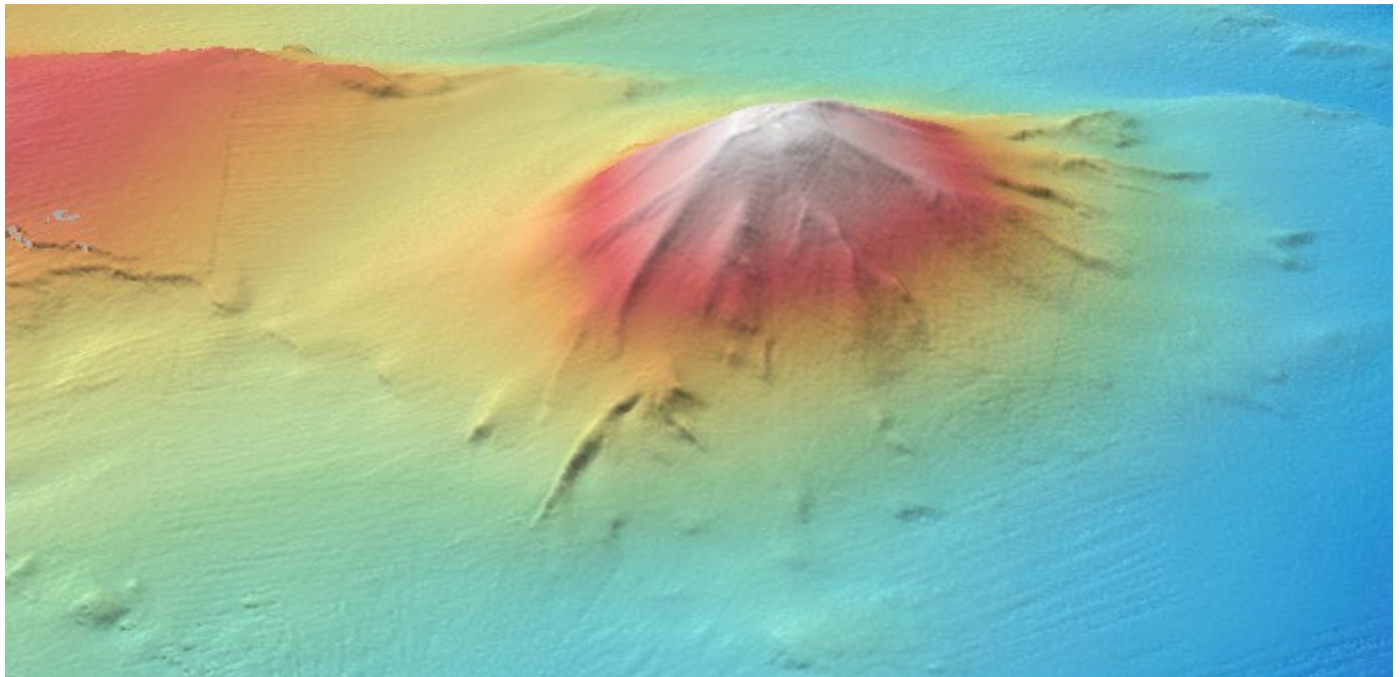


Expedition Report: EX2302, Seascape Alaska: Aleutians Exploration 1



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[July 30th, 2024]

Abstract

From May 5th - May 26th, 2023 (Seattle, Washington, to Dutch Harbor, Alaska), NOAA Ocean Exploration conducted the Seascope Alaska: Aleutians Exploration 1) expedition (EX2302), a mapping and autonomous underwater vehicle (AUV) expedition to the Gulf of Alaska and the Aleutian Islands. Operations during this 22-day expedition included the completion of 5 successful AUV dives and 2 remotely operated vehicle (ROV) dives which were conducted in water depths ranging from 55 m to 133 m for approximately 14 hours, 46 minutes of bottom time, and 68 km of linear travel. AUV and ROV operations supported a Defense POW/MIA Accounting Agency (DPAA) mission. AUV operations were conducted with an Iver3 AUV and ROV dives were supported by a human-portable Deep Trekker ROV, both supplied and operated by Orca Maritime. EX2302 also mapped 52,435.34 sq. km of seafloor (33,019.039 sq. km in the U.S. Exclusive Economic Zone). Data associated with this expedition will be archived and publicly available through the NOAA archives. Data related to underwater cultural heritage (UCH) and DPAA operations are withheld in a RESTRICTED version of this document to protect sensitive site location data per NOAA and US Government policy.

Region of Operation: Gulf of Alaska, Aleutian Islands

Ports: Seattle, Washington, to Dutch Harbor, Alaska

Bounding Coordinates: 54° 05.8 N to 47° 53.0 N, -125° 31.0 W to 179° 24.5 E

Expedition Dates: May 05 - May 26, 2023

Expedition Type: Mapping, AUV operations

Theme Keywords: marine archeology, multibeam mapping, hydrothermal vents, auv, auv operations, autonomous underwater vehicle, seeps, exploration, exploration mapping,

Place Keywords: west coast, alaska, aleutian trench, aleutian islands, gulf of alaska, unalaska, pacific ocean, northern pacific ocean, bering sea, bowers ridge

Citation: Gillespie, Treyson, Samuel Cuellar Amanda Bittinger, Colin Schmidt, Cassandra Ferrante, Brett Woodworth, Cameron Khule, Dana Carris. 2023. *Expedition Report: EX2302, Seascope Alaska 1: Aleutians Exploration 1*. NOAA Ocean Exploration Expedition Rep. 23-03. NOAA Ocean Exploration, National Oceanic and Atmospheric Administration. United States. <https://doi.org/10.25923/bj0g-b659>.

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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* (*Okeanos Explorer*) in the Aleutian Islands and Gulf of Alaska will contribute to [Seascape Alaska](#). Seascape Alaska is a multiyear, multipartner cooperative research campaign with an aim to create accessible, high-quality modern seabed data for Alaskan waters to support U.S. research, resource management, sustainable economic growth, and the health and security of Americans. The goal of Seascape Alaska is working to fully map the U.S. waters off Alaska through collaborative efforts among federal, tribal, state, and nongovernmental partners with a wide range of interests and dependencies on mapping data across coastal and ocean waters throughout the U.S. EEZ.

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 May 05 to May 26, 2023, NOAA Ocean Exploration and partners conducted a telepresence-enabled ocean exploration expedition (EX2302) on *Okeanos Explorer* to collect

critical baseline information and improve knowledge about unexplored and poorly understood deepwater areas of the Aleutian islands and the Gulf of Alaska.

During the 22 days at sea, there were 5 AUV dives, 2 ROV dives, and 52,435.34 sq. km of new bathymetric data were collected (see **Figure 1**). AUV and ROV operations were done in support of a Defense POW/MIA Accounting Agency (DPAA) project. These systems, an Iver3 AUV and Deep Trekker Pivot ROV, supplied and operated by Orca Maritime, were novel systems to *Okeanos Explorer* and not part of the typical ROV operations with *Deep Discoverer* and *Serios*. Section 5 provides details about the expedition schedule and unplanned events. Names, roles, and affiliations of science team members, both on ship and shore, are in **Appendix A**. Due to NOAA and federal policies on underwater cultural heritage (UCH) data, information from the AUV/ROV operations are restricted and included only in a RESTRICTED version of this report.

