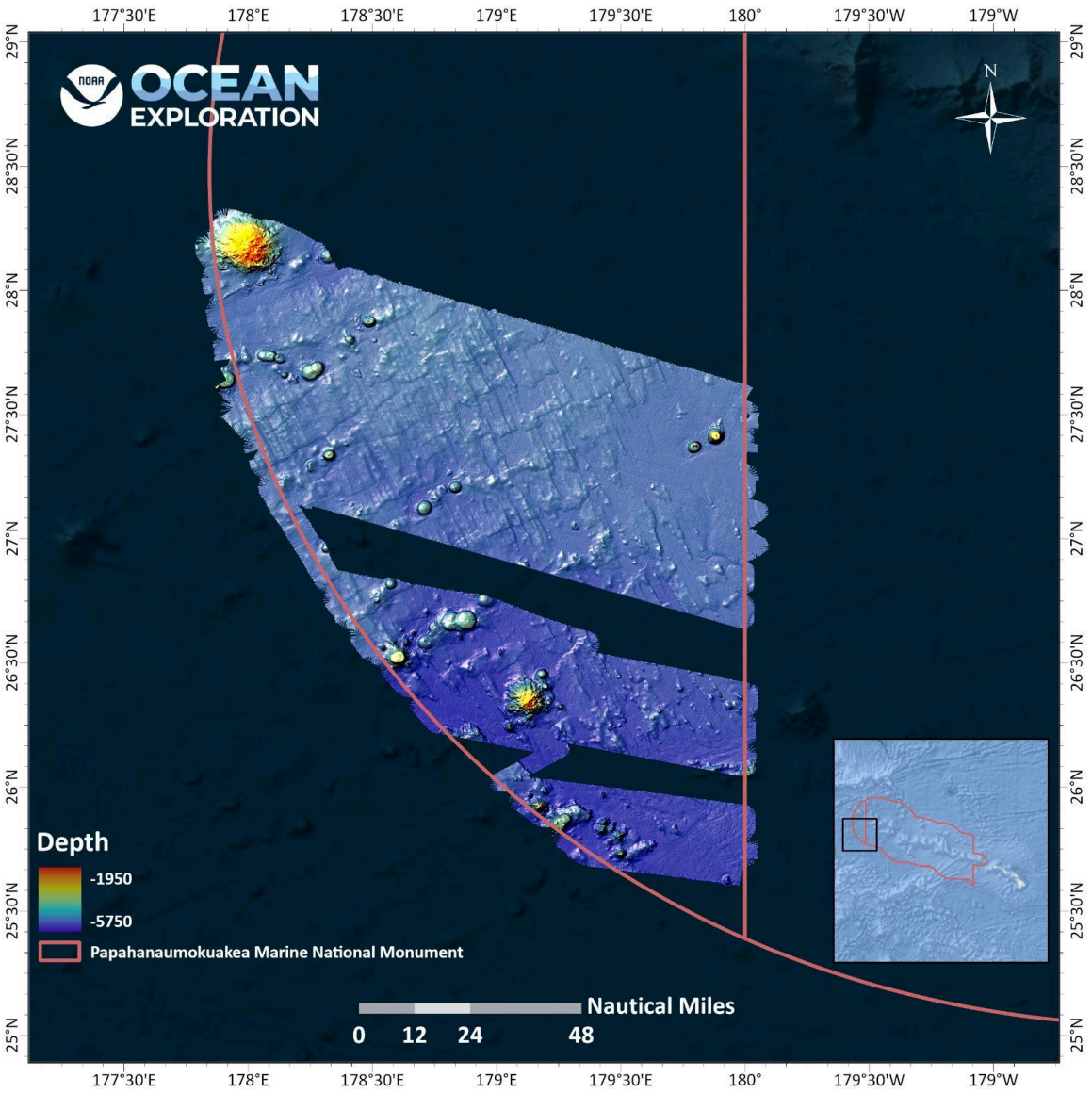


Figure 2. Bathymetric data collected during focused mapping operations on the eastern side of the antimeridian, complementing existing mapping coverage as represented by the gaps in the survey area.

Acoustic mapping data are generally sent to the NOAA archives within 120 days of the end of an expedition. The 2024 mapping readiness report describes the data archived for each dataset, including file formats (Candio et al. 2024). Information about proprietary software and freeware that can handle the varying data types is in the "NOAA OER Deepwater Exploration Mapping Procedures Manual" (Hoy et al. 2020).

7. Data Access

All data collected during NOAA Ocean Exploration expeditions and associated products are made publicly available via the NOAA archives, NOAA's National Centers for Environmental Information (NCEI), the NOAA Institutional Repository, and the Smithsonian National Museum of Natural History and Oregon State University sample repositories, unless protected (e.g., data associated with specific maritime heritage sites). Data collected by NOAA must be covered by a data management plan to ensure they are archived and publicly accessible. The data management plan for EX2404 is in the "EX2404 Project Instructions: Beyond the Blue: Papahānaumokuākea Mapping 2" (Candio, 2024).

The primary tools for accessing data collected during this expedition and archived at NCEI are the EX2404 data landing page, the NOAA Ocean Exploration Data Atlas, and the NOAA Ocean Exploration Video Portal (video data was not acquired for this expedition). Refer to the NOAA Ocean Exploration Data Access web pages for help navigating expedition data. Other resources include the NOAA Ocean Exploration Data (NCEI) ArcGIS online group, which provides access to all NOAA Ocean Exploration geospatial data services managed by NCEI, including the geospatial data layers found in the data atlas, and the NOAA Ocean Exploration Data Management website.

NCEI makes data publicly available over time as quality-control measures are completed, data are released, and publications and related materials are published. Thus, not all data and products will be made available at the same time. To access data and products from EX2404 that aren't yet public, request assistance by submitting a data request form or sending an email to oer.info.mgmt@noaa.gov.

7.1 Digital Data/Product Locations

The locations for directly accessing specific types of digital data collected during EX2404 and products documenting expedition results (at the time of writing this report) are provided in **Table 6**.

Table 6. Online locations for direct access to digital data collected during EX2404 and products documenting expedition results (at the time of writing this report).

Data/Product Type	Description
EM 304 Bathymetry and Backscatter Data	EM 304 bathymetric and backscatter data, supporting informational logs, and ancillary files are available through NCEI's Bathymetric Data Viewer
Water Column Data (EM 304 and EK60/EK80)	EM 304 and EK60/EK80 water column data, supporting data, and informational logs are available through NCEI's Water Column Sonar Data Viewer
Knudsen 3260 Sub-Bottom Profiler Data	Sub-bottom data, supporting data, and informational logs are available in NCEI's Trackline Geophysical Data Viewer
Sound Speed Profiles	Ancillary sound speed profiles are available with the mapping data through NCEI's Bathymetric Data Viewer and the expedition's oceanographic dataset
Oceanographic Dataset	Oceanographic data and products are available from NCEI. These data include data from shipboard sensors, including navigational data, meteorological data (wind), and oceanographic data (bathythermograph, sound velocity probe, thermosalinograph); additional data and products include profile data (XBT), event logs, images, ROV ancillary data, and sample data
Sun Photometer Measurements	Sun photometer measurements are available through NASA's Marine Aerosol Network
Reports and Papers	Reports and peer-reviewed papers are available through the NOAA Ocean Exploration Library Guide and the NOAA Institutional Repository

References

Candio, Sam, Patricia Albano, Charlie Wilkins, Anna Coulson, and Jason Meyer. 2024. *2024 NOAA Ship Okeanos Explorer Mapping Systems Readiness Report*. NOAA Ocean Exploration, National Oceanic and Atmospheric Administration. United States. https://doi.org/10.25923/j7ab-w612.

Candio, Sam. 2024. *EX2404 Project Instructions: Beyond the Blue: Papahānaumokuākea Mapping 2*. NOAA Ocean Exploration, National Oceanic and Atmospheric Administration. United States. https://doi.org/10.25923/bdc2-tr14.

Hoy, Shannon, Elizabeth Lobecker, Sam Candio, Derek Sowers, Grant Froelich, Kevin Jerram, Rachel Medley, Mashkoor Malik, Adrienne Copeland, Kasey Cantwell, Charlie Wilkins, and

Amanada Maxon. (2020). *Deepwater Exploration Mapping Procedures Manual*. NOAA Ocean Exploration, National Oceanic and Atmospheric Administration. United States. https://doi.org/10.25923/jw71-ga98.

IHO (International Hydrographic Organization). 2008. *IHO Standards for Hydrographic Surveys*, 5th edition. International Hydrographic Bureau. International Hydrographic Organization Special Publication, S-44. https://iho.int/uploads/user/pubs/standards/s-44/S-44_5E.pdf.

NOAA (National Oceanic and Atmospheric Administration). 2017. *Policy and Procedures for Compliance with the National Environmental Policy Act and Related Authorities*. NOAA. United States. https://www.noaa.gov/sites/default/files/2021-10/NOAA-NAO-216-6A-Companion-Manual-03012018%20%281%29.pdf.

Appendix A: EX2404 Science Team Members

EX2404 included onboard mission personnel (**Table A1**) as well as shore-based science personnel (**Table A2**) who participated remotely via telepresence.

Table A1. EX2404 onboard mission team personnel.

Name	Role	Affiliation
Sam Candio	Expedition Coordinator	NOAA Ocean Exploration
Treyson Gillespie	Mapping Watch Lead	University Corporation for Atmospheric Research
Margaret Hanley	Mapping Watch Lead	University Corporation for Atmospheric Research
Chris Wright	Global Foundation for Ocean Exploration Team Lead	Global Foundation for Ocean Exploration
Roland Brian	Video Engineer	Global Foundation for Ocean Exploration
Caitlin Bailey	Videographer	Global Foundation for Ocean Exploration
Olivia Andrus-Drennan	Videographer	Global Foundation for Ocean Exploration
Brian Doros	Video Engineer	Global Foundation for Ocean Exploration
Shannon Fitzgerald	Explorer-in-Training	University Corporation for Atmospheric Research
Cidney McMahon	Explorer-in-Training	University Corporation for Atmospheric Research
Nika Lebedev	Explorer-in-Training	University Corporation for Atmospheric Research

Appendix B: EX2404 Environmental Compliance Document

Categorical Exclusion (CE) Evaluation Worksheet

Project Identifier: EX2404

Date Review Completed: 5/20/2024

OAR NEPA Project Lead: Amanda Maxon, Environmental Compliance Specialist, Contractor, NOAA Office of Ocean Exploration and Research

OAR Functional Area: OER

Worksheet File Name: 2024-05-OER-E3-EX2404

Step 1. CE applicability

1. **Is this federal financial assistance, including via grants, cooperative agreements, loans, loan guarantees, interest subsidies, insurance, food commodities, direct appropriations, and transfers of property in place of money?**

   no

2. **What is the proposed federal action?**
   The proposed action is for NOAA's Office of Exploration and Research (OER) to complete the EX2404 Beyond the Blue: Papahānaumokuākea Mapping 2 using the NOAA Ship Okeanos Explorer (EX) focused on exploring deep waters (greater than 200 m) in U.S. waters of Hawai'i , Papahānaumokuākea Marine National Monument (PMNM), and in the high seas. Operations will be conducted 24 hours per day and will consist of mapping operations and full shore-based participation via telepresence. Expedition operations will include using Okeanos Explorer's scientific deep water sonar systems (Kongsberg EM 304 multibeam sonar, EK60/EK80 split-beam sonars, Knudsen 3260 Chirp sub-bottom profiler, and Teledyne acoustic Doppler current profilers), expendable bathythermograph (XBTs) in support of multibeam sonar mapping operations, conductivity, temperature, depth profiler (CTD) casts, and high-bandwidth satellite connection for continuous ship-to-shore communications.
   EX2404 Beyond the Blue: Papahānaumokuākea Mapping will commence July 18, 2024 from the Ford Island Navy Base in Honolulu, Hawai'i and will conclude at the Ford Island Navy Base in Honolulu, Hawai'i on August 12, 2024 for around 26 days at sea. Mapping operations will primarily be conducted in waters deeper than 200 m. The exact

start and end dates may vary by a few days to weeks depending on weather and other logistical considerations. Operations will be conducted 24 hours a day, and may consist of mapping operations, conductivity, temperature, and depth (CTD) operations, and full shore-based participation via telepresence. The action has independent utility and has not been inappropriately segmented from a larger federal action for review.

