

# Project Instructions: EX2307, Seascope Alaska 6: Gulf of Alaska Transit Mapping

**Date Submitted:** July 24, 2023  
**Platform:** NOAA Ship *Okeanos Explorer*  
**Project Number:** EX-23-07  
**Project Title:** Seascope Alaska 6: Gulf of Alaska Transit Mapping  
**Project Dates:** September 23 - October 14, 2023

**Prepared by:** \_\_\_\_\_ **Dated:** \_\_\_\_\_  
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NOAA Ocean Exploration

**Approved by:** \_\_\_\_\_ **Dated:** \_\_\_\_\_  
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Operations Chief, Expeditions and Exploration Division  
NOAA Ocean Exploration

**Approved by:** \_\_\_\_\_ **Dated:** \_\_\_\_\_  
Kelley Suhre  
Chief (acting), Expeditions and Exploration Division  
NOAA Ocean Exploration

**Approved by:** \_\_\_\_\_ **Dated:** \_\_\_\_\_  
CAPT Amanda Goeller  
Commanding Officer  
NOAA Marine Operations Center — Atlantic

# I. Overview

## A. Brief Summary and Project Period

This document contains project instructions specific to EX2307. For the annual cross-expedition details, see the [“NOAA Ship \*Okeanos Explorer\* FY23 Field Season Instructions.”](#) This expedition will commence on September 23, 2023, in Seward, Alaska, and conclude on October 14, 2023 in San Francisco, California. Operations will be conducted 24 hours a day, and consist of mapping operations and full shore-based participation via telepresence.

Operations will include the use of the ship’s deepwater mapping systems (Kongsberg EM 304 multibeam, 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 a high-bandwidth satellite connection for continuous ship-to-shore communications. Operations will focus on exploring deep waters greater than 200 m in U.S. waters and international waters off of the U.S. West Coast. Mapping operations may also be conducted in Canadian waters off the coast of British Columbia.

## B. Days at Sea

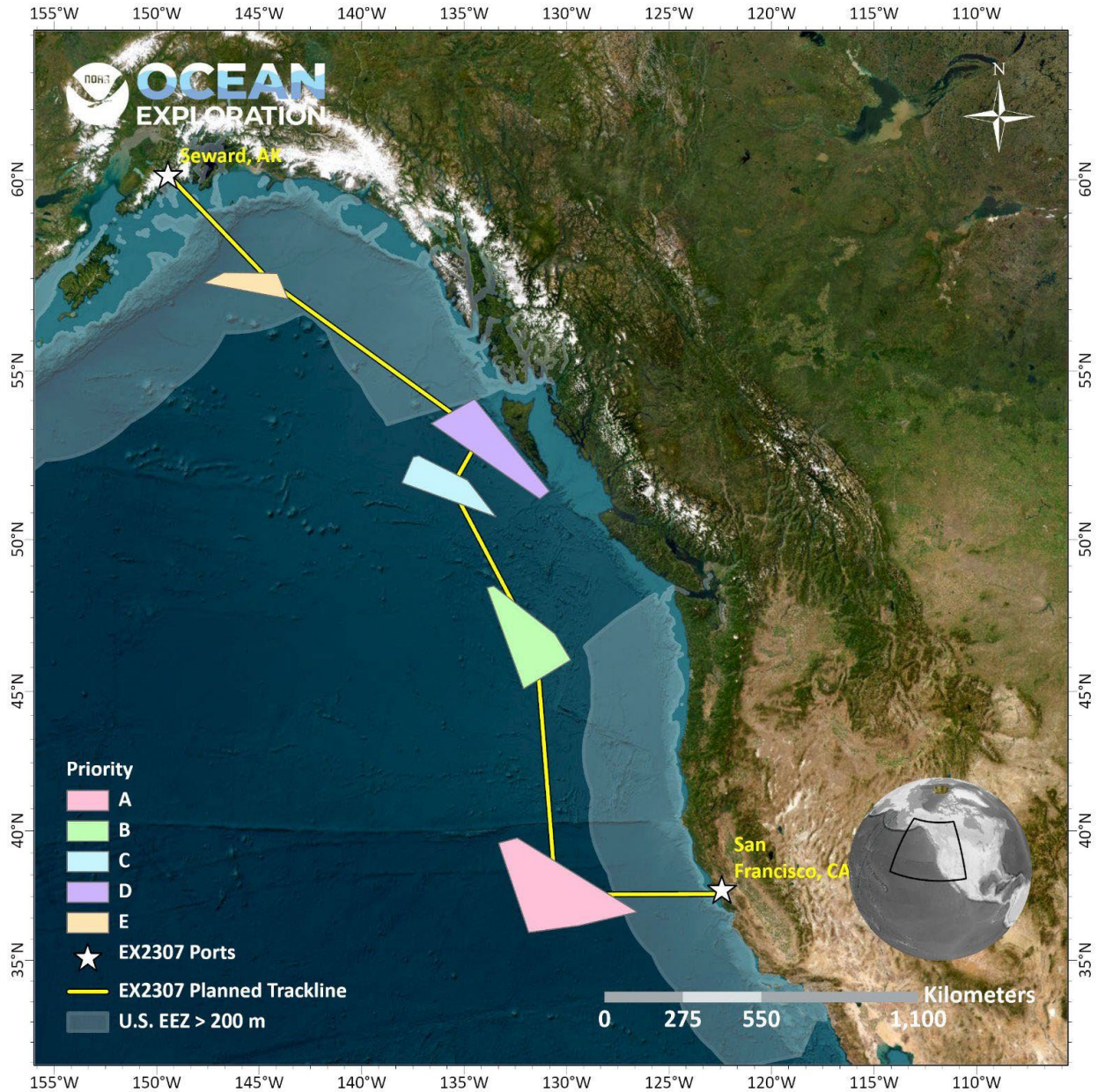
Of the 22 days at sea (DAS) scheduled for this expedition, 8 occur in FY23 and are funded by NOAA Office of Oceanic and Atmospheric Research line office base allocation. The remaining 14 DAS scheduled for this expedition occur in FY24 and are planned as program funded DAS.