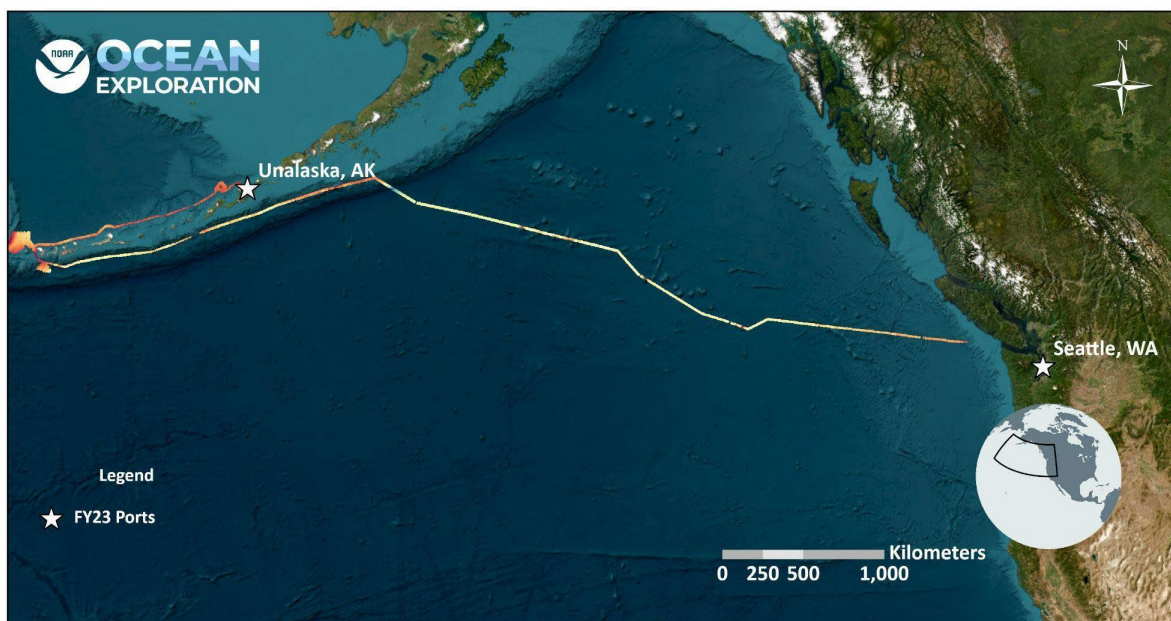


Figure 1. Map showing EX2302's track and bathymetric data collected.

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 Aleutian Islands and the Gulf of Alaska. To define the operating area for this expedition, we considered the [2023 Call for Input](#) and known priorities from resource managers.

Alaska’s coastline is longer than that of any other U.S. state or territory and is approximately one-third of the entire U.S. coastline. Despite representing the largest distinct region of the U.S. Exclusive Economic Zone (EEZ), Alaska’s waters remain one of the least explored areas in the United States. According to the “Progress Report on Unmapped U.S. Waters” (IOCM 2023), only 34% of Alaskan waters had been mapped to modern standards (100 meters) as of January 2023. Additionally, many of the deepwater habitats of the Gulf of Alaska, Aleutian Islands, and the Aleutian trench remain largely unexplored.

Mapping and exploring Alaska’s deep waters will provide baseline information needed to sustainably manage and protect these areas. Filling data gaps and increasing the understanding of this region has far-reaching benefits, including safer navigation and community access, hazard mitigation, preservation of marine habitats and heritage, a deeper comprehension of natural resources, and fisheries management.

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.

This expedition contributed to ongoing collaborations with the Alaska Fisheries Science Center, Bureau of Ocean Energy Management (BOEM), Alaska’s Office of History and Archaeology (OHA), the U.S. Geological Survey (USGS), and the Defense POW (Prisoner of War)/MIA (Missing in Action) Accounting Agency (DPAA).

2.2 Objectives

EX2302 addressed scientific themes and priority areas put forward by NOAA scientists and partners, including DPAA, and the broad ocean science and management communities. The primary objective of the expedition was to explore deepwater areas in the Gulf of Alaska and the Aleutian Islands 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.
- Explore U.S. maritime heritage by identifying and investigating sonar anomalies as well as characterizing shipwrecks.
- 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.

- Support the DPAA in investigating a site of interest in pursuit of its mandated mission in partnership with Orca Maritime and their Iver3 AUV and Deep Trekker ROV.
- Support in the identification of potential UCH sites within the Aleutian Islands.

A full list of expedition objectives is in “Project Instructions: EX2302, Seascape Alaska: Aleutians Explorations 1” (Cuellar, 2023).

3. Methodology

The primary systems used throughout EX2302 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.
- L3Harris Ocean Server Iver3 AUV (owned by Orca Maritime):
 - Maximum Operating Depth: 200 m
 - Diameter: 5.8 inches (15 cm)
 - Length: 86 cm (218 cm)
 - In-Air Weight: 85 lbs
 - Speed: 2-3 kts
 - Endurance: 4 hrs (sonar survey), 6 hrs (water quality survey)
 - Navigation: iXBlue PHINS C3 fiber-optic gyro inertial navigation system (INS), Teledyne RDI Explorer 600 kHz doppler velocity log (DVL), Keller PAA-30X/30 Baar depth sensor, WASS GPS, Imagenex Echosounder object avoidance.
 - Comms: Teledyne Benthos Acoustic Modem, 2.4 GHz telemetry radio control/comms, Iridium status and basic commands, WiFi remote access, GigE Ethernet port
 - Sensors: EdgeTech 2205 600/1600 kHz interferometric side scan sonar with bathymetry, AML sound velocity sensor, towed Marine Magnetics Explorer marine magnetometer
 - Power: 780 Watt hour swappable battery section (x2)
- Deep Trekker PIVOT ROV (owned by Orca Maritime):
 - Maximum Operating Depth: 305 m
 - Dimensions: 22.7 x 14.2 x 12.2 inches (57.6 x 36 x 31 cm)
 - In-Air Weight: 48 lbs
 - Endurance: up to 3 hours (payload and environment dependent)
 - Thrusters: 4x Vectored, 2x Vertical, magnetically coupled/sealed
 - Tether: 350 m (Copper)
 - Navigation: USBL, Compass, Depth Sensor, Altimeter

- Sensors: Oculus M750d Forward Looking Sonar
- Tools: 1x Arm equipped with a Two Pronged Grabber
- Power: 120v Battery, 350 m Copper tether
- 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, as well as to provide operational information for AUV/ROV dives. 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 prior to AUV/ROV operations. During AUV operations, all sonars were secured.

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 along Bower’s Ridge near the western extent of the Aleutian Islands. Mapping operations occurred 24 hours/per day, except when conducting daytime AUV operations.

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 2023” (Candio et al., 2023). 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. So, users of mapping data from EX2302

should refer to the 2023 readiness report to see if any supplemental files report changes that may affect their analysis. EK sonar calibrations were conducted in August 2023 during EX2305. Supporting documentation can be found in the “NOAA Ship *Okeanos Explorer* Mapping Systems Readiness Report 2023” (Candio et al., 2023).

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 .kml 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. 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 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 (typically every two hours when operating in more dynamic areas).

Vessel positioning and attitude were 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 .kml files. The primary system used 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 after EX2302, during expedition EX2305, and these calibration values are most appropriate for the EX2302 dataset. The calibration files will be archived with the sonar data when they become available, and the calibration report is available as a supplemental file to the 2023 mapping readiness report (Candio et al. 2023).

The split-beam sonars were used continuously throughout EX2302 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. The ADCPs were used to gather data prior to ROV deployments to assess currents in support of safe operations.

3.1.2 Data Processing and Quality Assessment Methods

3.1.2.1 Multibeam Sonar Bathymetry and Seabed Backscatter

Full-resolution multibeam files (.kml) 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” with a Sound Velocity Crossfade of 60 seconds. 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. Depth values were compared against orthogonal lines (crosslines) to evaluate the consistency of the multibeam sonar data collected during the expedition (**Figure 2**). A crossline analysis was completed using the Crosscheck Tool in QPS Qimera (**Table 1**) to evaluate the data against the Order 1 S-44 standards set by the International Hydrographic Organization (IHO 2008).

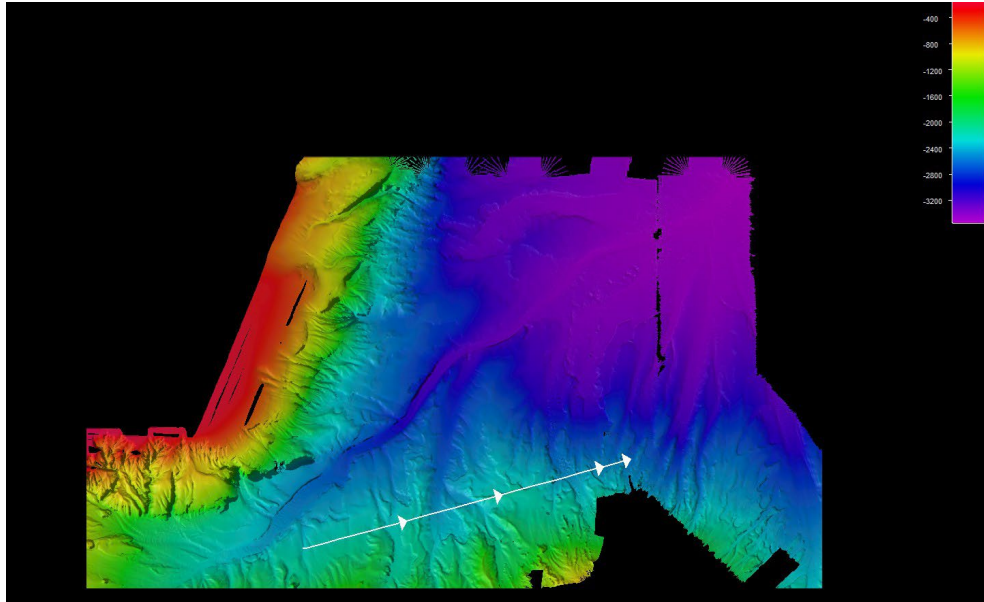


Figure 2. EX2302 crossline (shown in white) used for comparison against the bathymetric grid generated via orthogonal multibeam survey lines. Depths are shown in meters.