3. **Which class of CE in Appendix E of the NAO 216-6A Companion Manual is applicable to this action and why?**
    a. E3: Activities to collect aquatic, terrestrial, and atmospheric data in a non-destructive manner.
    b. The topical scope for this action is consistent with the CE number E3 in Appendix E of the Companion Manual to NOAA Administrative Order (NAO) 216-6A: to collect aquatic, terrestrial, and atmospheric data in a non-destructive manner. The expedition will potentially conduct calibrations of mapping sonars which will involve no permanent physical, chemical, or biological changes to the environment in areas deeper than 200 meters in depth. EX2404 will focus on performing mapping survey operations in the high seas and in areas of interest offshore Hawai'i within PMNM and adjacent waters which would not involve surface or land disturbance causing permanent changes to the environment. This expedition will perform mapping survey operations to collect critical baseline information to support priority NOAA and regional and cultural science and management in Hawai'i and PMNM. The use of conductivity, temperature and depth instruments, and XBTs will also occur during this expedition. Operations, deployment, and retrieval of these technologies will follow industry standards and applicable provisions under ESA, MMPA, MBTA, MSA, NMSA, and other local/specific regional regulations.

Step 2. Extraordinary Circumstances Consideration

4. **Would the action result in adverse effects on human health or safety that are not negligible?**

The actions of the NOAA Ship Okeanos Explorer will primarily take place in remote deep-sea (>200m) areas located offshore of Hawai'i with a focus on PMNM and the high seas. All operations are underwater and will have no human presence in the area besides those on onboard the EX2404. The vessel will transit through different depths as it moves from the ports of call to the areas of operations in deeper waters. These actions do not involve any procedures or outcomes known to result in impacts on human health and safety.

5. **Would the action result in adverse effects on an area with unique environmental characteristics that are not negligible?**

   While the Okeanos Explorer is operating within the U.S. EEZ and high seas where majority of operations would take place, the effects will be negligible as acoustic mapping operations and XBTs are considered transient and would not cause any permanent impact on the seabed or within the water column. The procedures that are employed when operating acoustic systems impacts are well-documented and would follow the accepted best management practices for all operations onboard the vessel to ensure that the level of impact is below minor to the point of being barely detectable. Expedition operations are planned and reviewed before any actions are taken in order to determine whether there would be the potential for adverse effects on the area.

6. **Would the action result in adverse effects on species or habitats protected by the ESA, MMPA, MSA, NMSA, or MBTA that are not negligible?**

   The activities are not likely to have a negative effect on species or habitats protected by the ESA, MMPA, MSA, NMSA, or MBTA. According to NOAA Fisheries, there are 22 ESA endangered and threatened species found within the Pacific Islands region. Okeanos Explorer operations will abide by the Best Management Practices and Mitigation Measures developed in collaboration with the various regulatory and federal agencies to ensure that operations in these sectors would not result in any activities having adverse effects on the species or habitats protected under ESA, MMPA, MSA, NMSA, or MBTA. Mitigation measures and Best Management Practices are provided to the expedition coordinators and the ship before operations are taken to ensure that they are following the actions developed to minimize or limit adverse effects on species or habitats in the proposed action area.

7. **Would the action result in the potential to generate, use, store, transport, or dispose of hazardous or toxic substances, in a manner that may have a significant effect on the environment?**

   The expedition operations will be in compliance with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it) to ensure generation, use, storage, transport, and disposal of such substances will not result in significant impacts.

8. **Would the action result in adverse effects on properties listed or eligible for listing on the National Register of Historic Places authorized by the National Historic Preservation Act of 1966, National Historic Landmarks designated by the Secretary**

of the Interior, or National Monuments designated through the Antiquities Act of 1906; Federally recognized Tribal and Native Alaskan lands, cultural or natural resources, or religious or cultural sites that cannot be resolved through applicable regulatory processes?

Marine operations by NOAA OER will take place within PMNM which was designated by Presidential Proclamation under the authority of the Antiquities Act of 1906. As part of the PMNM application process, NOAA OER will be working directly with the appropriate regional and cultural managers to ensure that actions taken by NOAA OER will not result in adverse or indirect effects that cannot be resolved though applicable regulatory processes. As part of the co-managed permitting process to access PMNM, NOAA OER will be attending mandatory training sessions, providing relevant updates and tracking documents for activities and personnel, and will sail with a cultural liaison during each expedition within the National Monument. NOAA OER will be operating within a National Monument designated by Presidential Proclamation under the authority of the Antiquities Act of 1906 but would not be operating within any additional listed or eligible properties, lands, resources or sites coming under the umbrella of protection referenced above.

9. **Would the action result in a disproportionately high and adverse effect on the health or the environment of minority or low-income communities, compared to the impacts on other communities (EO 12898)?**

NOAA Ship Okeanos Explorer will be operating in the remote and offshore areas of the U.S. EEZ and high seas during EX 2404. Operations will occur in the U.S. EEZ and in adjacent waters where there are no communities within or near the geographic scope of the expedition due to activities primarily operating in areas greater than 200 meters in depth. The expedition does not involve actions known or likely to result in adverse impacts on health or the environment of minority or low income communities.

10. **Would the action contribute to the introduction, continued existence, or spread of noxious weeds or nonnative invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of the species?**

During EX 2404, NOAA Ship Okeanos Explorer will make landfall in no additional areas other than Ford Island Navy Base. The ship and OER mission team will comply with all applicable local and federal regulations regarding the prevention or spread of invasive species. At the completion of every CTD cast, the equipment will be thoroughly rinsed with fresh water and completely dried to prevent spreading organisms from one site to another. Also, the Engineering Department

aboard NOAA Ship Okeanos Explorer attends yearly Ballast Management Training in accordance with NOAA Form 57-07-13 NPDES VGP Annual Inspection and Report to prevent the introduction of invasive species.

11. Would the action result in a potential violation of Federal, State, or local law or requirements imposed for protection of the environment?

OER has taken measures to ensure that any effects on species or habitats protected by the ESA, MMPA, MSA or NMSA meet the definition of negligible. The proposed actions will not result in any Federal, State, or local law violations or requirements imposed for protection of the environment. OER received a ESA Programmatic Letter of Concurrence and Project Design Criteria letter dated March 14, 2022 from the NMFS ESA Interagency Cooperation Division for ESA Section 7 that concurs with OER's determination that the proposed action may affect, but is not likely to adversely affect ESA-listed species and their designated or proposed critical habitat in the action areas. The ESA Programmatic Letter of Concurrence and its Project Design Criteria will be provided in the EX2404 expedition report.

Given the offshore focus of most of our proposed work, it was determined that it is not likely that we will encounter marine mammals protected under the MMPA, or sea birds protected under the MBTA as they are often found in territorial and state waters. If we did encounter any such protected animals, our impacts would be negligible because of the best management practices that were developed with relevant agencies that we adhere to avoid or minimize environmental impacts. These best management practices and project designed criteria are outlined in the EX2404 project instructions and expedition report.

OER requested an Essential Fish Habitat (EFH) consultation under section 304 of the Magnuson-Stevens Fishery Conservation and Management Act for expeditions conducted by NOAA Ship Okeanos Explorer starting in April 2024 thru December 2026 field season in the Central, Southern, Eastern, and Western Pacific Ocean. The EFH Letter of Concurrence was received on April 1, 2024 from the Assistant Regional Administrator for the NOAA Office of Habitat Conservation Division stating that the FY24 through FY26 expeditions will not adversely impact EFH. This letter will additionally be included in the EX2404 expedition report.

In accordance with Presidential Proclamation 8031 establishing PMNM under the Antiquities Act of 1906, 16 §§ 431-433 and implementing regulations (50 CFR Part 404), all activities must be conducted in accordance with the Proclamation and the regulations. NOAA, the U.S. Fish and Wildlife Service (FWS), the State of Hawai'i through the Department of Land and Natural Resources (DLNR) and the Office of Hawaiian Affairs (OHA) (collectively, the Co-Trustees) reviewed and endorsed the activities listed in the permit PMNM-2024-001 to conduct activities

within PMNM. Based on the applicable authorities, the permit authorizes the permittees listed above to conduct conservation and management activities within the monument subject to the terms and conditions enclosed. All activities are to be conducted in accordance with the permit. In January 2024, NOAA OER submitted a PMNM application request to conduct operations within PMNM during its upcoming FY24 field season with the NOAA Ship Okeanos Explorer. It was determined that NOAA OER's activities could be covered under permit number PMNM-2024-001 for activities within PMNM under the co-managed permit (PMNM-2024-001). OER's activities are to be conducted in accordance with the authorized permit application and all supporting materials submitted to the Monument, and the terms and conditions of the permit number PMNM-2024-001. This permit will be included in the EX2404 expedition report.

12. Would the action result in highly controversial environmental effects?

No, the exploration activities are considered small and minimal following the best available information about the effects of the equipment to support the determination that activities would be localized and be short in duration in any particular area at any given time with no notable or lasting changes to the environment. Given the project's scope and breadth, no notable or lasting changes or highly controversial effects to the environment by mapping operations conducted onboard Okeanos Explorer. Any effects would be small and considered minimal as the vessel transits through the area of interest continuously using acoustic sound sources, which have been analyzed to determine the effects that may occur during operations.

13. Does the action have the potential to establish a precedent for future action or an action that represents a decision in principle about future actions with potentially significant environmental effects?

The decision to take this action will not result in growth-inducing changes, compel future actions with potential impacts, or foreclose options for future actions. Each expedition is independently useful and is not connected to subsequent federal actions.

14. Would the action result in environmental effects that are uncertain, unique, or unknown?

The techniques and equipment used are standard for this type of field study, and the effects are well known and assessed to determine whether the actions may result in environmental effects that are uncertain, unique, or unknown.

15. Does the action have the potential for significant cumulative impacts when the proposed action is combined with other past, present and reasonably foreseeable future actions, even though the impacts of the proposed action may not be significant by themselves?

By definition, actions that a federal agency classifies as a categorical exclusion have no potential, individually or cumulatively, to significantly affect the environment. This expedition is consistent with a class of CE established by NOAA and there are no extraordinary circumstances for this action that may otherwise result in potentially significant impacts.

CE Determination

☒I have determined that a Categorical Exclusion is the appropriate level of NEPA analysis for this action and that no extraordinary circumstances exist that would require preparation of an environmental assessment or environmental impact statement.

☐I have determined that an environmental assessment or environmental impact statement is required for this action.