While mapping operations are planned 24 hours a day, this expedition will require 12 hours a day of support from the ship’s deck and engineering department.

## C. Operating Area

EX2307 will focus operations on U.S. waters and international waters off the U.S. West Coast with potential operations in Canadian waters off the coast of British Columbia. Mapping and CTD operations will be conducted at depths between 200-6000m. **Figure 1** shows the general operating area for the expedition. The waypoints for the general working area and proposed expedition track are in **Appendix A**. There is a contingency plan to go through the Inside Passage for weather avoidance.

As this expedition is operating in remote locations and/or far from a suitable port to treat medical emergencies, a medical officer is requested to be aboard for the entirety of the expedition.



**Figure 1.** Map showing priority mapping target regions for EX2307. The expedition track is subject to change based on survey results, field conditions, and the discretion of the commanding officer. Note: priority boxes C and D are in Canadian waters.

## D. Summary of Objectives

EX2307 operations will involve transit mapping from Seward, Alaska to San Francisco, California. There will be focused ocean mapping in priority boxes off the U.S. West Coast (and potentially Canadian waters) primarily in deep water (>200 m). This expedition will collect critical baseline information to support priority NOAA science and management needs.

Mission objectives for EX2307 include a variety of objectives focused on science, mapping, education, outreach, and data management. Overarching objectives that span the entire Fiscal Year 2023 (FY23) field season are covered in the “[NOAA Ship \*Okeanos Explorer\* FY23 Field Season Instructions](#).” See **Appendix B** for the expedition data management plan. Additional objectives specific to EX2307 follow:

## 1. Science Objectives

- a. Identify, map, and explore the diversity and distribution of benthic habitats, including potential deep-sea coral and sponge communities, fish habitats, and chemosynthetic communities.
- b. Map geologic features to better understand the geological context of the region and improve knowledge of past and potential geohazards.
- c. Acquire acoustic and oceanographic data as a foundation to better understand the characteristics of the water column and the pelagic fauna that inhabit it.
- d. Engage a broad spectrum of the scientific and management community, as well as the public, in telepresence-based exploration.
- e. Create and provide input into standard science products to provide a foundation of publicly accessible data and information products to spur further exploration, research, and management activities.
- f. Conduct stationary CTD casts as required to support high-priority requests from the science community (e.g., to help identify potential hydrothermal vents).
- g. Use the onboard laboratory to preserve and catalog all samples and ready them for shipping to their respective public archives.
- h. Collect water samples using the CTD-mounted Niskin bottles and filter samples in the onboard laboratory to obtain eDNA samples for shoreside processing.
- i. Collect sun photometer measurements as part of surveys of opportunity in partnership with NASA.