Crossline files:

- 0249_20230523_133443_EX2302_MB.kmall
- 0250_20230523_143443_EX2302_MB.kmall
- 0251_20230523_153443_EX2302_MB.kmall
- 0252_20230523_163443_EX2302_MB.kmall

Table 1. Crosscheck results.

Statistic	Value
Number of Points of Comparison	1654097
Grid Cell Size (m)	100.00
Difference Mean (m)	-.425747
Difference Median (m)	-0.425747
Difference Standard Deviation (m)	4.907416

Statistic	Value
Difference Range (m)	[-66.61, 111.66]
Mean + 2* Standard Deviation (m)	10.240579
Median + 2* Standard Deviation (m)	10.010544
Data Mean (m)	-2263.750105
Reference Mean (m)	-2263.324358
Data Z-Range (m)	[-2854.33, -1729.57]
Reference Z-Range (m)	[-2854.33, -1729.57]
Order 1 Error Limit (m)	29.427465
Order 1 # Rejected	2637
Order 1 P-Statistic	0.001594
Order 1 Survey	ACCEPTED

The results in **Table 1** confirm that the data collected meet International Hydrographic Organization Order 1 specifications for data quality.

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 a .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 2** 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 2. *Okeanos Explorer's* draft at the beginning and end of EX2302.

Location	Start of Expedition (05/05/2023)	End of Expedition (05/26/2023)
Forward	15' 0"	14' 3"
Aft Starboard	14' 2.5"	15' 0.5"
Aft Port	14' 8.5"	14' 8"

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). EM 304 files (.kmwcd) that include observed water column anomalies are flagged in the dataset's relevant processing logs. Locations of observed anomalies are provided in the data package (.shp and .csv files). All products maintain horizontal referencing to WGS84 (G1762) and vertical referencing to the assumed mean waterline.

3 watercolumn anomalies were detected during EX2302 and can be viewed on files:

- 0052_20230512_001600_EX2302_MB.kmall
- 0065_20230512_102727_EX2302_MB.kmall
- 0227_20230522_233407_EX2302_MB.kmall

Figures 3, 4, and 5 show the detection of each anomaly. Anomalies are summarized in Table 4 below.

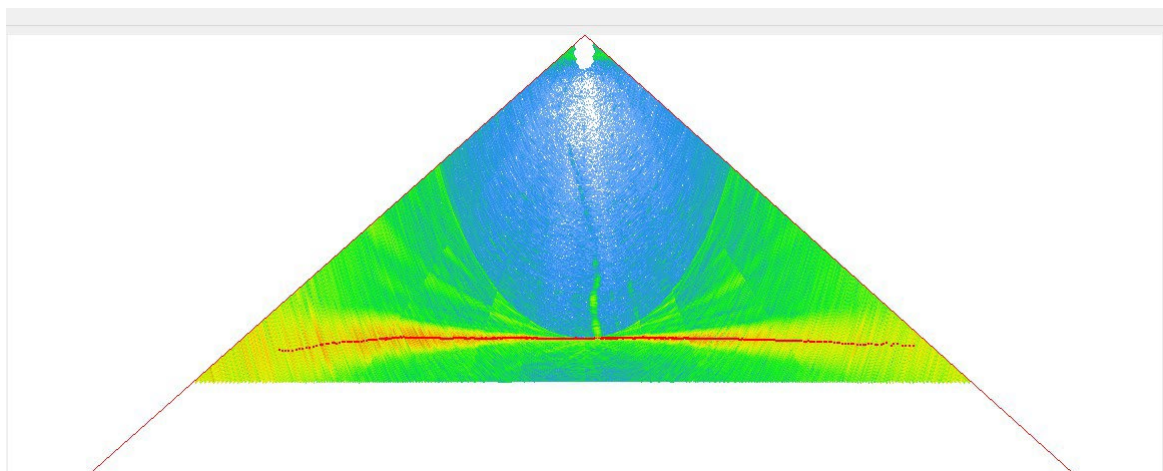


Figure 3. Watercolumn anomaly detected on line 0052_20230512_001600_EX2302_MB.kmall

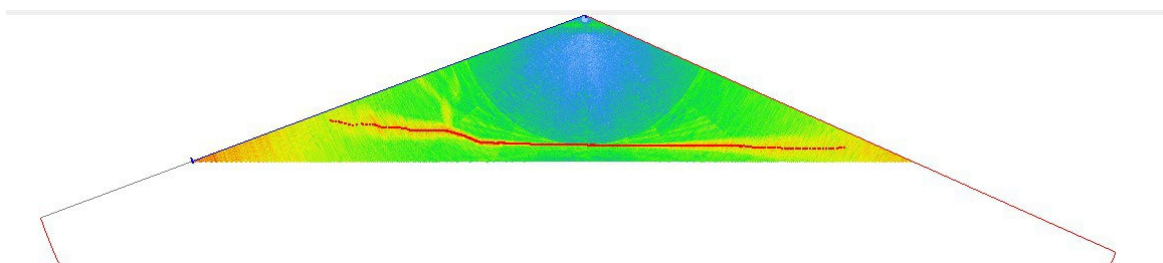


Figure 4. Watercolumn anomaly detected on line 0065_20230512_102727_EX2302_MB.kmall

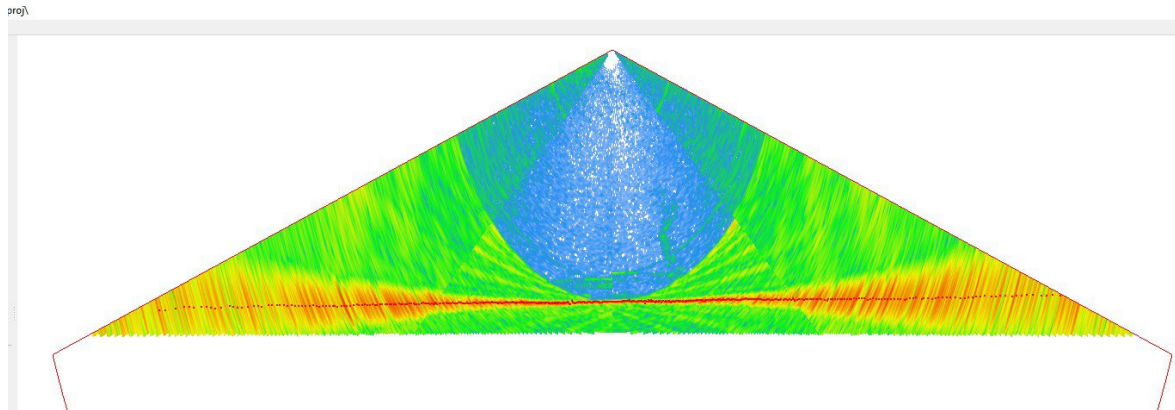


Figure 5. Watercolumn anomaly detected on line 0227_20230522_233407_EX2302_MB.kmall

Table 3. Summary table of observed anomaly locations.

SONAR FILENAME	SYSTEM (EM304/EK)	DATE	LAT (DD)	LONG (DD)	ANOMALY DEPTH (M)	SEAFLOOR DEPTH (M)	ANOMALY TYPE
0052_20230512_001600_EX2302_MB.kmall	EM304	05/12/2023	54.17884	-159.338874	645	2300	Seep
0065_20230512_102727_EX2302_MB.kmall	EM304	05/12/2023	53.748206	-162.585923	900	2015	Seep
0227_20230522_233407_EX2302_MB.kmall	EM304	05/22/2023	52.034025	179.912124	85	140	Seep

3.1.2.3 Split-Beam Sonars

No anomalies were observed in the EK sonars 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 SEGYP2 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 4 provides a list of the data collection and processing software versions used during EX2302.

Table 4. Versions of data collection and processing software used during EX2302.