OAR Decision Maker's Name: Jennifer Lukens

OAR Decision Maker's Position/Title: Deputy Director, NOAA Ocean Exploration

Date Signed:

LUKENS.JENNIFER.LEIGH.1365832583

Digitally signed by LUKENS.JENNIFER.LEIGH.1365832583
Date: 2024.05.28 12:31:43 -04'00'

PAPAHĀNAUMOKUĀKEA
Marine National Monument

Dear Monument Co-Trustees:

The National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service (FWS), the State of Hawai'i through the Department of Land and Natural Resources (DLNR) and the Office of Hawaiian Affairs (OHA) (collectively, the Co-Trustees) have approved the issuance of permit number PMNM-2024-001 to conduct activities within Papahānaumokuākea Marine National Monument ("Monument"). Activities are to be conducted in accordance with the permit application and all supporting materials submitted to the Monument, and the terms and conditions of permit number PMNM-2024-001

This permit is not valid until your signature page is received at this office. The original copy should be signed and returned to the monument office via email or at the following address within 30 days of issuance:

NOAA/Inouye Regional Center
NOS/ONMS/PMNM/Attn: Permit Coordinator
1845 Wasp Blvd, Building 176
Honolulu, Hawai'i 96818

You are required to carry a signed copy of the permit with you while conducting the permitted activities. Your permit contains specific special conditions and reporting requirements. Please review them closely and fully comply with them while undertaking permitted activities.

If you have any questions about this permit, please contact Phillip Howard at Phillip.Howard@noaa.gov.

Thank you for your continued cooperation with NOAA, FWS, the State of Hawai'i, and the Office of Hawaiian Affairs.

PAPAHĀNAUMOKUĀKEA
Marine National Monument

CONSERVATION AND MANAGEMENT PERMIT

Project Title: Co-Trustee Conservation and Management Activities in Papahānaumokuākea Marine National Monument

Permittee Names
Papahānaumokuākea Marine National Monument Co-Trustee Representatives:

Jared Underwood
Superintendant
Papahānaumokuākea Marine National Monument
Department of the Interior
U.S. Fish and Wildlife Service

Brian Neilson
Division of Aquatic Resources Administrator
Papahānaumokuākea Marine National Monument
State of Hawai'i Department of Land and Natural Resources

Eric Roberts
Superintendent
Papahānaumokuākea Marine National Monument
National Oceanic and Atmospheric Administration

Stacy Kealohalani Ferreira
Ka Pouhana (Chief Executive Officer)
Office of Hawaiian Affairs

Permit Number: PMNM-2024-001

Effective Dates: January 1, 2024 – December 31, 2024

This permit is issued for activities in accordance with Proclamation 8031 ("Proclamation") establishing Papahānaumokuākea Marine National Monument ("Monument") under the Antiquities Act of 1906, 16 USC §§ 431-433 ("Antiquities Act") and implementing regulations (50 CFR Part 404). All activities must be conducted in accordance with the Proclamation and the regulations (attached). No activity prohibited by the Proclamation or 50 CFR Part 404 is allowed except as specified below. Chapter 13-60.5, Hawai'i Administrative Rules remain in effect for activities in State waters.

The National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service (FWS), State of Hawai'i through the Department of Land and Natural Resources and the Office of Hawaiian Affairs (collectively the Co-Trustees) have reviewed and endorsed the activities listed in this permit. Based on applicable authorities, this permit hereby authorizes the permittees listed above to conduct conservation and management activities within the Monument subject to the terms and conditions enclosed herein. All activities are to be conducted in accordance with this permit. The permit application is incorporated into this permit and made a part hereof; provided, however, that if there are any conflicts between the permit application and the terms and conditions of this permit, the terms and conditions of this permit shall be controlling.

PERMITTED ACTIVITY DESCRIPTION:

To safeguard the resources and ecological integrity of the Monument, early and ongoing coordination of interagency activities will occur between the action agency and interested Monument management partners as soon as details of activities are identified. For example, a joint tracking sheet and calendar of proposed activities to be covered under the manager's permit will be kept and continually updated by agency staff. In addition, logistics planning and coordination meetings between all Monument Management Board (MMB) agencies may be implemented to further synchronize activities. The goal of early coordination is the commitment to identifying, incorporating, and customizing best management practices for specific activities prior to the activity occurring.

The following activities are authorized by this permit:

ENTRANCE

1. Staff, volunteers, cultural liaisons, or contractors necessary for the permitted activities may enter the Monument for conservation and management activities, and resident families of Midway Atoll may enter the Monument. Invited news media representatives may enter the Monument to provide public information of conservation and management activities. All personnel will be identified and information will be provided to the Monument Permit Coordinators prior to each entry; this information is documented digitally on a shared spreadsheet. The permit applicants shall ensure that all personnel assigned to conduct conservation and management activities authorized under this permit are fully qualified to perform in the assigned role(s) and shall be limited to the scope of actions set forth in this permit and all other applicable policies, protocols, permits, and regulations. (ALL MMB AGENCIES)

OPERATIONS

2. Operating field stations of the National Wildlife Refuge System (NWRS) and the State of Hawai'i Kure Atoll State Wildlife Sanctuary, necessary for meeting mission and purposes of refuges and the Monument in support of on-site management and resource conservation including but not limited to: (STATE) (FWS)

    a. Maintaining and repairing/replacing facilities and their components (e.g., carpentry, electrical, plumbing, welding, general construction); (STATE) (FWS)
    b. Building and other facilities deconstruction and reconstruction; (STATE) (FWS)
    c. Maintaining airport and airstrips, including improvements such as runway lighting replacement, taxiway maintenance (including repaving, and painting/marking); (FWS)
    d. Painting, including all preparation work such as scraping, washing, etc.; (STATE) (FWS) and
    e. Lead-based paint soil remediation, including removing sand/soil from around many or all affecting buildings and proper on-site containment of this material. (STATE) (FWS)

3. Supporting and re-supplying field camps and field stations, including but not limited to, delivery and removal of supplies, equipment, people, waste, and/or assets necessary for operations. (ALL MMB AGENCIES)

4. Operating vessels to provide access for conservation and management activities. Authorized vessel operations shall include, but are not limited to:

    a. Operating, mooring and anchoring small boats; (ALL MMB AGENCIES)
    b. Conducting maintenance, proficiency training and safety measures for authorized vessels; (ALL MMB AGENCIES)
    c. Anchoring of the authorized vessels and small boats on sandy substrate only, and all anchors must be lowered into place; (ALL MMB AGENCIES)
    d. Establishing and utilizing an underwater mooring at Nihoa to allow for safer and more environmentally sound "anchoring" for authorized support vessels (ALL MMB AGENCIES)
    e. Discharging gray water outside of all Special Preservation Areas and the Midway Atoll Special Management Area (MASMA); (ALL MMB AGENCIES) and
    f. Discharging biodegradable solid waste associated with galley operations restricted to 3 nautical miles (ground to 1 inch in diameter) and 12 nautical miles (unground) outside of all Special Preservation Areas and the Midway Atoll Special Management Area (MASMA). (ALL MMB AGENCIES)

5. Possessing fishing gear to conduct sustenance fishing for pelagic species within Midway Atoll Special Management Area (MASMA) in accordance with the Monument Management Board Policy on Sustenance Fishing (Attachment #2). (ALL MMB AGENCIES)

6. Operating aircraft and airfields, including necessary maintenance and use of airfields and runways at Midway Atoll (Kuaihelani). (FWS)

7. Conducting on-site reviews and operational evaluations including, but not limited to: (ALL MMB AGENCIES)

    a. On-site reviews by management and congressional personnel; (ALL MMB AGENCIES)
    b. Agency site visits and meetings for management planning and programmatic assessments; (ALL MMB AGENCIES) and
    c. On-site management and safety reviews to gauge implementation and effectiveness of Monument management and programs. (ALL MMB AGENCIES)

8. Conducting personnel safety, fitness, and health maintenance including, but not limited to: (ALL MMB AGENCIES)

    a. Biking and jogging at Midway Atoll (Kuaihelani); and (ALL MMB AGENCIES)
    b. Swimming and bathing at all islands and atolls (ALL MMB AGENCIES); and
    c. Conducting health and safety activities for all personnel, including but not limited to: site safety reviews, adverse weather and emergency response procedures, safety protocols, and continuation of operation plans. (ALL MMB AGENCIES)

RESOURCE SURVEY AND MONITORING

9. Closed or open circuit SCUBA diving, swimming and snorkeling as necessary to support conservation and management activities covered under this permit. (ALL MMB AGENCIES)

10. Touching coral, living or dead, necessary to support conservation and management activities covered under this permit. (ALL MMB AGENCIES)

11. Attracting any living Monument resource, necessary to support conservation and management activities covered under this permit. (ALL MMB AGENCIES)

12. Surveying and monitoring target species and habitats to evaluate trends and status for management purposes. Activities in direct support of management, monitoring, and characterization may include: (ALL MMB AGENCIES)

    a. Placing scientific equipment or drilling into submerged and emergent lands in order to install scientific equipment, devices, markers, oceanographic instrument arrays, unmanned aerial systems, remotely operated camera systems, and remote viewing camera systems on submerged or emergent lands, and performing necessary maintenance activities on such equipment; (NOAA) (STATE) (FWS)

b. Collecting climatological data and necessary scientific information from on-site equipment; (NOAA) (STATE) (FWS)
c. Photographing and filming (including UAS) as necessary to document Monument resources; (ALL MMB AGENCIES)
d. Non-lethal marking and tagging for monitoring purposes; (ALL MMB AGENCIES) Note: Prior to authorization to conduct work which may result in the "take" of a protected species, a separate ESA/MMPA permit shall be required. (NOAA) (STATE) (FWS)
e. Visual, non-invasive marking and tagging for monitoring purposes; (ALL MMB AGENCIES) and
f. Physical surveying of and sampling from landfills, storage tanks, contamination sites, or other potentially hazardous materials associated with current and former occupation and use of the Northwestern Hawaiian Islands (NWHI); (NOAA) (STATE) (FWS) and
g. Visual, acoustic, electronic (i.e. Conductivity-Temperature-Depth (CTD) casts) and/or unmanned (aerial and marine) surveys in support of monitoring coral reefs, pelagic environments, and estimating the abundance and distribution of animals in the NWHI. (NOAA) (STATE) (FWS)

13. Removing, moving, taking, harvesting, possessing, injuring, disturbing, or attempting to remove, move, take, harvest, possess, injure, or disturb biological, chemical, or geological samples for analysis in support of activities under approved management plans, restoration or recovery plans, and for base line inventory and monitoring of population trends and habitat conservation and management. (ALL MMB AGENCIES)

14. Removing, moving, taking, harvesting, possessing, or attempting to remove, move, take, harvest, or possess a set number of any visually observable marine organism morphotype (except mammals) or terrestrial plant morphotype (including fungi), which cannot be visually identified or may represent a new geographic record or new species, with the set number based upon the per island/atoll abundance criteria below: (ALL MMB AGENCIES)

    a. One (1) specimen can be taken, removed, or possessed if in abundance assessment cannot be ascertained, or less than ten (10) such specimens are present, cumulative during the course of the collection event per island and atoll; (ALL MMB AGENCIES)
    b. Up to three (3) specimens can be taken, removed, or possessed if an abundance assessment of ten (10) or more such specimens is ascertained, cumulative during the course of the collection event per island or atoll; (ALL MMB AGENCIES) and
    c. For clonal organisms that cannot be visually identified or may represent a new geographic record or new species, take shall be limited to no more than half the clonal organism visually observed. Up to three (3) clonal specimens of similar morphology can be taken, removed, or possessed if an abundance assessment of

ten (10) or more of such specimens is ascertained, cumulative during the course of the collection event per island or atoll. (ALL MMB AGENCIES)