## 2. Acoustic Mapping Objectives

- a. Collect transit data that addresses bathymetric gaps or prioritizes areas with poor bathymetric or seabed backscatter data quality. Requested transit speeds will be the best possible speed up to 10 kn.
- b. Conduct 24-hour mapping operations for the entirety of the expedition. Mapping operations will consist of concurrent data acquisition from the EM 304 multibeam echosounder, EK60/80 split-beam echosounder suite, and Knudsen 3260 sub-bottom profiler.
- c. Collect high-resolution bathymetry in areas with no (or low quality) sonar data.
- d. Collect high-resolution mapping data in priority areas, as shown in **Figure 1**. Execute mapping line plans as defined by onboard personnel, with real-time adjustments made



to obtain complete seabed coverage as necessary. An average survey speed of 8-9 kn will be used during mapping operations.

- e. Conduct XBT casts as data quality requires, but not more than six hours apart.
- f. Calibrate EK sonar suite as operations and conditions permit.
- g. Maintain CTD capabilities as a backup sound velocity profiling method for mapping data requirements.

### 3. Video Engineering Objectives

- a. Provide onboard support for 24-hour exploration operations.
- b. Verify Global Foundation for Ocean Exploration (GFOE) managed telepresence systems perform as expected.

### 4. Network/Onboard Data Objectives

- a. Ensure integrity of all data processing pipelines and automated transfer to shore for all raw sonar data and daily bathymetry and bottom backscatter mosaic products.
- b. Ensure Global Foundation for Ocean Exploration (GFOE) managed VSAT, network, and computing infrastructure operate as required to meet mission objectives.
- c. Ensure shipboard instruments/teams are producing expected data products at the expected rates according to established conventions.
- d. Ensure data management processes organize, backup, and transmit data to shore as expected.
- e. Support shore-based personnel with remote access to shipboard resources to better meet mission objectives.
- f. Cross-train network, system administration, and data management personnel.
- g. Improve system documentation.

### 5. Outreach and Education Objectives

- a. Train the next generation of ocean explorers by hosting up to three explorers-in-training on the ship. Training will include standing eight-hour watches of sonar data acquisition, processing, and documentation according to standard NOAA Ocean Exploration procedures. Ancillary projects may be assigned as necessary.
- b. Host interactions with audiences on shore (exact schedule TBD).
- c. Host limited scheduled ship tours while in port (exact schedule TBD)
- d. Engage the general public in ocean exploration through social media and live video and timely content (web features, highlight videos, video clips, still imagery, and mapping products) on the NOAA Ocean Exploration website.

### 6. Remote Science and Exploration Command Center Objectives

- a. Conduct operations in conjunction with shore-based exploration command centers and remote science team participants.

## 7. Ship Objectives

- a. Conduct stationary CTD operations as requested and able with the CastAway CTD.
- b. Potentially assist with deployment of EK calibration gear.

## E. Participating Institutions

See “[NOAA Ship \*Okeanos Explorer\* FY23 Field Season Instructions](#)” for institutions that consistently participate throughout the field season.

## F. Personnel (Mission Party)

Mission personnel (see **Table 1**) will arrive in Seward, Alaska starting on September 21, 2023. Mission personnel will then be aboard for the duration of the expedition (September 23 - October 14, 2023). Some personnel will depart by October 16, 2023, and others will stay aboard for the expedition that follows (EX2308). The expedition will also be supported by shoreside personnel (see **Table 2**).

Mission personnel sailing aboard NOAA Ship *Okeanos Explorer* must fill out a [Sailing Contact Form](#) that collects emergency contact information for each person. This information is available to the operations officer to fulfill safety requirements to sail.

**Table 1.** Seagoing mission personnel: This list is tentative until travel is booked. Any deviations will be communicated to the operations officer.

#	Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
1	LTJG Abby Letts	Expedition Coordinator	9/20	10/16	F	NOAA Ocean Exploration	USA
2	Peliks, Marcel	Watch Lead	9/21	10/15	M	UCAR	USA
3	Hoy, Shannon	Watch Lead	9/20	10/16	F	NOAA Ocean Exploration	USA
4	Albano, Trish	Watch Lead in training	9/21	10/15	F	NOAA Ocean Exploration	
5	Ebrahim, Adrianna	Explorer-in-Training	9/21	10/15	F	UCAR	USA
6	Griffiths, Jonathan	Explorer-in-Training	9/21	10/15	M	UCAR	USA

#	Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
7	Martinson, Ingrid	Explorer-in-Training	9/21	10/15	F	UCAR	USA
8	Fernando Aragon	GFOE Team Lead	Already aboard	10/15	M	GFOE	USA
9	Durbin, Mark	Data Engineer	9/21	10/15	M	GFOE	USA

\* Not confirmed.