Software	Purpose	Version
SIS	EM 304	5.10.2
EK80	EK suite	2.0.0
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	2.3.4
FMGT	Backscatter	7.9.5
FM Midwater	Water Column	7.9.3
Sound Speed Manager	Sound Speed Profiles	2021.1.6
NRCan (SegJp2)	Sub-Bottom	1.0
Fledermaus 7	Visualization/Data Analysis	7.8.11

3.2 ROV Operations

A small Deep Trekker ROV was used to support specific partner objectives during EX2302 and included limited visual survey of seafloor. Each ROV dive was approximately 30 minutes long, conditions and logistics permitting. Dives were conducted during daylight hours.

During each benthic dive, the ROVs descended to the seafloor and gathered visual and acoustic data for review. Additional information is available in the restricted report and restricted dive summaries.

No sampling operations were conducted during EX2302.

3.4 Conductivity, Temperature, and Depth

CTD measurements were not collected during this expedition.

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. No sun photometer measurements were taken during this expedition.

3.6 Novel Technologies and Opportunistic Tools

An Autonomous Underwater Vehicle (AUV) survey was conducted in the vicinity of the Aleutian Islands to collect sidescan sonar, magnetometer, and multibeam bathymetry data in support of the Seascape Alaska campaign and in partnership with the DPAA. AUV dives were conducted across 3 of the 22 days at sea totaling 5 separate missions. A small Deep Trekker Pivot ROV was utilized for visual inspections of the seafloor. These vehicles were operated by Orca Maritime, Inc. of San Diego, CA. Details of these dives contain Restricted and sensitive data and are included in a Restricted version of this document.

4. Environmental and Historical Compliance

General records of multi-expedition environmental and historical compliance are in the “NOAA Ship *Okeanos Explorer* FY23 Field Season Instructions” as supplemental files (Cuellar 2023).

Overviews of expedition-specific compliance activities are provided below. Copies of associated records of compliance are in **Appendix B**.

4.1 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 2023 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.

As required under Section 7 of the Endangered Species Act (ESA), NOAA Ocean Exploration conducted an informal consultation with NOAA Fisheries' Office of Protected Resources to request their concurrence with our biological evaluation determining that *Okeanos Explorer* operations conducted as part of EX2302 may affect, but are not likely to adversely affect, ESA-listed marine species. NOAA Ocean Exploration received a letter dated March 14, 2022, from the NMFS ESA Interagency Cooperation Division that concurs with NOAA Ocean Exploration that the proposed action may affect, but is not likely to adversely affect ESA-listed species and designated and proposed critical habitat in the action.

NOAA Ocean Exploration requested an Essential Fish Habitat (EFH) consultation for expeditions on NOAA Ship *Okeanos Explorer* to the Pacific Ocean region for operations during the 2023 field season. The Letter of Acknowledgement was received on August 3, 2022, from the Assistant Regional Administrator for the NOAA Office of Habitat Conservation stating that these expeditions will not adversely impact EFH.

NOAA Ocean Exploration requested a permit for operations within the National Marine Sanctuaries (NMS) and a permit was granted on March 20, 2023. No operations during EX2302 occurred within NMS boundaries.

A Marine Scientific Research (MSR) was granted by Global Affairs Canada and the Department of Fisheries and Oceans Canada (DFO) on May 1st, 2023 to allow passage through Canadian EEZ waters on departure from Seattle, WA to Alaska.

A NEPA Categorical Exclusion (CE) Evaluation Worksheet review was completed on April 3, 2023 and it was determined that mapping operations, the use of a small, ground-truthing ROV, and AUV survey operations would not present circumstances to require preparation of an environmental assessment or environmental impact statement.

4.2 Historical Compliance

NOAA Ocean Exploration's maritime heritage-related activities are informed by the [Federal Archaeology Program \(FAP\)](#), U.S. legislation on the treatment of cultural remains, and the UNESCO "Convention for the Protection of the Underwater Cultural Heritage" (UNESCO 2001).

Thus, NOAA Ocean Exploration adheres to the research standards and management practices directed by the National Historic Preservation Act of 1966 (NHPA, 54 U.S.C. 300101 *et seq.*) and follows the guidelines in the Rules Concerning Activities Directed at Underwater Cultural Heritage, an annex to the “Convention on the Protection of the Underwater Cultural Heritage.”

During this expedition, NOAA Ocean Exploration coordinated with Alaska’s Office of History and Archaeology (OHA) to acquire a State of Alaska Cultural Resource Investigation Permit (#2023-17) within Alaskan State waters. Discussions were had with OHA staff to identify potential underwater cultural heritage resources within Alaskan waters throughout the Aleutian Islands. The State Cultural Resources Investigation Permit (SCRIPs) permit will be attached as a supplemental document to this report.

Details about NOAA Ocean Exploration’s maritime heritage policies are in the field season instructions as supplemental files (Cuellar 2023).

5. Schedule

Table 5 provides a day-by-day breakdown of EX2302.

Table 5. EX2302 schedule.

Date (UTC)	Activity
5/2 - 5/4	Mobilization in Seattle, Washington
5/5	Departure from Seattle, Washington, begin transit towards Aleutian Islands
5/6	Transit mapping
5/7	Transit mapping
5/8	Transit mapping
5/9	Transit mapping
5/10	Transit mapping
5/11	Transit mapping
5/12	Transit mapping
5/13	Transit mapping
5/14	Aleutian Islands mapping
5/15	AUV operations in Aleutian Islands
5/16	Focused mapping in Aleutian Islands
5/17	AUV operations in Aleutian Islands
5/18	AUV operations in Aleutian Islands
5/19	Focused mapping of Bower’s Ridge

Date (UTC)	Activity
5/20	Focused mapping of Bower's Ridge
5/21	Focused mapping of Bower's Ridge
5/22	Focused mapping of Bower's Ridge
5/23	Focused mapping of Bower's Ridge
5/24	Transit mapping to Dutch Harbor, Alaska
5/25	Transit mapping to Dutch Harbor, Alaska
5/26	Transit mapping, Arrive in Dutch Harbor, Alaska
5/27	Demobilization in Dutch Harbor, Alaska

6. Results

This section details the results of EX2302. Metrics for the expedition's major scientific work are in **Table 6**. A station log detailing the location of each operation conducted is provided as a supplemental file to this expedition report. This is included in the RESTRICTED data package.

Table 6. Summary of scientific metrics for EX2302.

Metrics	Totals
Days at Sea	22
Days at Sea in U.S. Waters	21
Linear km Mapped by EM 304	6353.95
Sq. km Mapped by EM 304	52,435.34
Sq. km Mapped by EM 304 in U.S. Waters	33,019.039
Vessel CTD Casts	0
XBT Casts	108
AUV Dives	5
ROV Dives	2
ROV Dives in U.S. Waters	2

6.1 Acoustic Operations Results

NOAA Ocean Exploration mapped 52,435.34 sq. km of seafloor during the 22 days at sea for EX2302. Of the 52,435.34 sq. km mapped, 33,019.039 sq. km was deeper than 200 m and within the U.S. Exclusive Economic Zone and Territorial Sea.

During EX2302, 3 seeps were found during transit or dedicated mapping operations. These seeps are shown on the map below in **Figures 6 and 7**. Seeps are visualized in figures 3, 4 and 5 with additional data in Table 3.