15. Conducting habitat mapping for the production of accurate, high-resolution base maps with methods to include: (ALL MMB AGENCIES)

    a. Data collecting to include optic, acoustic, and metal detector technologies, as well as land and dive operations, including the use of a remotely operated vehicle (ROV) and UAS, for ground truthing; (ALL MMB AGENCIES) and
    b. Global Positioning System (GPS) mapping and Light Detection and Ranging (LIDAR) work. (ALL MMB AGENCIES)

NATURAL RESOURCE PROTECTION, RESTORATION, AND REMEDIATION

16. Conducting management actions necessary to understand and carry out protection, restoration, and remediation of species and habitats, such as carrying out existing species recovery and restoration plans (ALL MMB AGENCIES).

    a. Conducting wildlife disentanglement, health response (including treatment and necropsy), and translocation activities according to existing species recovery plans; (NOAA) (STATE) (FWS)
    b. Conducting population augmentation or reestablishment activities such as capture, translocation, reintroduction, and out-planting; (ALL MMB AGENCIES)
    c. Conducting invasive species controls by mechanical, chemical and manual methods as needed; (ALL MMB AGENCIES)
    d. Investigating and monitoring of contamination in abiotic or biotic resources. (NOAA) (STATE) (FWS)

17. Removing marine debris, including but not limited to, plastic pollution, trash, derelict fishing gear and other materials (land and ocean-based) that pose threats to Monument resources. Activities may include: (ALL MMB AGENCIES)

    a. Disentangling wildlife from marine debris and other materials by authorized personnel; (NOAA) (STATE) (FWS)
    b. Tracking debris via drifter buoys and Unmanned Aerial Vehicles; (NOAA) (STATE) (FWS)
    c. Monitoring of sites that have been cleared of debris for recovery rates and effects of removal; (ALL MMB AGENCIES)
    d. Locating and removing debris and hazardous materials. This may be through interagency agreements, such as the Department of Defense (DOD) Innovative Readiness Training (IRT), Formerly Used Defense Sites (FUDS), or the Base Realignment and Closure (BRAC) Programs. Efforts may include activities such as seafloor and island mapping, reconnaissance and removal of materials, and derelict vessel salvage and removal; (ALL MMB AGENCIES) and
    e. Removal of sessile encrusting flora and fauna associated with marine debris. (ALL MMB AGENCIES)

18. Providing emergency response and damage assessment, mitigation, restoration, and monitoring post-response management. (ALL MMB AGENCIES) Activities may include:

    a. Conducting damage assessment, mitigation, restoration, monitoring, and post-response management in coordination with appropriate federal and/or state resource agencies and, as appropriate, consistent with NOAA, FWS, and State of Hawai'i Damage Assessment and Restoration regulations, policies, and procedures (e.g., oil spills, ship groundings, tsunami-generated marine debris, damage assessments, monitoring alien species, monitoring coral bleaching events, collection of bleached coral or alien species); (ALL MMB AGENCIES) and
    b. Conducting activities in response to an unusual mortality event (including but not limited to threatened and endangered species, marine mammals, and migratory birds) mass stranding or other urgent species response. (NOAA) (STATE) (FWS)

CULTURAL AND HISTORICAL RESOURCE IDENTIFICATION AND PROTECTION

19. Removing, moving, taking, harvesting, possessing, injuring, disturbing; or attempting to remove, move, take, harvest, possess, injure, or disturb post-contact artifacts as needed, subject to National Historic Preservation Act (NHPA) consultation when applicable, for the purpose of identifying, documenting, interpreting, preserving, and protecting the Monument's cultural and historic resources. (ALL MMB AGENCIES)

20. Monitoring and surveying historic sites. (ALL MMB AGENCIES)

21. Conducting or allowing for the preservation and conservation of artifacts subject to successful NHPA Section 106 consultation and appropriate approvals from other Federal agencies (e.g., U.S. Navy), when applicable. (ALL MMB AGENCIES)

22. Non-commercial filming and photographic activities for the purposes of further documenting and capturing the history of the NWHI. (ALL MMB AGENCIES)

23. Locating historic artifacts using passive side scan sonar, metal-detector, or (land-based) ground penetrating radar. (ALL MMB AGENCIES)

24. Returning of any previously collected samples to appropriate areas in Papahānaumokuākea with proper cultural and biological protocols and in coordination with appropriate federal and/or state resource agencies and community partners, including OHA and the Papahānaumokuākea Native Hawaiian Cultural Working Group, as appropriate. (ALL MMB AGENCIES)

25. Recording of atmospheric, celestial, biological, and other environmental observations for the purpose of developing and understanding natural trends, changes and cycles. (ALL MMB AGENCIES)

26. Conducting native Hawaiian cultural protocols and ceremonies, including offering of culturally and biologically appropriate ho'okupu in accordance with Monument regulations and Best Management Practices. (ALL MMB AGENCIES)

27. Removing, moving, taking, harvesting, possessing, injuring, disturbing; or attempting to remove, move, take, harvest, possess, injure, or disturb non-living culturally significant natural materials acquired during Monument operations and activities for cultural ceremony, practices and education. (ALL MMB AGENCIES)

28. Transferring culturally significant natural materials acquired during Monument operations and activities to Hawaiian cultural practitioners, in coordination with appropriate federal and/or state resource agencies and community partners, including OHA and the Papahānaumokuākea Native Hawaiian Cultural Working Group, and with the appropriate transfer documents and required permits. (ALL MMB AGENCIES)

29. Maintaining, preserving, caring for, and perpetuating Native Hawaiian wahi kūpuna (cultural sites) and iwi kūpuna (ancestral bones) in accordance with proper cultural protocols and consultation per the NHPA, Native American Graves Protection and Repatriation Act, Archeological Resources Protection Act, American Indian Religious Freedom Act and applicable sections of the Hawai'i State Constitution, Hawai'i Revised Statutes and Hawai'i Administrative Rules. (ALL MMB AGENCIES)

30. Conducting activities necessary for maintaining and preserving historic sites on Midway Atoll. (ALL MMB AGENCIES)

OUTREACH AND EDUCATION

31. Gathering information and experiences from personnel within the Monument to develop agency web pages, Navigating Change projects, and other Monument educational outreach products. (ALL MMB AGENCIES)

32. Removing, moving, taking, harvesting, possessing, injuring, disturbing; or attempting to remove, move, take, harvest, possess, injure, or disturb non-living debris and biological samples and specimens such as albatross boluses and carcasses for educational and/or outreach projects. (ALL MMB AGENCIES)

33. Transferring educational and outreach materials (e.g., albatross boluses or other non-living debris or biological samples) shall be according to one of the following categories, subject to all applicable permits and Monument Management Board (MMB) approved transfer documents: (ALL MMB AGENCIES)

    a. *Internal transfers*. Transfers among the MMB agencies provided such educational and/or outreach material shall remain within the custody of the MMB. (ALL MMB AGENCIES)

b. *External transfers*. Transfers outside of the MMB agencies if authorized in writing, to government agencies and accredited educational institutions, for the purpose of cultivating, informing, or involving constituencies that support or enhance conservation of the natural, cultural, and historic resources of the Monument. (ALL MMB AGENCIES)
c. *Loan Transfers*. Loans of biological samples or specimens, which must be returned to the MMB with a specified time frame and are subject to conditions stipulated in writing, to government agencies and accredited educational institutions for the purpose of supporting educational or outreach projects that enhance conservation of the natural, cultural, and historic resources of the Monument. (ALL MMB AGENCIES)

34. Conducting news media and VIP site visits to enhance public knowledge and understanding of Monument resources. (ALL MMB AGENCIES)

35. Conducting environmental, cultural, and historical education programs throughout the Monument by designated agency staff and contractors. (ALL MMB AGENCIES)

HAWAIIAN MONK SEAL CONSERVATION AND MANAGEMENT ACTIVITIES

36. Conducting the following population monitoring activities:

    a. Conducting seal assessments by visually identifying animals, and marking and tagging animals; (ALL MMB AGENCIES)
    b. Instrumenting seals including but not limited to mounted cameras and telemetry tags. (NOAA)

37. Operating unmanned aircraft systems (UAS) to assist in monitoring Hawaiian monk seal population. (NOAA)

38. Traversing Mokumanamana to conduct population assessment surveys only when full surveys cannot be completed by boat landing or UAS operations. (NOAA)

39. Placing acoustic recording devices on submerged sandy substrate to capture underwater vocalizations of Hawaiian monk seals. (NOAA)

40. Installing trail cameras in terrestrial areas to monitor entrapments and animal behavior. (ALL MMB AGENCIES)

41. Disentangling monk seals from marine debris. (NOAA) (STATE) (FWS)

42. Conducting health surveillance and response, including but not limited to cutting umbilical cords, antihelminthic treatments, lancing abscesses, administering antibiotics and vaccinations, responding to disease outbreaks, necropsy and collecting/archiving/transferring samples for further research and diagnostic collaboration. (NOAA) (STATE) (FWS)

43. Translocating Hawaiian monk seals, consisting of the following types:

    a. *Intra-atoll*: These translocations will include moving seals from areas of high risk where threats are imminent to safer areas and moving pups to promote maternal fostering when necessary. Field staff will perform these movements; greater resources (e.g., veterinarian care) will not typically be necessary. (NOAA)
    b. *Inter-atoll*: These translocations will include transport of weaned female pups from atolls/islands of low survival to those of higher survival. (NOAA)
    c. *MHI-NWHI*: These translocations will include transport of main Hawaiian Island (MHI) seals that are considered a threat to themselves or humans because they have demonstrated a pattern of interacting with humans. (NOAA)
    d. *NWHI-captive care*: Seals may be taken into temporary captivity for treatment at appropriate, federally permitted rehabilitation facilities in the MHI for release back in the NWHI (i.e., permitted for captive care of injured, ill or prematurely weaned seals). (NOAA)
    e. Aggressive male seal translocation to areas with no pups or juveniles. (NOAA)

44. Reuniting nursing mothers and pups, when separated (includes instances of pup switches). (ALL MMB AGENCIES)

45. Mitigating male aggression towards pups and juveniles (individual and multiple male-based aggression), including utilizing all federally permitted techniques (including, but not limited to, poles, rocks, slingshots, and air horns). Mitigation tools shall be applied as appropriate for the given context (i.e., the intensity, severity and frequency of aggression and the location, with regard to other species in the area such as birds). Mitigation may include temporarily separating males from juveniles by placing either in temporary shore-pens (see below). Mitigation also may include removal of the male(s) from the area by:

    a. Translocation to a location where no pups or juveniles will be harmed; (NOAA) (STATE) (FWS)
    b. Placement in an appropriate, federally permitted facility that is agreeable and permitted to care for a male indefinitely; (NOAA)
    c. Lethal removal: this type of removal will only be applied when the above two options are not feasible, possible or exhausted. The preferred technique for euthanasia will be via physical means (e.g., firearm, captive bolt, etc.), in order for the carcass to remain in PMNM and for culturally appropriate and environmentally proper disposal to occur. When necessary, chemical euthanasia and removal of the carcass from PMNM will be allowed. (NOAA)

46. Conducting captive care of compromised seals to administer veterinary care and/or food supplementation. Captive care may include the capture and transport of seals to shore-pens (in the NWHI) or facilities in the MHI. NWHI seals under care in the MHI may be returned to the NWHI when a licensed veterinarian deems them rehabilitated and transport is feasible. The seals will then be released to the NWHI site deemed most

appropriate for their subsequent survival (determined on the basis of such factors as the intensity and severity of imminent threats to the seals and recent survival trends at each atoll/island). (NOAA)