## 1. Foreign National Guests (FNGs) Access to OMAO Facilities and Platforms

Foreign national access to *Okeanos Explorer* or other federal facilities will not be required for this expedition.

## G. Administrative

### 1. Points of Contact

**Table 3.** Points of contact.

Operations	Name, Title	Office	Address	Phone	Email
Marine Operations Center, Atlantic	CAPT Amanda Goeller, Commanding Officer	Marine Operations Center, Atlantic	439 West York Street Norfolk, VA 23510-1145	(757) 441-6778	<a href="mailto:co.moc.atlantic@noaa.gov">co.moc.atlantic@noaa.gov</a>
Marine Operations Center, Atlantic	CDR Steven Barry, Chief of Operations	Marine Operations Center, Atlantic	439 West York Street Norfolk, VA 23510-1145	(757) 441-6842	<a href="mailto:Chiefops.MOA@noaa.gov">Chiefops.MOA@noaa.gov</a>
NOAA Ship Okeanos Explorer (primary)	CAPT Colin Little, Commanding Officer	NOAA Ship Okeanos Explorer	NOAA Ship Okeanos Explorer 47 Chandler Street Newport, RI 02841	(401) 439-7848	<a href="mailto:CO.Explorer@noaa.gov">CO.Explorer@noaa.gov</a>
NOAA Ship Okeanos Explorer (primary)	LT Hunter Brendel, NOAA Operations Officer	NOAA Ship Okeanos Explorer	NOAA Ship Okeanos Explorer 47 Chandler Street Newport, RI 02841	(808) 659-9179 x221	<a href="mailto:ops.explorer@noaa.gov">ops.explorer@noaa.gov</a>
Mission (primary)	LTJG Abby Letts, Expedition Coordinator	NOAA Ocean Exploration	Joint Hydrographic Center 24 Colovos Rd Durham, NH 03824	(301) 325-3792	<a href="mailto:abby.letts@noaa.gov">abby.letts@noaa.gov</a>
Mission (other)	Kasey Cantwell, Operations Chief	NOAA Ocean Exploration	1315 East-West Highway, Silver Spring, MD 20910	(301) 717-7776	<a href="mailto:kasey.cantwell@noaa.gov">kasey.cantwell@noaa.gov</a>

Operations	Name, Title	Office	Address	Phone	Email
Mission (other)	Kelley Suhre, Chief (acting), Expeditions and Exploration Division	NOAA Ocean Exploration	1315 East-West Highway, Silver Spring, MD 20910	(703) 927-5449	<a href="mailto:kelley.suhre@noaa.gov">kelley.suhre@noaa.gov</a>
Mission (other)	Jeremy Weirich, Director	NOAA Ocean Exploration	1315 East-West Highway, Silver Spring, MD 20910	(301) 452-7366	<a href="mailto:jeremy.weirich@noaa.gov">jeremy.weirich@noaa.gov</a>

## 2. Diplomatic Clearances

None required.

## 3. Licenses and Permits

The expedition coordinator is responsible for obtaining and listing all permits as well as any identification numbers they contain. See **Appendix C** for the applicable documents. Final documents will be archived with the associated expedition report.

## 4. Shipments

The *Okeanos Explorer* operations officer should be notified of any shipments to the ship. Send an email describing the shipment (including size and number of items) to [OPS.Explorer@noaa.gov](mailto:OPS.Explorer@noaa.gov).

For shipments to arrive while in port in Seward, Alaska, at the start of the expedition, **shipments should arrive no later than September 15**, and be shipped to the following address:

NOAA Ship *Okeanos Explorer*  
 Attn: Name/Dept  
 47 Chandler Street  
 Newport, RI 02841

For shipments to arrive while in port in San Francisco, California, after the expedition from September 23 - October 14, 2023, **shipments should arrive no later than October 6**, and should be shipped to the following address:



NOAA Ship *Okeanos Explorer*  
Attn: Name/Dept  
47 Chandler Street  
Newport, RI 02841

## 5. COVID-19 Contingency Plan for Scientific Party

Refer to the most recent [COVID-19 Policy](#) for more information:

**Positive COVID-19 Test Result:** In the event of a positive test result for any member of the scientific party, or the identification of recent close contact with a positive COVID-19 case through contact tracing:

- The member will not be cleared to board the ship, and lodging shall be provided at a nearby hotel with availability at program or partner expense for up to 10 days. The closest hotel is: Harbor 360 Hotel, 1412 4th Avenue, Seward, AK 99664
- The Expedition Coordinator will be notified of any mission personnel who are not cleared to sail.
- The Expedition Coordinator will determine, in consultation with the ship's command and appropriate parties, whether the mission will continue without the uncleared personnel.
- Subsequent testing will be sought using a health care provider or local commercial testing facility.

### Symptoms of Possible COVID-19:

In the event a member of the scientific party develops symptoms of possible COVID-19 while underway, [OMAO protocols](#) will be followed.

Once ashore, all logistics and support for the affected scientist(s) will be coordinated through a point of contact from their program:

Kasey Cantwell  
Operations Chief, Expeditions and Exploration Division  
NOAA Ocean Exploration  
SSMC3, #2335  
1315 East West Hwy

Duties of the shoreside support person/team include coordination of (if needed):

- Further testing
- Well-being check-in & symptom screening
- Travel
- Lodging
- Medical support
- Onsite support as needed

- Notify Kasey Cantwell, Operations Chief, (301) 717-7776, [kasey.cantwell@noaa.gov](mailto:kasey.cantwell@noaa.gov) to start communication with participating programs and partners.

If the affected scientist is in a foreign port, the shoreside POC shall contact **the U.S. Embassy (or consulate, or appropriate Dept. of State entity)** to request help and if necessary, translation support.

**DOS contact information by port for this expedition:** N/A

## II. Operations

The expedition coordinator is responsible for ensuring mission personnel are trained in planned operations and are knowledgeable about expedition objectives and priorities. The commanding officer is responsible for ensuring all operations conform to the ship’s accepted practices and procedures.

### A. Expedition Itinerary

**Table 4** summarizes the expedition itinerary. All times and dates are subject to conditions and the discretion of the commanding officer. Locations are approximate. Additional items may be added to the itinerary as expedition plans are further developed.

**Table 4. Expedition itinerary:** This is an approximate itinerary and is subject to change based on objective completion, weather, and logistical needs.

Date	Activities
9/21 - 9/22	Mission personnel begin to arrive on ship. Underway preparations and training. Mobilization. Mission personnel will need laptop computers added to the wireless network. Ship familiarization tour and orientation for new mission personnel.
9/23	Departure, targeted mapping. Pre-project meeting to be held with ship at 1430 in combination with daily operations meeting.
9/24	Targeted mapping, potential CTD operations, potential EK calibration.
9/25	Targeted mapping, potential CTD operations, potential EK calibration.
9/26	Targeted mapping, potential CTD operations, potential EK calibration.
9/27	Targeted mapping, potential CTD operations, potential EK calibration.
9/28	Targeted mapping, potential CTD operations, potential EK calibration.
9/29	Targeted mapping, potential CTD operations, potential EK calibration.
9/30	Targeted mapping, potential CTD operations, potential EK calibration.

Date	Activities
10/1	Targeted mapping, potential CTD operations, potential EK calibration.
10/2	Targeted mapping, potential CTD operations, potential EK calibration.
10/3	Targeted mapping, potential CTD operations, potential EK calibration.
10/4	Targeted mapping, potential CTD operations, potential EK calibration.
10/5	Targeted mapping, potential CTD operations, potential EK calibration.
10/6	Targeted mapping, potential CTD operations, potential EK calibration.
10/7	Targeted mapping, potential CTD operations, potential EK calibration.
10/8	Targeted mapping, potential CTD operations, potential EK calibration.
10/9	Targeted mapping, potential CTD operations, potential EK calibration.
10/10	Targeted mapping, potential CTD operations, potential EK calibration.
10/11	Targeted mapping, potential CTD operations, potential EK calibration.
10/12	Targeted mapping, potential CTD operations, potential EK calibration.
10/13	Targeted mapping, potential CTD operations, potential EK calibration.
10/14	Arrive in San Francisco, CA
10/15	Demobilization. Majority of mission personnel depart.
10/16	Remaining mission personnel depart.

## B. Staging and Destaging

Minimal staging and destaging are anticipated for this mapping expedition.