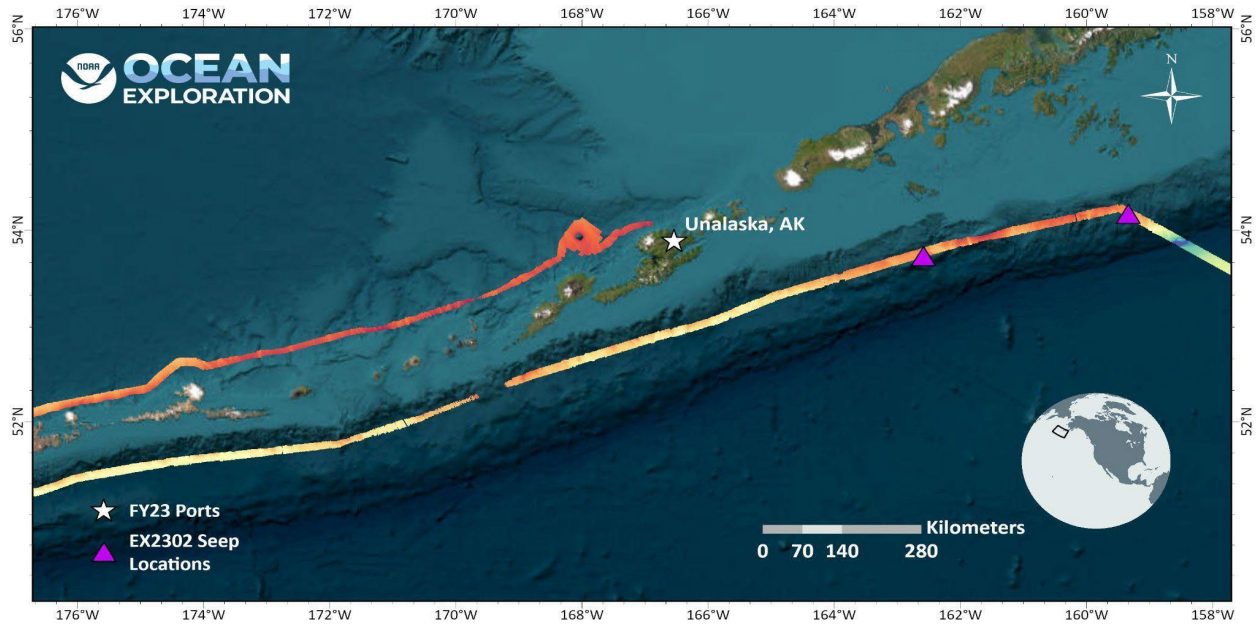


Figure 6: A map showing 2 seep locations in the Western Hemisphere discovered during EX2302 transit mapping operations. Each seep can be seen in Figures 3, 4, and 5, with additional information and locations in Table 3.

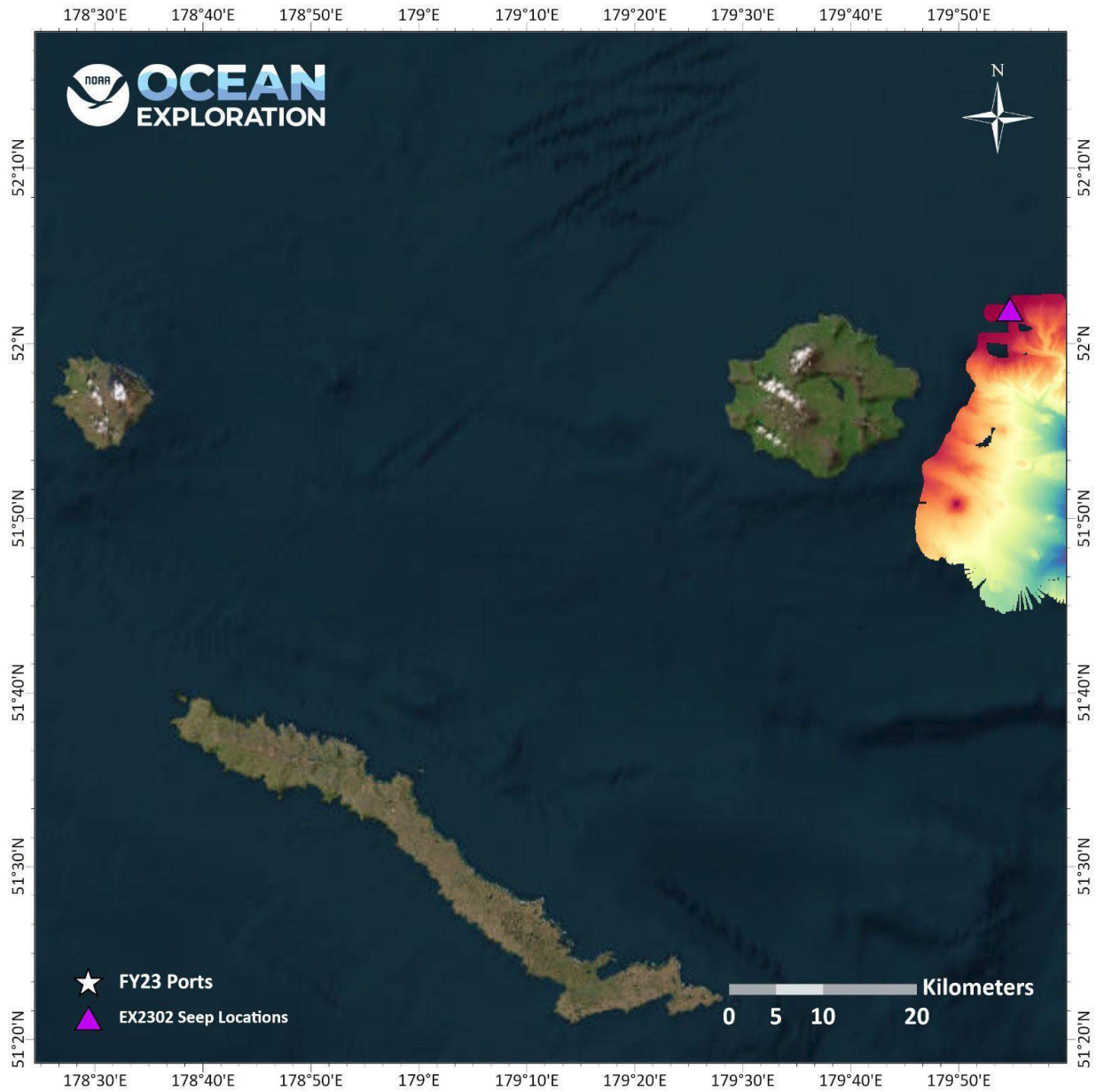


Figure 7: A map showing a seep location in the Eastern Hemisphere, found during EX2302 mapping operations. Each seep can be seen in Figures 3,4, and 5, with additional information and locations in Table 3.

Generally, acoustic mapping data are sent to the NOAA archives within 120 days of the end of an expedition. The 2023 mapping readiness report describes the data archived for each dataset, including file formats (Candio 2023). 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).

6.2 ROV Operations Results

Two ROV dives were executed during EX2302. Each dive lasted approximately 30 minutes until the battery pack located on the ROV reached its critical power depletion percentage. Details of these 2 dives are included within the Restricted version of this document.

6.3 Novel Technologies and Opportunistic Tools

Details of the use of the IVER3 AUV and Deep Trekker Pivot ROV are contained within the Restricted version of this document due to their sensitive nature.

6.4 Engagement

EX2302 engaged with audiences around the world, opening a window of understanding into the deep sea. Highlights included:

- Two ship tours were conducted to engage a diversity of audiences, including local news media and members of Camp Qungaayux, a camp created as a way to preserve the Unangan ways of being by handing down Unangan knowledge and wisdom to the younger generations of Unalaska
 - A tour was conducted for 2 members of KUCB News, of Unalaska, AK
 - A tour was conducted for 6 members of Camp Qungaayux.
- Expedition news was shared in approximately 90 news/web stories. The biggest newsmakers were the seamount off British Columbia and the seeps in the Aleutian Trench. Both were featured on the 28 McClatchy paper (e.g., Miami Herald) websites. Other outlets included local Alaska and British Columbia media and news aggregators Yahoo and AOL. This coverage amplified the impact of the expedition, increasing the audience reached.
- Expedition Coordinator, Sam Cuellar, conducted a radio show interview on Mornings with Simi, hosted by Simi Sara on 980 CKNW, the most listened-to news-talk radio show in Vancouver, Canada. The discovery of seamounts, underwater archaeology, and NOAA Ocean Exploration's mission were discussed.

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 EX2302 is in the “Project Instructions: EX2302, Seascape Alaska: Aleutians Explorations 1” (Cuellar, 2023).

The primary tools for accessing data collected during this expedition and archived at NCEI are the 2023 [expeditions data landing page](#), the [NOAA Ocean Exploration Data Atlas](#), and the [NOAA Ocean Exploration Video Portal](#). 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 EX2302 that aren’t yet public, request assistance by submitting a [data request form](#) or sending an email to oar.info.mgmt@noaa.gov.

7.1 Digital Data/Product Locations

The locations for directly accessing specific types of digital data collected during EX2302 and products documenting expedition results (at the time of writing this report) are provided in **Table 7**.

Table 7. Online locations for direct access to digital data collected during EX2302 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 POSPac and BS correction files can be requested from oar.oer.exmappingteam@noaa.gov
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

Data/Product Type	Description
ADCP Data	ADCP raw data are available by request from oar.oer.exmappingteam@noaa.gov
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 (CTD and XBT), event logs, images, ROV ancillary data, and sample data
Sun Photometer Measurements	Sun photometer measurements are available through NASA's Marine Aerosol Network
Dive Summaries	Individual ROV/AUV dive summaries and associated ROV dive data are available as supplemental files to this Restricted version of this report
Reports and Papers	Reports and peer-reviewed papers are available through the NOAA Ocean Exploration Library Guide and the NOAA Institutional Repository

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Appendix A: EX2302 Science Team Members

EX2302 included onboard mission personnel (**Table A1**) as well as shore-based science personnel (**Table A2**) who participated remotely via telepresence.