47. Monitoring shark activity at Lalo (French Frigate Shoals). Monitoring may include camping on islets with shark incidents on nursing pups and recording shark activity and shark-seal interactions via hand-held or mounted cameras (cameras will be mounted on a pole 15' or less with no guy wires to be used only during the field season and attended daily by field staff). (NOAA)

48. Placing temporary shore-pens at select NWHI breeding sites to facilitate monk seal recovery activities described here within (e.g., translocations, captive care, and male aggression mitigation). (ALL MMB AGENCIES)

49. Attracting Monument living marine resources using baited hooks, with bait to include fish parts (brought from outside the Monument), shark remains (obtained from permitted activities), and salvaged monk seal tissues (obtained from deceased monk seals at Lalo (French Frigate Shoals) and brought from outside the Monument). (ALL MMB AGENCIES)

50. Removing, moving, taking, possessing, injuring, or disturbing; or attempting to remove, move, take, possess, injure, or disturb up to 13 Galapagos sharks (*Carcharhinus galapagensis*) within a distance of 700 meters from the shorelines and inlets at Lalo (French Frigate Shoals) in consultation with OHA and the Papahānaumokuākea Native Hawaiian Cultural Working Group. Only Galapagos sharks with a minimum size of 2 meters (6.5 feet) tail length or greater shall be lethally removed. Permittees are required to safely release Galapagos sharks smaller than the minimum size limit as well as all other non-target species. The following four removal methods are authorized:

    a. Deploying a *hand-held harpoon* from shore or small boat when a targeted Galapagos shark is observed. Targeted shark shall then be hauled on shore or alongside a small boat for humane euthanasia using a .44 caliber bang stick. (NOAA)

    b. Deploying a baited *handline* from shore or small boat. Targeted shark caught shall then be hauled on shore or alongside a small boat for humane euthanasia using a .44 caliber bang stick. (NOAA)

    c. Deploying *bottomsets*, where each bottomset shall have a maximum of ten baited hooks and a buoy line at the top and an anchor (9-12 lb.) at the bottom. All bottomset gear shall be deployed only on sandy substrate and shall be closely monitored by field project personnel. (NOAA)

    d. Deploying *drumlines*, where each drumline shall consist of a single baited hook and drum-buoy with gear configuration to allow baited hook to rest on the bottom or suspended above the seafloor. All drumline gear shall be deployed only on

sandy substrate and shall be closely monitored by field project personnel. (NOAA)

51. Possessing fishing gear in support of permitted activities, within a distance of 700 meters from the shorelines of East, Trig, Gin, Little Gin, and Round islets (Lalo / French Frigate Shoals). All fishing gear shall be monitored closely to prevent mortality of non-target species. (NOAA)

52. Placing anchors on submerged lands that are part of authorized fishing gear. All anchors shall be placed on sandy substrate and all anchors removed when fishing gear is retrieved. (NOAA)

53. Conducting necropsies on euthanized Galapagos sharks on Tern Island, Lalo (French Frigate Shoals) for the purpose of obtaining morphometric measurements, reproductive state, and removing samples of muscle, liver, vertebrae, and gut contents for scientific analyses. (NOAA)

54. Discharging of Galapagos shark remains (post-necropsy) at a distance of approximately 0.5 miles seaward from the Lalo (French Frigate Shoals) breaking reef. Global Positioning System (GPS) coordinates shall be recorded at each carcass discharge site. One carcass, including any lethal by-catch shall be disposed of at each site. (NOAA)

55. Transferring necropsy samples from Galapagos shark remains to researchers for scientific analyses:

    a. Diet analysis through isotope screening (vertebrae) (NOAA)
    b. Diet analysis through fatty acid profiles (liver) (NOAA)
    c. Ciguatera and mercury level testing (muscle and liver) (NOAA)
    d. DNA analysis from fin clip and stomach contents, if available (NOAA)

56. Transferring biological samples (e.g., teeth and skin) for cultural purposes to practitioners shall occur only to such persons conducting protocol in PMNM. (NOAA)

57. Erecting temporary polyvinyl tents for housing monk seal field teams at Lalo (French Frigate Shoals), Kamole (Laysan), Kapou (Lisianski), Manawai (Pearl and Hermes) and Hōlanikū (Kure). One tent at each site may have a radio antenna extending upwards <10ft. (NOAA) (FWS)

No further disturbance of the cultural or natural resources of the Monument is allowed.

The MMB may monitor activities under the permit. Any member of the MMB or their designee may, for a period not to exceed 48 hours, verbally require temporary modification or cessation of activities identified in the permit if, in the opinion of the MMB member or designee, such action is necessary to limit effects on Monument resources beyond the intended scope of the permit, to protect governmental equipment, or to ensure the safety of personnel. Such action will be followed as soon as possible by MMB emergency consideration of the temporary permit

modification or temporary permit cessation. If the MMB concurs with the temporary action taken by the MMB member or designee, the Co-Trustees may amend the permit with the necessary changes or withdraw it. A decision by the Co-Trustees to amend the permit or to allow the activity to continue unchanged will include the necessary findings that the activity and its effects satisfy Monument permit issuance criteria and do not risk the safety of governmental employees or damage to governmental equipment.

PERMITTED ACTIVITY LOCATION:

Other than entrance into the Monument, the permitted activities listed above are allowed at the following locations:

1. The permittees may conduct conservation and management activities throughout all areas of Papahānaumokuākea Marine National Monument.

GENERAL TERMS AND CONDITIONS:

In accordance with the Proclamation and applicable regulations, the permitted activities listed above are subject to the following general terms and conditions:

1. The permittees must sign and date this permit on the appropriate line below. Once signed and dated, the permittee must provide a signed original copy to the Monument official identified below. The permit becomes valid on the date the last signature is obtained and shall remain valid until the permit expiration date.

   NOAA/Inouye Regional Center
   NOS/ONMS/PMNM/Attn: Permit Coordinator
   1845 Wasp Blvd, Building 176
   Honolulu, HI 96818

2. This permit is neither transferable nor assignable and must be carried by the permittee while engaging in any activity authorized by this permit. All other persons entering the Monument under the authority of this permit must provide the name of the permittee or the permit number to any authorized enforcement or management personnel upon request.

3. This permit may only be modified by written amendment approved by the Co-Trustee signatories listed at the end of this permit. Modifications to this permit must be requested in the same manner as the original request was made. Any modifications requested by the permittees, such as adding or changing personnel to be covered by the permit or to change the activities that are allowed, must be made in writing.

4. This permit is subject to suspension, modification, non-renewal, or revocation for violation of the Proclamation, implementing regulations, or any term or condition of the permit. Any verbal notification of a violation from an authorized monument representative may require immediate cessation of activities within the Monument. The issuance of a permit shall not constitute a vested or property right to receive additional or future permits. This permit may, in the sole discretion of the Co-Trustee signatories listed at the end of this permit, be renewed or reissued. However, there is no right to a

renewal or reissuance. Failure to fulfill permit requirements may affect consideration of future permit applications.

5. Permit terms and conditions shall be treated as severable from all other terms and conditions contained in this or any other ancillary permit. In the event that any provision of this permit is found or declared to be invalid or unenforceable, such invalidity or unenforceability shall not affect the validity or enforceability of the remaining terms or conditions of this permit.

6. This permit does not relieve the permittee of responsibility to comply with all federal, state and local laws and regulations. For a list of federal, state, and local laws and regulations, refer to attached Papahānaumokuākea Marine National Monument Laws and Regulations document. Activities under this permit may be conducted only after any other permits or authorizations necessary to conduct the activities have been obtained.

7. The permittees may be held liable for the actions of all persons entering the Monument under the authority of this permit.

8. All persons entering the Monument under the authority of this permit are considered under the supervision of the permittee and may be liable in addition to the permittee for any violation of this permit, the Proclamation and implementing regulations in conjunction with this permit. The permittee must ensure that all such persons have been fully informed of the permit terms and conditions prior to entry into the Monument. Each such person must provide written acknowledgment to the permittee, prior to entry into the Monument, that he/she has received a copy of the permit, agrees to abide by all applicable terms and conditions, and may be liable for violations of the permit. The permittee shall maintain all signed acknowledgments and submit them with the summary report described in General Condition #22.b. An acknowledgement form is attached.

9. Notification of entry into the Monument must be provided at least 72 hours, but no longer than one month, prior to the entry date. Any updates to the list of personnel must also be provided at least 72 hours before entering the Monument. Notification of departure from the Monument must be provided within 12 hours of leaving the Monument. Notification may be made via e-mail or telephone by contacting: E-mail: nwhi.notifications@noaa.gov; Telephone: 1-866-478-6944; or 1-808-395-6944. No other methods of notification will be considered valid.

10. The permittee and any person entering the Monument under the authority of this permit shall, before entering the Monument, attend a cultural briefing or view designated cultural informational materials on Papahānaumokuākea regarding the region's cultural significance and Native Hawaiians' spiritual and genealogical connection to the natural and cultural resources. Persons entering the Monument at Midway Atoll may satisfy this requirement upon arrival.

11. All vessels (including tenders and dive boats), engines and anchor lines shall be free of introduced species prior to entry into the Monument. To ensure this, all vessels, engines and anchor lines shall be inspected for potential introduced species prior to departing the last port before entering the Monument. No later than 24 hours prior to entry, the permittee shall provide the Monument Permit Coordinator with a report prepared by the individual conducting the inspection that: a) sets forth when and where the inspection occurred; b) identifies any introduced species observed, including where found; c) summarizes efforts to remove any species observed; and d) certifies the vessel as free of all introduced species. The Monument Permit Coordinator shall review the report and, based on the review, may delay the entry into the Monument until all concerns identified by the Monument Permit Coordinator have been addressed.

12. All hazardous materials, biohazards and sharps, must be pre-approved by the Co-Trustees. For purposes of this permit, "hazardous material" has the same meaning as the definition found at 49 CFR §105.5 (U.S. Department of Transportation). All hazardous materials, biohazards and sharps must be stored, used, and disposed of according to applicable laws and Monument-approved protocols. The permittee or a designated individual entering the Monument under the authority of this permit must be properly trained in the use and disposal of all such materials proposed. Proof of appropriate training may be required by the Co-Trustees. No such material may be left in the Monument after the departure of the permittee unless it has been previously approved by monument staff. Immediately after the project is complete the permittee must remove all such materials from the Monument. The permittee will be responsible for all costs associated with use, storage, transport, training, disposal, or HazMat response for these materials.

13. All equipment or supplies brought into the Monument, or structures of any kind built in the Monument by the permittee are the responsibility of the permittee. All materials that are brought to the Monument by the permittee must be removed by the permittee except as otherwise permitted. Any permanent structures, equipment, or supplies that require maintenance, are determined to be unserviceable, or are a safety hazard, must be immediately repaired or removed from the Monument by the permittee. No structures, equipment, or supplies may be left in the Monument following the completion of the project except as listed in the permit.

14. If monument staff are present at the field site, the permittee must meet with them before beginning permitted activities. Even with a valid permit, authorized monument staff may prohibit entry into any location(s) within the Monument as they may deem appropriate to conserve or manage resources, particularly in areas where cumulative impacts of permitted activities are concentrated.

15. In order to facilitate monitoring and compliance, any person entering the Monument under the authority of this permit, including assistants and ship's crew shall, upon request by authorized monument enforcement personnel, promptly: a) allow access to and inspection of any vessel or facility used to carry out permit activities; b) produce for

inspection any sample, record, or document related to permit activities, including data, logs, photos, and other documentation obtained under, or required by, this permit; and c) allow inspection on board the vessel or at the permittee's premises of all organisms, parts of organisms, and other samples collected under this permit.