## C. Operations to Be Conducted

### 1. CTD Casts

CTD casts using the CastAway CTD will be requested when scientifically beneficial during operations and will be scoped with the operations officer and senior survey technician in advance.

## 2. EK Calibration

An EK sonar suite calibration will potentially be requested based on weather windows. The EK calibration would be scoped with the operations officer and senior survey technician in advance.

## 3. Extended Operations

There are no planned extended operations for this expedition at this time.

## 4. Telepresence/Outreach Events

- a. Three live video feeds will be used throughout the expedition to provide situational awareness for onshore personnel.
- b. Live interactions are planned for this expedition with exact numbers and timing TBD.

## 5. In-Port Events

- a. No in port public events are planned for this expedition.

## 6. Special/Unusual Operations or Requests

There are no special or unusual operations or requests for this expedition.

## D. SCUBA Dive Plan

All SCUBA dives are to be conducted in accordance with the requirements and regulations of the [NOAA Diving Program](#) and require the approval of the ship's commanding officer. No SCUBA science dives are planned during EX2307, but the ship may plan training, safety drills, or maintenance dives.

## E. Applicable Restrictions

Not applicable.

## III. Equipment

A detailed list of equipment provided by the ship and NOAA Ocean Exploration can be found in the "[NOAA Ship \*Okeanos Explorer\* FY23 Field Season Instructions](#)." There are no specific changes relative to this expedition.

## IV. Hazardous Materials

### A. Policy and Compliance

See the [“NOAA Ship \*Okeanos Explorer\* FY23 Field Season Instructions.”](#)

### B. Inventory

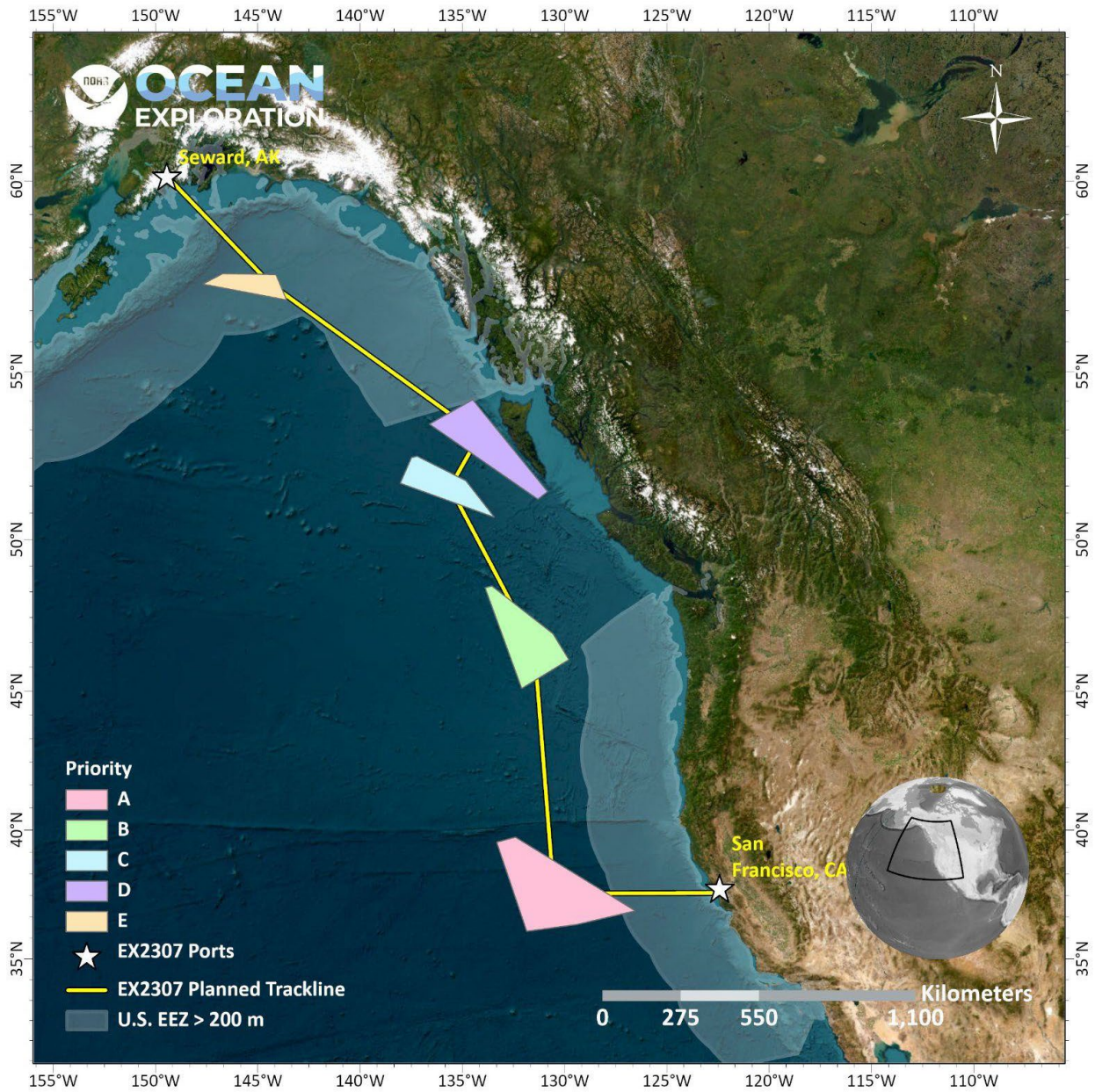
**Table 5.** Inventory of hazardous materials that will be aboard for EX2307.