Table A1. EX2302 onboard mission team personnel.

Name	Role	Affiliation
Cuellar, Samuel	Expedition Coordinator	NOAA Ocean Exploration
Bittinger, Amanda	Mapping Watch Lead	UCAR
Gillespie, Treyson	Mapping Watch Lead	UCAR
Ferrante, Cassandra	Mapping Watchstander	UCAR
Nelson, Chad	AUV Operator	Orca Maritime
Lamendola, Christine	AUV Operator	Orca Maritime
Wright, Chris	GFOE Team Lead	Global Foundation for Ocean Exploration
Aragon, Fernando	GFOE Data Manager	Global Foundation for Ocean Exploration
Brian, Roland	GFOE Video Engineer	Global Foundation for Ocean Exploration
Kline, Logan	Knauss Fellow	Global Foundation for Ocean Exploration
Brett Woodworth	Explorer-in-Training	UCAR
Cameron Khule	Explorer-in-Training	UCAR
Dana Carris	Explorer-in-Training	UCAR

Appendix B: EX2302 Environmental and Historical Compliance Documentation

Marine Scientific Research Permit Canada:



UNCLASSIFIED
IGR-1340/42

May 1, 2023

Mr. John Griffith
Deputy Director
Ocean Science Policy and Authorizations
Office of Ocean and Polar Affairs
United States Department of State
2201 C Street NW
Washington, D.C. 20520

Dear Mr. Griffith,

Authorization for the Research Ship OKEANOS EXPLORER (May 1 - Oct 31 2023).

I am pleased to advise that the Government of Canada grants its consent to the early portions (only) of the proposed cruise for the research ship **OKEANOS EXPLORER** to undertake marine scientific research in areas under Canadian jurisdiction or sovereignty during first segment of the above mentioned dates. Please be aware, the Marine Protected Area (MPA) Activity Plan Application, for the second segment of the mission (EX2307 'Sea-Scape Alaska: Transit Mapping') dated Sept 23 through Oct 14, 2023 is still under review and **has not been approved**. The Department of Fisheries and Oceans Canada (DFO) will follow-up with the proponent directly (copying the Department of State on all communications) regarding further clarifications and distribute final approvals pertaining to the second segment of the marine scientific research mission accordingly.

Enclosed is the Canadian Hydrographic Service (CHS) request for the submission of bathymetric data for this mission. Additionally, The proponent is asked to ensure their Best Management Practices reflect that any injured or dead marine mammals must be reported to DFO when in Canadian Pacific waters ([Report a marine mammal or sea turtle incident or sighting \(dfo-mpo.gc.ca\)](#))

Please inform the applicant, the portion of the cruise within the southern area of EX2303 (circled in red on Figure 1), contains active Pacific Hake fishing grounds, outside of Juan de Fuca Strait. If this research mission requires specific clearances from

Canada

other vessels to conduct their mapping activities, please advise DFO immediately at DFO.NCRForeignVesselClearance-DegagementnavireetrangerRCN.MPO@dfo-mpo.gc.ca.

The portion of this cruise pertaining to the contingency plan for ROV mapping (circled in blue on Figure 2) overlaps active ground-fish fishing areas. As a courtesy, the applicant is asked to notify the following key fishing representatives should their plans shift to Canadian waters.

- Bruce Turris, Canadian Groundfish Research and Conservation Society
bruceturris@shaw.ca
- Brian Mose Deepsea Trawlers Association bmose@uniserve.com
- Rob Kronlund Canadian Sablefish Association
arkronlund@canadiansablefish.com
- Chris Atcheson Canadian Sablefish Association
cacheson@canadiansablefish.com
- Chris Sporer Pacific Halibut Management Association phma@citytel.net
- Jordan Belveal Outside ZN rep jordan@jordanbelveal.com
- Please also copy the DFO on any communications at DFO.NCRForeignVesselClearance-DegagementnavireetrangerRCN.MPO@dfo-mpo.gc.ca

Should the vessel's research activity take place inside Canadian waters (territorial sea or internal waters), please be aware of the Canada Border Services Agency (CBSA) marine reporting requirements:

Canada Border Services Agency (CBSA) - marine reporting requirements:

Foreign expeditions arriving in Canada by research vessel and entering Canadian waters (territorial sea or internal waters) are required to report to the nearest Canada Border Services Agency (CBSA) Marine Reporting office.

CBSA Marine Reporting Offices:

(Pacific) Phone: (604)-713-9840 and email: NP12REXC01G@cbsa-asfc.gc.ca

Vessels are required to transmit the following completed forms: **Form A6** General Declaration and **Form A6A** Freight/Cargo Manifest. The forms can be obtained electronically via the links below:

Form A6: <http://www.cbsa-asfc.gc.ca/publications/forms-formulaires/a6.pdf>

Form A6A: <http://www.cbsa-asfc.gc.ca/publications/forms-formulaires/a6a.pdf>

There are no reporting requirements to the CBSA if no research activity takes place inside Canadian waters (territorial sea or internal waters).

We are pleased that Canadian participants would be welcome to join the project, and that the scientific results and all the data from this cruise will be freely and generously shared. Additionally, Canada requires copies of all bathymetric data derived from these marine scientific research projects. This includes single and multi-beam data collected in passage to and from the research site as well as the bathymetric data collect at or in the investigation area". The attached document provides the information required and directions. We request copies of the preliminary and final cruise reports

Yours sincerely,



Kevin Tunney,
Deputy Director
Security and Defence Relations Division

Encl.

Figure 1: Pacific Hake Fishing Ground (red)

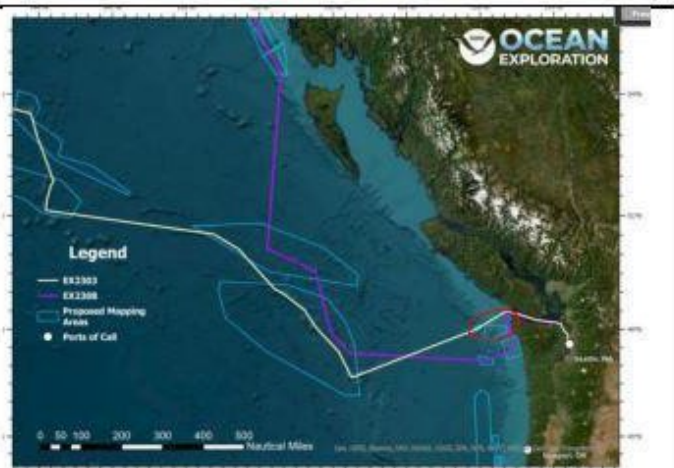
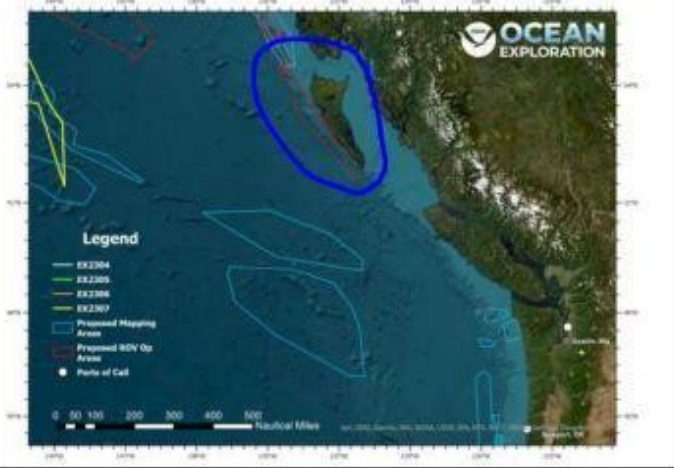


Figure 2: Groundfish Fishing Ground (blue)





Special Requirements for Bathymetric Data MARINE SCIENTIFIC RESEARCH REQUESTS

The Government of Canada wishes to inform all parties requesting authorization to conduct marine scientific research in areas under Canada's jurisdiction (meaning Canada's inland waters, territorial sea (0-12NM), exclusive economic zone (12-200NM), and extended continental shelves) that Canada requires copies of all bathymetric data derived from these marine scientific research projects. This includes single and multi-beam data collected in passage to and from the research site as well as the bathymetric data collected at or in the investigation area.