16. It is prohibited to possess or consume alcohol in the Hawaiian Islands National Wildlife Refuge in accordance with the refuge policy. Any violations will result in immediate removal of the offender from the Monument at the individual's own cost. Offenders may not be readmitted to the Monument.

17. All persons entering the Monument under the authority of this permit are responsible for the cost of removing themselves from the Monument at the conclusion of the term of the permit or upon revocation or suspension of the permit. All such persons are also responsible for the cost of removing themselves from the Monument in the event of a necessary medical evacuation, emergency evacuation, including weather, or for the cost of any necessary search and rescue operation.

18. Except as expressly required by applicable law, the Co-Trustees are not liable for any damages to equipment or injuries to the permittee and persons entering the Monument under the authority of this permit. The permittee and any person entering the Monument under the authority of this permit shall release, indemnify, and hold harmless the National Oceanic and Atmospheric Administration, the Department of Commerce, the U.S. Fish and Wildlife Service, the Department of the Interior, the United States Government, the State of Hawai'i, the Office of Hawaiian Affairs, and their respective employees and agents acting within the scope of their duties from and against any claims, demands, actions, liens, rights, subrogated or contribution interests, debts, liabilities, judgments, costs, and attorney's fees, arising out of, claimed on account of, or in any manner predicated upon the issuance of this permit or the entry into or habitation upon the Monument or as the result of any action of the permittee or persons participating in the activity authorized by this permit. In the event that a government employee, acting in his official capacity, is the permittee, or is entering the Monument under the authority of this permit, then he shall be subject to all applicable federal and State laws that pertain to claims by or against him predicated upon the issuance of this permit or entry into or habitation upon the Monument.

19. Monument managers or their designees may verbally require the permittee to modify or cease activities not identified in this permit if, in the opinion of the managers or designees, such action is necessary to limit disturbance to or protect monument resources, to protect government equipment, or to ensure the safety of personnel. After providing such verbal instructions, the managers or designees will provide the permittee with a written modification, suspension or revocation to this permit at the earliest practicable opportunity. The failure to follow verbal instructions or modified permit terms, or to cease activities upon suspension or revocation of this permit, may constitute a violation of this permit, the Proclamation, the regulations, or other applicable law.

20. Disturbance of any cultural or historic property, including but not limited to Native Hawaiian cultural sites, burials, archaeological deposits, maritime heritage sites, and WWII structures and features, such as stone walls and mounds, stone uprights, bunkers, batteries, camp sites, hospitals, housing areas, and radio towers; or the disturbance or collection of any historic or cultural materials and artifacts, including but not limited to bottles, dishes, cartridges, hospital materials, carvings, human remains, or Native Hawaiian bone or stone implements, found within the Monument, including the sale or trade in such items, is prohibited.

21. All monument resources within the jurisdiction of the State of Hawai'i are held in trust under the Hawai'i State Constitution, Article XI, Sec. 1. The State of Hawai'i and the Government of the United States reserve ownership or control, as the case may be, of monument resources, both living and nonliving, that may be taken or derived from those found in the Monument.

22. The permittee must satisfy the following reporting requirements (subject to change):

    a. Within thirty (30) days after the expiration date of this permit, the permittee must submit a summary report of activities conducted under this permit. The report shall be submitted using the Monument permit report template, if applicable.

    b. For permitted vessels, the permittee having authority over the vessel must maintain and submit a cruise log within thirty (30) days after the expiration date of this permit. The log shall include but is not limited to: description of cruise activities, geographic locations of those activities, anchoring locations, and small boat dive locations. The permittee shall also maintain a daily vessel discharge log, which must be submitted with the cruise log.

    c. Annual Report. The comprehensive annual report is a summary of all activities undertaken, including but not limited to: dates of all arrivals and departures from islands and atolls within the Monument, names of all persons involved in permitted activities, details of all specimens collected, handled, etc., any other pertinent information, GPS locations of all samples collected, transects, etc., results of work to date, copy of all data collected, and a proposed schedule of publication or production of final work. The report shall include a concise summary or abstract for use in Monument reports. A minimum of one electronic copy (Microsoft Word preferred, but not required), must be submitted to the Co-Trustees. The annual report is due by December 31 for each calendar year the permit was in effect. Subsequent annual reports are required each year until all data collected under research permits are fully analyzed.

    d. For activities on state lands or within state waters, the permittee must submit a monthly report on the specified form.

e. The permittees may debrief the Co-Trustees following the completion of all activities in the Monument covered under this permit. The permittee may schedule the debriefing upon submitting the annual report.

f. The permittee must submit two copies of any article, publication, or other product created as a result of the information gained or work completed under this permit, including materials generated at any time in the future following expiration of this permit.

g. Any publications and/or reports resulting from activities conducted under the authority of this permit must include the notation that the activity was conducted under permit number PMNM-2024-001. This requirement does not apply to publications or reports produced by the news media.

h. All required submissions (including plans, logs, reports, and publications) shall be provided to the Monument official at the address indicated below:

Permit Coordinator
NOAA/Inouye Regional Center
NOS/ONMS/PMNM
1845 Wasp Blvd., Building 176
Honolulu, HI 96818

23. All data acquired or created in conjunction with this permit will be submitted with the summary report, and annual report. Photographic and video material is considered data. The permittee retains ownership of any data, (including but not limited to any photographic or video material), derivative analyses, or other work product, or other copyrightable works, but the Federal Government and the State of Hawai'i retain a lifetime, non-exclusive, worldwide, royalty-free license to use the same for government purposes, including copying and dissemination, and making derivative works. The permittee will receive acknowledgment as to its ownership of the data in all future use. This requirement does not apply to data acquired or created by the news media.

24. Because photographic or video material that is created for personal use (i.e., not specifically acquired or created in conjunction with this permit) could unintentionally collect data that is also valuable for management purposes, the Co-Trustees reserve the right to request copies of any such material and the permittee agrees to provide a copy of such material within a reasonable time. The Co-Trustees may use such material for management purposes.

25. Any question of interpretation of any term or condition of this permit will be resolved by the Co-Trustees.

26. Permittee is required to work in conjunction with the U.S. Fish and Wildlife Service, Hawaiian Islands National Wildlife Refuge and Midway Atoll National Wildlife Refuge

regarding any arrangements at Nihoa Island, Mokumanamana (Necker Island), the islands of Lalo (French Frigate Shoals), Pūhāhonu (Gardner Pinnacles), Kamole (Laysan Island), Kapou (Lisianski Island), the islands of Manawai (Pearl and Hermes Atoll), Midway Atoll (Kuaihelani), and with the State of Hawai'i Kure Atoll Seabird Sanctuary Manager at Hōlanikū (Kure Atoll). The Refuge managers for the above locations listed in the Permitted Activity Locations section must be notified at least 72 hours and not more than 30 days prior to arrival. Upon departing, notification to the appropriate refuge manager is required. Contact information for notifications are listed below:

a. Hawaiian Islands National Wildlife Refuge: Amanda Boyd, 808-792-9488 or Amanda_J_Boyd@fws.gov

b. Hōlanikū (Kure Atoll): Cynthia Vanderlip at kureatoll@gmail.com

SPECIAL TERMS AND CONDITIONS:

1. This permit is not to be used for nor does it authorize the sale of collected organisms. Under this permit, the authorized research activities must be for noncommercial purposes not involving the use or sale of any organism, by-products, or materials collected within the Monument for obtaining patent or intellectual property rights.

2. 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.

3. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocol attached to this permit.

4. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.

5. Refueling of tenders and all small vessels must be done at the support ship and outside the confines of lagoons or near-shore waters in the State Marine Refuge.

6. No fishing is allowed in state waters except as authorized under state law for subsistence, traditional and customary practices by Native Hawaiians.

7. If there is any Hawaiian monk seal or any other protected species in the area when performing any permitted activity, the activity shall cease until the animal(s) depart the area, except as permitted for specific management of that species.

8. To ensure the protection of monument resources, the permittee must conduct all activities in accordance with the following monument Best Management Practices (BMP) and guidelines, as attached:

a. Marine Alien Species Inspection Standards for Maritime Vessels (PMNM BMP #001)
b. Protocol for Acquiring Avian Blood Samples (PMNM BMP #002)
c. Human Hazards to Seabirds Briefing (PMNM BMP #003)
d. Best Management Practices for Boat Operations and Diving Activities (PMNM BMP #004)
e. Protocol to Reduce Impact to the Laysan Finch (PMNM BMP #005)
f. General Storage and Transport Protocols for Collected Samples (PMNM BMP #006)
g. Best Management Practices for Terrestrial Biosecurity (PMNM BMP #007)
h. Protocols Necessary for Conducting Trolling Research and Monitoring (PMNM BMP #008)
i. Best Practices for Minimizing the Impact of Artificial Light on Sea Turtles (PMNM BMP #009)
j. Marine Wildlife Viewing Guidelines (PMNM BMP #010)
k. Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment (PMNM BMP #011)
l. Precautions for Minimizing Human Impacts on Endangered Land Birds (PMNM BMP #012)
m. Nonnative Species Inspection Requirements at Midway Atoll (PMNM BMP #015)
n. Best Management Practices for Activities on Nihoa (PMNM BMP #016)
o. Best Management Practices for Maritime Heritage Sites (PMNM BMP #017)
p. Rodent Prevention and Inspection Standards for Permitted Vessels (PMNM BMP #018)
q. Best Management Practices for Activities on Mokumanamana (PMNM BMP #019)
r. Best Management Practices to minimize the spread of nuisance alga (BMP# 20)

9. To ensure minimal disturbance to birds and safety of monument staff, all inland GPS survey work must be pre-approved by the on-island manager or staff escort prior to surveying.

10. An evaluation of additional permits (i.e. MMPA, MBTA, USACE, etc.) required and/or regulatory environmental consultations needed (i.e. ESA Section 7, MSA EFH, NHPA Section 106, etc.) will occur for each co-manager activity and be obtained/completed prior to the activity occurring (as necessary).

11. Permittee is required to work in conjunction with the U.S. Fish and Wildlife Service, Hawaiian Islands National Wildlife Refuge and Midway Atoll National Wildlife Refuge regarding any arrangements at Nihoa Island, Mokumanamana (Necker Island), the islands of Lalo (French Frigate Shoals), Pūhāhonu (Gardner Pinnacles), Kamole (Laysan Island), Kapou (Lisianski Island), the islands of Manawai (Pearl and Hermes Atoll), Midway Atoll (Kuaihelani), and with the State of Hawai'i Kure Atoll Seabird Sanctuary Manager at Hōlanikū (Kure Atoll). The Refuge managers for the above locations listed in the Permitted Activity Locations section must be notified at least 72 hours and not more than 30 days prior to arrival. Upon departing, notification to the appropriate refuge manager is required. Contact information for notifications are listed below:

a. Lalo (French Frigate Shoals): Deputy Superintendent, Amanda Boyd; email Amanda_J_Boyd@fws.gov, or telephone 808-286-1320.
b. Midway Atoll (Kuaihelani): Midway Refuge Manager, Elaine Johnson; email Elaine_Johnson@fws.gov, or telephone 808-954-4818.
c. Kamole (Laysan Island): Deputy Superintendent, Amanda Boyd; email Amanda_J_Boyd@fws.gov, or telephone 808-286-1320.
d. Hōlanikū (Kure Atoll): Kure Biological Field Station Supervisor, Cynthia Vanderlip at kureatoll@gmail.com.