Item	Use	Approximate Locations
95% UPS denatured ethanol (275 gal)	Sample preservation	02 Deck, ethanol shed
Formaldehyde (2 gal) to be buffered into 10% buffered formalin	Sample preservation	Wet lab, under the chemical hood
Bleach (1 qt)	Sterilization and sample preservation	Wet lab cabinet under sink
Magnesium chloride (500 g)	Sample preservation	Wet lab under hood
Sodium phosphate (1 kg)	Sample preservation	Wet lab under hood
AquaShield	Underwater lubricant	ROV workshop fire cabinet, pit
Dow Corning 4	Electrical insulating compound	ROV workshop fire cabinet, pit
Fluid film spray	Silicone lubricant	ROV workshop fire cabinet
Isopropanol alcohol (2 gal)	Solvent	ROV workshop fire cabinet
Scotchkote	Electrical insulating compound	ROV workshop fire cabinet
3M silicone spray	Silicone lubricant	ROV workshop fire cabinet
Synthetic AW hydraulic oil, ISO-22	Amsoil (AWG-05)	Hanger, pit, vehicles
Tap Magic cutting fluid	Cutting/machining lubricant	ROV workshop fire cabinet
Tap Magic heavyweight cutting fluid	Cutting/machining lubricant	ROV workshop fire cabinet
Tuff Coat M	Marine lubricant	Winch room
Dow Corning Molykote 111	Valve lubricant and sealant	ROV workshop Fire cabinet, pit
WD40	Lubricant	ROV workshop fire cabinet
Loktite	Bolt adhesive	ROV workshop fire cabinet



Item	Use	Approximate Locations
Shell Diala S2	Vitrea	Hanger, vehicles
Por-15	Paint kit	ROV workshop fire cabinet
Aeroshell 41	Hydraulic fluid	Hanger, ROV Deep Discoverer
Ultratane	Butane fuel	ROV workshop fire cabinet
Rust-oleum	Protective enamel	ROV workshop fire cabinet
Flux-Off	Soldering flux remover	ROV workshop fire cabinet
Propane	Torch fuel	ROV workshop fire cabinet
Adhesive Pliobond 25	General adhesive	Tool room
AP 120 Metal Prep	Degreaser/cleaner for metal surfaces	Pit
Butane fuel	Torch refill	Tool room
PVC cement	Adhesive for PFV plastic piping	Tool room
Phosphoric acid	Ferrous metal rust removal	Tool room
Pipetite paste	Plumbing sealant	Tool room/pit
Spindle oil 10, ROS PT	Lubricant/compensation oil	Tool room
DC557	Silicon grease	Tool room/pit
Tether potting catalyst	Two part epoxy catalyst	Pit
Tether potting compound	Two part epoxy ingredient	Pit
ThermaPlex bearing grease	Lubricant	Pit
Tritech Seaking	Compensator oil for sonar head	Pit

# Appendix A. Waypoints



**Figure A1.** Map showing the general operating area for EX2307 (for reference).

**Table A1.** Waypoints for proposed expedition track (yellow line).

Latitude	Longitude
60.1133801°N	149.4407221°W
57.3825911°N	144.3758478°W

53.1781887°N	134.1621423°W
51.6247092°N	135.6014720°W
46.5196653°N	131.4772387°W
37.5837144°N	130.5257586°W
37.7769595°N	135.6014720°W

# Appendix B. Data Management Plan

Report Date: 2023-07-24

## 1. General Description of Data to be Managed

### 1.1 Name and Purpose of the Data Collection Project:

EX-23-07, Seascope Alaska 6: Gulf of Alaska Transit Mapping

This expedition will commence on September 23, 2023, in Seward, Alaska, and conclude on October 14, 2023 in San Francisco, California. Operations will be conducted 24 hours a day and full shore-based participation via telepresence.