Bathymetric data collected in areas under Canada's jurisdiction must be provided to Fisheries and Oceans Canada's Canadian Hydrographic Service (CHS). In order to ensure that this data can be properly utilized, the Government of Canada requests the following:

1. A metadata profile containing, to the fullest extent possible, the elements in Table 1 be provided when the data is submitted;
2. Copies of all the files associated with the bathymetric data set(s) are submitted;
3. Where possible, the bathymetric data be gridded to the best possible resolution and that this grid is submitted with the data; and,
4. All of the above are concurrently submitted to the IHO Data Centre for Digital Bathymetry (DCDB).

Table 1. Metadata Profile for Bathymetric Data

General Information		
Location(s)	<i>(e.g. city, river)</i>	
Survey purpose	<i>(e.g. site monitoring, after dredging)</i>	
Start and end date of survey	Start <i>yyyy-mm-dd</i>	End <i>yyyy-mm-dd</i>
Organization name		
Organization contact information		
Responsible researcher for survey - Name		
Responsible researcher for survey - Contact information		
Analyzed for Navigational Warnings (NAVWARN)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Restricted data	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Backscatter available	Yes <input type="checkbox"/>	No <input type="checkbox"/>

Data Acquisition	
Vessel(s)	
Sounding hardware	<i>(e.g. Hydrobox, Kongsberg EM2040)</i>
Technique of Sounding	<i>(e.g. multi-beam sonar, LIDAR)</i>
Resolution	<i>(e.g. 0.5m, 5m x 5m matrix)</i>
Data acquisition software	<i>(e.g. HYPACK, QINSY, SIS, ISAH)</i>
Data processing software	<i>(e.g. HYPACK, FLEDERMAUS, AutoCAD, HIPS, JRSondeW7)</i>

Horizontal Reference	
Horizontal coordinates system	<i>(e.g. Northing, Easting, DD, D-M-S)</i>
Horizontal datum	<i>(e.g. NAD 27, NAD 83, WGS84)</i>
Projection	<i>(e.g. UTM zone 3)</i>
Positioning method	<i>(e.g. DGPS, RTK, PPK)</i>
Positioning hardware	<i>(e.g. Trimble R7, Trisponder, POSMV)</i>
Benchmark reference	<i>(e.g. 80k0559)</i>
Benchmark coordinates	<i>Northing, Easting or D-M-S</i>



Vertical Reference	
Vertical reference system	(e.g. CD, CGVD28, IGLD)
Benchmark reference height	
Water level reduction method	(e.g. HyVsep, Tidal observation)
Tidal station reference	(e.g. : Toronto #13320)

Survey Accuracy	
Horizontal accuracy	(e.g. $\pm 1m$, $\pm 5m$)
Vertical accuracy	(e.g. $\pm 0.15m$, $\pm 0.50m$, $\pm 1m$)
Sounding corrected for vessel draft	Yes <input type="checkbox"/> No <input type="checkbox"/>
Calibration data	Yes <input type="checkbox"/> No <input type="checkbox"/>
IHO CATZOC	(e.g. CATZOC = A2)
IHO Order of Survey	(e.g. Special, 1A)

All correspondence with the CHS shall be coordinated by email to:

DFO.NCRCHSInfo-InfoSHCNCR.MPO@dfo-mpo.gc.ca

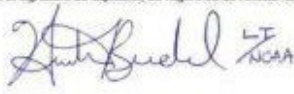

Subject: MSR Bathymetric Data

Hydrographer General of Canada



Canada Border Services Agency / Agence des services frontaliers du Canada

GENERAL DECLARATION - DÉCLARATION GÉNÉRALE

Name of shipping line (liner service only) - Nom du service (service de ligne régulière seulement)		<input type="checkbox"/> Arrival / Arrivée	<input type="checkbox"/> Departure / Départ	Carrier code - Code du transporteur 9ITN	Report No. - N° du rapport V-0119
1. Name and description of ship - Nom et description du navire NOAA Ship Okeanos Explorer - Research Vessel		2. Port of arrival/departure - Port d'arrivée/départ USSEA		3. Date and time of arrival/departure Date et heure d'arrivée/départ 5MAY23	
4. Nationality of ship - Nationalité du navire USA	5. Name of master - Nom du capitaine CAPT Colin Little	6. Port arrived from/Port of destination - Port de provenance/Port de destination USDUT			
7. Certificate of registry (port, date, number) - Certificat d'immatriculation (port, date, numéro) N/A		8. Name and address of ship's agent - Nom et adresse de l'agent du navire National Oceanic and Atmospheric Administration 47 Chandler St Newport, RI 02841			
9. Gross registered tons - Tonnes de jauge brute 2062	10. Net registered tons - Tonnes de jauge nette 618	11. Position of the ship in the port (berth or on station) Emplacement du navire au port (poste à quai ou en service) N/A			
12. Brief particulars of voyage (previous and subsequent ports of call, underline where remaining cargo will be discharged) Renseignements sur le voyage (ports où le navire a fait et fera escale, soulignez les noms des ports de déchargement des marchandises à bord) USSEA-USDUT, scientific research - will not be entering Canadian port					
13. Brief description of the cargo - Description sommaire de la cargaison N/A					
14. Number of crew (including master) - Équipage (capitaine compris) 38	15. Number of passengers - Nombre de passagers	16. Remarks - Observations Vessel is conducting research operations in Canadian EEZ but will not enter any Canadian port.			
Attached documents - Documents annexés (indicate number of copies - Indiquez le nombre d'exemplaires) Crew List					
17. Cargo declaration - Déclaration de la cargaison N/A	18. Ship's stores declaration - Déclaration des provisions de bord N/A				
19. Crew list - Liste de l'équipage 1 Copy	20. Passenger list - Liste des passagers		21. Lease and signature by master, authorized agent or officer Date et signature du capitaine, de l'agent ou de l'officier dûment autorisé 		
22. Crew's effects declaration - Déclaration des effets de l'équipage N/A	23. Maritime declaration of health - Déclaration maritime de santé N/A				
24. Tonnage of cargo loaded/unloaded - Tonnage de la cargaison chargée/déchargée	Net weight - Poids net	Unit of measure - Unité de mesure	25. Number of containers - Nombre de conteneurs	Other (specify) - Autres (précisez)	
Containerized - Conteneurisée	A	N/A	B	N/A	N/A
Non-Containerized - Non-Conteneurisée	C	N/A	D	N/A	N/A
26. Type of service - Genre de service		If liner - Si il s'agit d'un service de ligne		27. Vessels on charter - Navire affrété	
<input type="checkbox"/> Liner / Navire de ligne		<input type="checkbox"/> Conference line / De conférences		<input type="checkbox"/> Yes / Oui	
<input checked="" type="checkbox"/> Other / Autres		<input type="checkbox"/> Independent line / Compagnie indépendante		<input checked="" type="checkbox"/> No / Non	
28. Certificates (indicate expiry date) - Certificats (indiquez la date d'expiration)		Sanitation - Sanitaire		Loadline - Ligne de charge	
Safety construction - Sécurité de la construction Y-A M D-J 2026MAR15		Y-A M D-J 2024JAN23		Y-A M D-J 2026MAR15	
Safety equipment - Sécurité du matériel Y-A M D-J 2024MAR05		Safety radio - Radio de sécurité Y-A M D-J 2024MAR05			
29. Name of owner - Nom du propriétaire US Government DOC	30. Summer dead weight tonnage - Poids en lourd - d'été 720.37		31. Ship's overall length (to the nearest tenth of a meter (0.0)) Longueur hors tout (à un dixième de mètre près (0.0)) 68m		
32. (a) <input checked="" type="checkbox"/> Permission hereby granted to discharge cargo La permission de débarquer la cargaison est par la présente accordée (b) <input type="checkbox"/> Clearance hereby granted for outward voyage La permission d'aller est par les présentes accordée TC border services officer - agent des services frontaliers			33. Date of issue - Date de délivrance 2023-05-05 		

Dans ce formulaire, toutes les expressions désignant des personnes visent à la fois les hommes et les femmes.