Your signature below, as permittee, indicates that you accept and agree to comply with all terms and conditions of this permit. This permit becomes valid on the date when signed by the last Monument official. Please note that the expiration date on this permit will not be extended by a delay in your signing below.

JARED UNDERWOOD Digitally signed by JARED UNDERWOOD Date: 2023.12.21 08:59:21 -10'00' 12/21/2023

Jared Underwood — Date
Superintendent, Papahānaumokuākea Marine National Monument
Department of the Interior
U.S. Fish and Wildlife Service

COLLINS.VINCENT.A.1365821859 Digitally signed by COLLINS.VINCENT.A.1365821859 Date: 2023.12.19 09:31:40 -10'00'

Eric Roberts — Date
Superintendent, Papahānaumokuākea Marine National Monument
Department of Commerce
National Oceanic and Atmospheric Administration

Dec 20, 2023

Brian Neilson — Date
Division of Aquatic Resources Administrator/State Co-Manager,
Papahānaumokuākea Marine National Monument
Department of Land and Natural Resources
State of Hawai'i

Dec 22, 2023

Stacy Kealohalani Ferreira — Date
Ka Pouhana (Chief Executive Officer)
Office of Hawaiian Affairs

Attachments (24):

1. PMNM Rules and Regulations
2. Monument Management Board Policy on Sustenance Fishing
3. Papahānaumokuākea Marine National Monument Rules and Regulations
4. Map of the Papahānaumokuākea Marine National Monument
5. Permit Acknowledgment Form
6. Marine Alien Species Inspection Standards for Maritime Vessels (PMNM BMP #001)
7. Protocol for Acquiring Avian Blood Samples (PMNM BMP #002)
8. Human Hazards to Seabirds Briefing (PMNM BMP #003)
9. Best Management Practices for Boat Operations and Diving Activities (PMNM BMP #004)
10. Protocol to Reduce Impact to the Laysan Finch (PMNM BMP #005)
11. General Storage and Transport Protocols for Collected Samples (PMNM BMP #006)
12. Best Management Practices for Terrestrial Biosecurity (PMNM BMP #007)
13. Protocols Necessary for Conducting Trolling Research and Monitoring (PMNM BMP #008)
14. Best Practices for Minimizing the Impact of Artificial Light on Sea Turtles (PMNM BMP #009)
15. Marine Wildlife Viewing Guidelines (PMNM BMP #010)
16. Disease and Introduced Species Prevention Protocol for Permitted Activities in the Marine Environment (PMNM BMP #011)
17. Precautions for Minimizing Human Impacts on Endangered Land Birds (PMNM BMP #012)
18. Nonnative Species Inspection Requirements at Midway Atoll (PMNM BMP #015)
19. Best Management Practices for Activities on Nihoa (PMNM BMP #016)
20. Best Management Practices for Maritime Heritage Sites (PMNM BMP #017)
21. Rodent Prevention and Inspection Standards for Permitted Vessels (PMNM BMP #018)
22. Best Management Practices for Activities on Mokumanamana (PMNM BMP #019)
23. Best Management Practices to minimize the spread of nuisance alga (PMNM BMP# 20)

Dec 20, 2023

Dawn N. S. Chang
Chairperson
Board of Land and Natural Resources
Department of Land and Natural Resources
State of Hawai'i

Date

JARED UNDERWOOD Digitally signed by JARED UNDERWOOD Date: 2023.12.21 08:57:11 -10'00' 12/21/2023

Jared Underwood
Superintendent
Papahānaumokuākea Marine National Monument
Department of the Interior
U.S. Fish and Wildlife Service

Date

COLLINS.VINCENT.A.1365821859 Digitally signed by COLLINS.VINCENT.A.1365821859 Date: 2023.12.19 09:55:09 -10'00'

Eric Roberts
Superintendent
Papahānaumokuākea Marine National Monument
Department of Commerce
National Oceanic and Atmospheric Administration

Date

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

5/4/23

Refer to NMFS No.: OPR-2021-03453

David Turner
Acting Deputy Director
NOAA Office of Ocean Exploration & Research
1315 East-West Hwy
Silver Spring, MD 20910

RE: Revisions to the Endangered Species Act Section 7 Programmatic Letter of Concurrence on NOAA's Office of Ocean Exploration and Research's Marine Operation Activities

Dear Mr. Turner:

NOAA's Office of Ocean Exploration and Research (OER) consulted with the National Marine Fisheries Service (NMFS) in 2022 on their action to conduct marine operation activities. The consultation was completed in March 2022 and a programmatic letter of concurrence was issued (OPR-2021-03453).

On April 3, 2023, and April 18, 2023, NOAA OER informed NMFS of several changes they wanted to make to their research activities. NOAA OER reached out to NMFS about the possibility of adjusting the action to allow for an extended action area, while also including new technologies and best management practices.

We determined reinitiation of consultation is not required because the proposed changes to the action area and updated technologies do not represent a change in scope of the proposed action and will not result in effects to our species beyond what was analyzed in the programmatic letter of concurrence. We provided a summary of our determination in a memo summarizing updates to the programmatic letter of concurrence that will be available on the Environmental Consultation Organizer (https://appscloud.fisheries.noaa.gov/) to reflect the revisions to the action.

This letter is to notify you of our determination and our inclusion of the extended action area and additional technologies as part of the action through our amendment to the programmatic letter of concurrence.

Reinitiation of consultation is required and shall be requested by NOAA OER where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (1) New information reveals effects of the action that may affect an ESA-listed species or designated critical habitat in a manner or to an extent not previously considered; (2) The identified action is subsequently modified in a manner that causes an effect to the ESA-listed species or designated critical habitat that was not considered in this concurrence letter; (3) Take

of an ESA-listed species occurs; or (4) A new species is listed or critical habitat designated that may be affected by the identified action (50 C.F.R. §402.16).

If you have any questions regarding this letter, please contact Steven Thornton, Consultation Biologist, at (301) 427-8462 or steven.thornton@noaa.gov, or me at (301) 427-8495 or lisamarie.carrubba@noaa.gov.

Sincerely,

CARRUBBA.LISAMARIE.1365823932

Lisamarie Carrubba, Ph.D
Acting Chief
ESA Interagency Cooperation Division
Office of Protected Resources

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Regional Office
1845 Wasp Blvd., Bldg 176
Honolulu, Hawai'i 96818
(808) 725-5000 · Fax: (808) 725-5215

Jennifer Lukens
Deputy Director
National Oceanic and Atmospheric Administration
Office of Ocean Exploration and Research
Silver Springs, MD 20910

April 1, 2024

Dear: Dr. Lukens:

The National Marine Fisheries Service, Pacific Islands Regional Office (NMFS) received a request for an essential fish habitat (EFH) consultation on March 14, 2024 from NOAA's Office of Exploration and Research (OER) for the "Beyond the Blue" campaign, the fisheries and ecosystem research that OER will conduct and/or fund from 2024 – 2026 across the Pacific region. OER has proposed to include and adhere to best management practices (BMPs) and minimization measures that when implemented would be suitable to ensure that adverse effects to EFH would be minimal. NMFS appreciates the opportunity to review the proposed permit action pursuant to the EFH provisions (Section 305(b) as described by 50 CFR 600.920) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act; 16 U.S.C. 1855(b)). After reviewing the consultation enclosures, we have determined that there may be adverse effects to EFH. We provide conservation recommendations under the EFH provisions within Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to help the permit applicant to avoid and minimize adverse effects to EFH.

Project Description

OER's proposed marine operation activities are intended to support initiatives including the Seabed 2030 and the National Strategy for Ocean Mapping, Exploration, and Characterization. To support these initiatives, the focus of the "Beyond the Blue" campaign will be to fill the gaps in basic understanding of deep-ocean and seafloor data, information, and overall awareness within the U.S. Exclusive Economic Zone (EEZ) and international waters. Work is expected to commence in the Pacific Ocean starting in April 2024, and extend through to December 2026.

Expeditions will be conducted primarily on *Okeanos Explorer*, *Nautilus*, and other vessels of similar or smaller size. Activities will be funded by OER and will provide real-time or near real-

time, open access deep-water oceanographic data that would benefit NOAA, research and education institutions, resource managers, and the general public. These same technologies are also used on other OER supported projects and oceanographic research platforms.

Okeanos Explorer conducts four types of expeditions annually:

1. Mapping survey expeditions: These expeditions conduct 24/7 seafloor mapping using hull-mounted sonars, and conductivity-temperature-density (CTD) rosette casts. Additional technologies are occasionally brought on board to acquire more data in the area of interest;

2. Telepresence-enabled remotely operated vehicle(s) (ROV), uncrewed surface vessel(s) (USV), and autonomous underwater vehicle(s) (AUV) expeditions. During these expeditions, ROV, USVs, and AUVs dives or deployments are conducted for several hours to several days. When the ROV is not in the water, the ship conducts mapping and occasional CTD rosette casts;

3. Shakedown expeditions: These expeditions are to test mapping capabilities; ROV, USV, AUV, and CTD systems; and

4. Technology Testing Expeditions: These expeditions are planned to test novel and emerging technologies.

E/V *Nautilus* conducts very similar cruise types to those above, however more frequently deploys additional scientific equipment including human occupied vehicles, profilers, landers, profiling floats, and other cabled equipment. Other research vessels also conduct these same activities, however, most are not equipped with telepresence technology.

On average each year, approximately five *Okeanos Explorer* expeditions are dedicated to mapping, while up to four expeditions combine ROV, and/or USVs and AUVs work and overnight mapping. The duration of these expeditions typically range from 7 to 30 days. Shakedown and emerging technology expeditions range from 7 to 30 days in duration. In addition, OER-supported expeditions may be conducted based on available funding and vessel(s) availability.

OER also occasionally supports USV operations that are either dedicated missions deployed from shore, or deployed from a ship. Several of these deployments may be supported by OER each year and each deployment ranges from 1 to 60 days.

Proposed Action Area

The proposed activities will be conducted in unknown and poorly known marine environments around the Central, Southern, Eastern, and Western Pacific Ocean in depths of 656 feet (200 meters) and deeper, and the areas transited by vessels between ports, including but not limited to ports of calls located in North America and the Pacific Islands. Transit mapping operations are also planned between all areas mentioned, including the high seas.

In the Pacific Islands and Central Pacific, NOAA OER will primarily target areas with lower percentage of mapping coverage. Complementary exploration opportunities, activities and operations conducted by partners but funded by OER, will include systematic mapping in Howland/Baker, Jarvis, Wake Island, Johnston Atoll, and American Samoa. Focal areas for the *Okeanos Explorer* are expected to include Kingman and Palmyra and Johnston Atoll, and deep waters surrounding the Northwest Hawaiian Islands and along the Emperor Seamount chain.

Essential Fish Habitat

Pelagic FEP

The marine water column extending from the surface to a depth of 656 feet (200 meters) from the shoreline to the outer limit of the EEZ for eggs and larvae, and to a depth of 3,280 feet (1,000 meters) for adults, in the pelagic environment have been designated as EFH under the Western Pacific Fishery Management Council's Pelagic Fishery Ecosystem Plan.

Pacific Remote Island Area

The marine water column from the surface to a depth of 3,280 feet (1,000 meters) from the shoreline to the outer boundary of the EEZ (230 miles), and the seafloor from the shoreline out to a depth of 328 feet (100 meters) around the islands and atolls of the Pacific Remote Islands, have been designated as EFH. As such, the water column and submerged bottom habitats of around each of the Pacific Remote Island Areas are designated as EFH and support various life stages for the management unit species (MUS) identified under the Western Pacific Fishery Management Council's Pacific Remote Island Areas Fishery Ecosystem Plan (FEP). The MUS and life stages found in these waters include: eggs, larvae, juveniles, and adults of Coral Reef Ecosystem MUS, Bottomfish MUS (BMUS), and Crustacean MUS (CMUS); and juveniles and adults of Pelagic MUS (PMUS).