A6 (07)

BSF309



**FREIGHT/CARGO MANIFEST
CARGAISON/MANIFESTE DE CARGAISON**

Restore/Restaurer

Help Aide

**CARGO DECLARATION
DÉCLARATION DE LA CARGAISON**

Arrival
Arrivée

Departure
Départ

Page: _____ of _____
 de _____ de _____

Carrier code
Code du transporteur: **9ITN**

Report No.
N° du rapport: **V-0119**

1. Name of ship (agent) - Nom du navire (agent) NOAA Ship Okeanos Explorer	2. Port where report is made (presented) (agent) Bureau d'origine du rapport (présenté) (agent) USSEA	3. Nationality of ship (agent) - Nationalité du navire (agent) USA						7. Date of sailing from port of loading (Date de départ du port de chargement) 05MAY2023	
4. Name of Master (agent) - Nom du capitaine (agent) CAPT Colin Little	5. Port of loading/port of discharge (agent) Port de chargement/port de déchargement (agent) USDDUT	6. Free destination (if in-transit cargo) (agent) Destination libre (si cargaison en transit) (agent) USDDUT	9. Bill of Lading No. (agent) N/A	10. Marks and numbers (agent) N/A	11. Number and kind of packages, description of goods, unit (s), (agent) N/A	12. Gross weight (agent) N/A	13. Measurement (agent) N/A	14. CBISA registration No. (agent) N/A	15. Freight details, charges, etc. (agent) N/A



NOAA SHIP OKEANOS EXPLORER CREW LIST

Family Name	Given Name	Ranking/Rating	Nationality
Abbitt	Rosemary	XO	US
Adams	Matthew	GVA	US
Aniya	Tarah	JO	US
Aragon Sanabria	Fernando	Scientist	US
Beahm	Arlene	CC	US
Bittinger	Amanda	Scientist	US
Blessing	David	CET	US
Brendel	Hunter	OPS	US
Brian	Roland	Scientist	US
Brill	Peter	AB	US
Carris	Dana	Scientist	US
Castillo	Raymond	GVA	US
Cuellar	Sam	Scientist	US
Daneu	David	1AE	US
Downs	Gregory	2AE	US
Dunn	Christopher	OPS	US
Fennell	Patrick	CS	US
Ferrante	Cassie	Scientist	US
Gearty	Austin	JO	US
Gianelloni	Todd	CME	US
Gillespie	Treyson	Scientist	US
Hozendorf	Jerrod	CB	US
Kline	Logan	Scientist	US
Kuhle	Cameron	Scientist	US
Lamendola	Christin	Scientist	US
Lebron Jr.	Pedro	JUE	US
Little	Colin	CO	US
Nelson	Chad	Scientist	US
Parson	Charles	2C	US
Portal	Christopher	GVA	US
Reed	Michael	Medical	US
Remaley	Christopher	AB	US
Schmidt	Colin	SST	US
Sparks	Brya	OS	US
Woodworth	Brett	Scientist	US
Wright	Chris	Scientist	US
Xu	Jiaxin	JO	US



The State Cultural Resource Investigation Permit (SCRIP) (Restricted Only)

The State Cultural Resource Investigation Permit (SCRIP) is included in the RESTRICTED version of this report only due to the sensitive nature of information it contains.

NEPA Categorical Exclusion

Categorical Exclusion (CE) Evaluation Worksheet

Project Identifier: EX2302

Date Review Completed: 4/3/2023

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

OAR Functional Area: OER

Worksheet File Name: 2023-04-OER-G3-EX2302

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 the NOAA's Office of Exploration and Research (OER) to complete a mapping expedition using the NOAA Ship Okeanos Explorer scientific sonar systems (Kongsberg EM304 multibeam, Simrad EK60 and EK80 split-beam, Knudsen 3260 chirp sub-bottom profiler, and Teledyne Acoustic Doppler Current Profiler). EX2302 Seascape Alaska: Aleutians Exploration 1 (Mapping), will depart from Seattle, Washington on May 5th, 2023, and conclude in Dutch Harbor, Unalaska, Alaska on May 27th, 2023 approximately 23 days at sea. The exact start and end dates may vary by a few days depending on weather and other logistical considerations. After leaving Seattle, the ship will transit across the Gulf of Alaska, conducting deep-water mapping operations over unmapped stretches of ocean before arriving at the Aleutian Trench. Transiting west, mapping operations will continue until arriving in the vicinity of Tanaga Island.

Over a period of 3 days, the IVER3 AUV and magnetometer array will be launched and recovered via a small boat deployed from NOAA Ship Okeanos Explorer to conduct survey operations during daylight hours within Tanaga Bay. The actions demonstrated

during this expedition are independent utility and is not connected to any other federal action.

3. Which class of CE in Appendix E of the NAO 216-6A Companion Manual is applicable to this action and why?

- a. G3: Topographic, bathymetric, land use and land cover, geological, hydrologic mapping, charting, and surveying services that do not involve major surface or subsurface land disturbance and involve no permanent physical, chemical, or biological change to the environment.
- b. The topical scope for this action is consistent with the CE number G3 in Appendix E of the Companion Manual to NOAA Administrative Order (NAO) 216-6A: Topographic, bathymetric, land use and land cover, geological, hydrologic mapping, charting, and surveying services that do not involve major surface or subsurface land disturbance and involve no permanent physical, chemical, or biological change to the environment. These expeditions will conduct calibrations of sonars which will involve no permanent physical, chemical, or biological changes to the environment in areas deeper than 200 meters in depth. EX2302 will focus on performing mapping survey operations, high seas when transiting to Tanaga Island and Tanaga Bay in the Aleutian Islands, and offshore of Alaska which would not involve surface or land disturbance causing permanent changes to the environment.

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 take place in remote deep-sea (>200m) areas located off shore of the U.S. West Coast, Alaska, and on the high seas with a focus on waters within the U.S. EEZ. UCH specific operations offshore of Tanaga Island within Tanaga Bay will occur in waters less than 200 m. Operations in shallower waters will be conducted using a small boat to minimize the potential impacts on protected species and critical habitats that may be near the area of interest. All operations are underwater and will have no human presence in the area besides those on onboard the EX2302. 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?

2

While the Okeanos Explorer is operating within the U.S. EEZ where majority of operations would take place, the effects will be negligible as acoustic mapping operations 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 Steller Sea Lions found in the Tanaga Island region where the shallow water work is proposed to occur. The 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 the these sectors would not result in any activities having adverse effects on the species or habitats protected under ESA, MMPA, MSA, NMSA, or MBTA.

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 the 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, an 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?

The proposed action will not result in adverse or indirect effects that cannot be resolved through applicable regulatory processes since we will not be operating within 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)?

The NOAA Ship Okeanos Explorer will be operating in the remote and offshore areas along the U.S. West Coast as the EX transits through the high seas to reach Tanaga Island and Tanaga Bay within the Aleutian Islands. There are no communities within or near the geographic scope of the expedition due to activities operating in areas greater than 200 meters for the primary focused mapping operations. 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 as Tanaga Island is not inhabited by any 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 EX2302, NOAA Ship Okeanos Explorer will not make landfall in areas other than commercial ports in Seattle, Washington AND Dutch Harbor, Unalaska, Alaska. 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 the 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 an 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 EX2302 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 FY23 Field Season Instructions.

OER requested a Essential Fish Habitat (EFH) consultation under section 304 of the Magnuson-Stevens Fishery Conservation and Management Act for expeditions conducted by the NOAA Ship Okeanos Explorer during its 2023 field season in the North Pacific Ocean, Eastern Pacific Ocean, Central Pacific Ocean, and Alaska. The EFH Letter of Acknowledgement was received on August 3, 2022 from the Assistant Regional Administrator for the NOAA Office of Habitat Conservation stating that the FY23 expeditions will not adversely impact EFH. This letter will additionally be included in the EX2302 expedition report.

As part of the Underwater Cultural Heritage project (UCH), OER has reached out to the Alaska Heritage Resources Survey (AHRS) is a data repository with information on over 45,000 reported cultural resources (archaeological sites, buildings, structures, objects or locations, etc.), from prehistoric to modern, and some paleontological sites within the State of Alaska. The AHRS is maintained by the Alaska Department of Natural Resources and the Office of History and Archaeology (OHA). Proposed UCH projects are likely subject to review under the Alaska Historic Preservation Act (AHPA) (A.S. 41.35.070) or Section 106 of the National Historic Preservation Act (36 CFR 800). OER is in the process of receiving SCRIP permit about the proposed UCH work being conducted offshore of Tanaga island within Tanaga Bay.

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

No, the exploration activities are small and considered minimal following the best available information about effects of the equipment to support 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 breath, no notable or lasting changes or highly controversial effects to the environment by mapping operations conducted onboard the 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?

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.

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: David Turner *David Turner*

OAR Decision Maker's Position/Title: Acting Deputy Director NOAA Ocean Exploration & Research