Mariana Archipelago

The marine water column from the surface to a depth of 3,280 feet (1,000 meters) from shoreline to the outer boundary of the EEZ, and the seafloor from the shoreline out to a depth of 1,313 feet (400 meters) around each of the Mariana Islands, have been designated as EFH. As such, those waters are designated as EFH and support various life stages for the MUS identified under the Western Pacific Fishery Management Council's Mariana Archipelago Fishery Ecosystem Plan. The MUS and life stages may include eggs, larvae, juveniles, and adults for BMUS, PMUS, and CMUS.

Hawai'i Archipelago

The marine water column from the surface to a depth of 3,280 feet (1,000 meters) from shoreline to the outer boundary of the EEZ, and the seafloor from the shoreline out to a depth of 2,296 feet (700 meters) around each of the Hawaiian Islands, have been designated as EFH. As such, the water column and bottom of the Pacific Ocean near each of the islands and atoll of the Northwestern Hawaiian Islands, and the surrounding waters and submerged lands are designated as EFH and support various life stages for the MUS identified under the Western Pacific Fishery Management Council's Hawai'i Archipelago FEP. The MUS and life stages found in these waters include larvae, juveniles, and adults of BMUS, PMUS, and CMUS.

American Samoa Archipelago

The marine water column extending from the surface to a depth of 3,280 feet (1,000 meters) from the shoreline to the outer limit of the EEZ, and the seafloor to a depth of 1,313 feet around the islands of American Samoa have been designated as EFH. As such, the water column and bottom of the nearshore Pacific Ocean surrounding the islands and atolls in American Samoa are designated as EFH and support various life stages for the MUS identified under the Western Pacific

Fishery Management Council's American Samoa Archipelago FEP. The MUS and life stages found in these waters include: eggs, larvae, juveniles, and adults of BMUS.

Specific types of habitat considered as EFH for the all of the above FEPs include coral reef, patch reef, hard substrate, artificial substrate, seagrass beds, soft substrate, lagoon, estuarine, surge zone, deep slope terraces and pelagic/open ocean.

Potential Adverse Effects

There is the potential for adverse effects to EFH due to vessel transits (including tender boats), from the deployment and recovery of instruments (including ROVs, USVs, etc.), and the collection of biological and geological samples. Adverse effects may be a result of physical damage, turbidity, chemical contamination, and the introduction of invasive species.

Physical Damage/Removal (physical stressor): Physical damage to principle benthic organisms may result in breakage or dislocation (i.e., mortality). Corals are particularly vulnerable to physical damage because their slow-growing carbonate skeleton is relatively brittle and their polyps are easily damaged. Reduction of topographic complexity in the habitats of the coral reef ecosystem reduces biodiversity and productivity (Alvarez-Filip et al. 2009). Literature reviews (Newell et al., 1998; ICES 2016) suggest that the successional marine community requires at least six to eight months to recover back to initial levels after removal.

Turbidity: Increased turbidity can cause smothering of benthic species and block sunlight necessary for species that rely on photosynthesis. For corals, turbidity has been shown to reduce species diversity, change growth patterns, and reduce growth and survival (Rogers 1990). For fish, turbidity is less likely to cause significant impacts because of their mobility, but some effects are still possible. Fish may be displaced from their normal home range which could result in negative intra- and interspecies interactions and impact fitness, leading to lower reproductive success and a lower ability to find prey or avoid predators (Kjelland et al. 2015).

Chemical Contamination (pollution stressor): Chemical pollutants can have a variety of lethal and sublethal effects on habitat-forming marine organisms, including alteration of growth, interference with reproduction, disruption of metabolic processes, and changes in behavior. These adverse effects can cascade through ecosystems, altering species composition and ecosystem functions and services. Some pollutants are environmentally persistent and can take years or even decades to biodegrade, and others can bioaccumulate or biomagnify through the food chain, eventually posing a direct threat to human health. Petroleum contamination can adversely affect coral, with results including mortality, inhibition of reproduction, reduced calcium deposition, alteration of physiological processes, tissue loss, and reduced carbon fixation (Turner and Renegar 2017).

Introduction of invasive species (biological stressor): Introduced species are organisms that have been moved, intentionally or unintentionally, into areas where they do not naturally occur. Invasive species may rapidly increase in abundance to the point that they come to dominate their new environment, creating adverse ecological effects to other species of the ecosystem and the functions and services it may provide (Goldberg and Wilkinson 2004). Invasive species can decrease species diversity, change trophic structure, and diminish physical structure, but adverse effects are highly variable and species-specific.

OER-proposed BMPs

Physical impact to benthic habitat

- All vessels in coastal waters will operate in a manner to minimize propeller wash and seafloor disturbance, and transiting vessels should follow deep water routes, as practicable.
- Except in an emergency, the vessel will not anchor while at sea.
- Vessels will avoid anchoring on hard-bottom and coral habitat.
- Vessels will avoid anchoring in areas containing seagrass or eelgrass.

Turbidity

- Whenever possible, cabled instruments deployed will not be allowed to contact the seafloor. Those that do contact the seafloor will only do so for the minimal time required to achieve scientific objectives.
- The vessel will employ the use of dynamic positioning during ROV dives, or other vehicle/instrument operations that would otherwise require anchoring.
- Vehicles/instruments will be operated in a manner to avoid seafloor disturbance, and setting the vehicles/instruments on the seafloor will be held to a minimum. For those situations when the vehicle/instrument does make contact with the seafloor, visual observations will be made to confirm that the area the vehicle/instrument is set down on does not include corals or other fragile animals that can reasonably be avoided.
- When possible, rock samples will be selected in a way to minimize disturbance to the surrounding environment and to minimize the take of attached organisms.
- Landers will not be deployed in, or adjacent to, areas with benthic environments designated as EFH or Habitat Areas of Particular Concern (HAPC).
- OER will not conduct operations with these types of bottom-impacting AUVs in designated EFH and HAPC

Introduction of invasive species

- Avoid discharge of ballast water in designated protected habitats.
- All vessels will use anti-fouling coatings.
- Clean hull regularly to remove aquatic nuisance species.
- Avoid cleaning of hull in protected habitats.
- After each instrument/vehicle is used, the vehicles/instruments will be brought back onboard and thoroughly sprayed with freshwater and allowed to air dry before the next dive. Though marine organisms should not survive this process, the instruments/vehicles are thoroughly inspected prior to every dive and checked for the presence of biological organisms to prevent the spread of invasive species from one location to another.

Vessel waste and discharge

- All vessels operating in areas where protected habitats are known to be present in the region will continue to follow the International Convention for the Prevention of Pollution from Ships discharge protocols.

- The use of detergents and other pollutants which may be washed into the marine environment will be avoided or held to a minimum.
- Avoid use of cleaners with nonylphenols.

OER Determination

OER has determined that implementation of the various BMPs listed above during the 2024 – 2026 fisheries and ecosystem research conducted and/or funded by OER will be sufficient to avoid or minimize adverse effects to EFH. OER seeks NMFS concurrence with this determination.

NMFS Concerns

NMFS expects that many potential adverse effects from the "Beyond the Blue" campaign will be reduced when implementing the OER-imposed BMPs. However, NMFS remains concerned that there is a risk of unavoidable loss of EFH due to the potential degradation of the quality of EFH from direct physical impacts from the potential use of anchors. To further avoid and minimize the risk to EFH in the project area, NMFS offers the conservation recommendations below.

Conservation Recommendations

NMFS offers the following conservation recommendation to the OER pursuant to 50 CFR 600.920 so that potential adverse effects from the proposed project activities are avoided, minimized, offset for, or otherwise mitigated:

Conservation Recommendation 1: Inspect all equipment prior to beginning work each day to ensure the equipment is in good working condition, and there are no contaminant (e.g., oil, fuel) leaks. Work must be stopped until leaks are repaired and equipment is cleaned.

Conservation Recommendation 2: All AUV and submersible missions will have a plan that details the mission, geographic locations, and deployment and retrieval plans to minimize the potential for collisions and groundings and ensure proper retrieval.

Conservation Recommendation 3: As possible, a spill response kit should be kept on all boats while in operation in order to be able to respond rapidly in the event of a spill (gas, oil, etc.).

Conclusion

Please be advised that regulations (Section 305(b)(4)(B)) to implement the EFH provisions of the Magnuson-Stevens Act require that federal activities agencies provide a written response to this letter within 30 days of its receipt and at least 10 days prior to final approval of the activities. A preliminary response is acceptable if final activities cannot be completed within 30 days. The final response must include a description of measures to be required to avoid, mitigate, or offset the adverse impacts of the activity. If the response is inconsistent with our EFH Conservation Recommendations, an explanation of the reason for not implementing the recommendations must be provided.

NMFS greatly appreciates the OER' efforts to comply with the EFH provisions of the Magnuson-Stevens Act for the proposed Jarvis Island project. NMFS has determined that while the OER' proposed mitigation measures will help to avoid and minimize adverse effects to EFH, some unavoidable loss may still occur. NMFS provides the EFH conservation recommendation as described above to help OERS ensure that adverse effects to EFH included coral reef resources are avoided, minimized, offset for, or otherwise mitigated.

Please do not hesitate to contact Richard Hall at 808-725-5018 and or richard.hall@noaa.gov should you have any questions, comments, or require additional technical assistance.

Sincerely,

Gerry Davis
Assistant Regional Administrator
Habitat Conservation Division

cc by e-mail: Kelly Suhre, NOAA OER
Amanda Maxon, NOAA OER
Malia Chow, NOAA NMFS PIRO HCD
David Delaney, NOAA NMFS
Richard Hall, NOAA NMFS PIRO HCD PIRO HCD

References Cited

Alvarez-Filip, L., Dulvy N., Gill J., Côté I., and A. Watkinson. 2009. Flattening of Caribbean coral reefs: Region-wide declines in architectural complexity. Proceedings of the Royal Society B: Biological Sciences. 276(1669):3019-3025.

Goldberg, J. and C. Wilkenson. 2004. Global threats to coral reefs: coral bleaching, global climate change, disease, predator plagues, and invasive species. In Status of the Coral Reefs of the World: 2004 (C. Wilkinson, ed.). Australian Institute of Marine Science, Townsville, Queensland. pp. 67-92.

ICES. 2016. Effects of extraction of marine sediments on the marine environment 2005–2011. ICES Cooperative Research Report No. 330. 206 pp.

Kjelland, M., Woodley C., Swannack T., and D. Smith. 2015. A review of the potential effects of suspended sediment on fishes: potential dredging-related physiological, behavioral, and transgenerational implications. Environ. Syst. Decis. 35:334-50.

Newell, R.C., Seiderer, L.J. and D.R. Hitchcock. 1998. The impact of dredging works in coastal waters: a review of the sensitivity to disturbance and subsequent recovery of biological resources on the sea bed. Oceanography and Marine Biology: An Annual Review, 36, pp.127-178.

Renegar, D. 2017. Petroleum hydrocarbon toxicity to corals: A review. Marine Pollution Bulletin. 119(2):1-16.

Rogers, C. 1990. Responses of coral reefs and reef organisms to sedimentation. Marine Ecology Progress Series. 62: 185-202. 14

Turner, N., and D. Renegar. 2017. Petroleum hydrocarbon toxicity to corals: A review. Marine Pollution Bulletin. 119(2):1-16.