### 1.2 Summary Description of the data to be collected:

Operations will include the use of the ship's deepwater mapping systems (Kongsberg EM 304 multibeam, 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 a high-bandwidth satellite connection for continuous ship-to-shore communications. Operations will focus on exploring deep waters (greater than 200 m for mapping operations) in U.S. and International waters off the U.S. West Coast and the Canadian waters off the coast of British Columbia.

### 1.3 Keywords or phrases that could be used to discover the data:

#### Theme Keywords:

bathymetric gaps, benthic habitats, CTD, deep-sea coral and sponge communities, EM304, fish habitats, geohazards, habitat areas of particular concern, HAPC, mapping survey, marine education, multibeam, multibeam backscatter, multibeam sonar, multi-beam sonar, sun photometer, Seabed 2030, Seascope Alaska, single beam sonar, singlebeam sonar, single-beam sonar, site characterization, sonar anomalies, split beam sonar, sub-bottom profile, systematic exploration, water column backscatter, EXPRESS, EXpanding Pacific Research and Exploration of Submerged Systems

#### Place Keywords:

Alaska, British Columbia, Canada, San Francisco, Seward, U.S. West Coast

### 1.4 If this mission is part of a series of missions, what is the series name?

Okeanos Mapping Cruises

### 1.5 Planned or Actual Temporal Coverage of the data:

Start Date: 2023-09-23 and End Date: 2023-10-14

### 1.6 Actual or Planned Geographic Coverage of the data:

Northernmost Boundary: 60 and Southernmost Boundary: 37

Westernmost Boundary: -150 and Easternmost Boundary: -130

### 1.7 What data types will be created or captured and submitted for archive?

Bottom Backscatter, Cruise Plan, Cruise Summary, CTD (processed), CTD (product), CTD (raw), Digital Video, Digital Images, EK60 Split Beam Data, EK80 Split Beam Data, Multibeam (image), Multibeam (processed), Multibeam (product), Multibeam (raw), Navigational Data, SCS Output (compressed), SCS Output (native), Seafloor Imagery, Sound Velocity Profile, Sub-Bottom Profile data, Temperature data, Water Column Backscatter, XBT (raw), SCS Output (compressed), SCS Output (native)

### **1.8 What platforms will be employed?**

NOAA Ship Okeanos Explorer

### **2 Points of Contact for this Data Producing Project**

Overall POC: Abby Letts, Abby.Letts@noaa.gov

Title: Expedition Coordinator

Affiliation: NOAA Office of Ocean Exploration and Research

Phone: (626) 660-8744 (Abby Letts)

### **3 Points of Contact for Managing the Data**

Data POC: Caitlin Ruby

Data POC Title: Stewardship Data Management

Data POC Email: caitlin,ruby@noaa.gov

### **4 Resources**

#### **4.1 Have resources for management of these data been identified?**

Yes

#### **4.2 Approximate percentage of the budget devoted to data management. (specify % or unknown)**

Unknown

### **5 Data Lineage and Quality**

#### **5.1 What is the processing workflow from collection to public release?**

SCS data shall be delivered in its native format to NCEI-MD (oceanographic archive); the data are then converted to an archive-ready, documented, and compressed NetCDF3 format which is made available for download through the Ocean Exploration Digital Atlas; water column profile data and navigation data will be delivered in ASCII format to NCEI-MD; EM304 and EK60/80 output data and metadata along with water column profiles used for calibration will be delivered to NCEI-CO (geophysical archive). AUV seafloor imagery, water column profile data and navigation data will be delivered in ASCII format to NCEI-MD on a separate drive.

#### **5.2 What quality control procedures will be employed?**

Quality control procedures for the data from the Kongsberg EM304 is handled at UNH CCOM/JHC. Raw (level-0) bathymetry files are cleaned/edited into new data files (level-1)



and converted to a variety of products (level-2). Data from sensors monitored through the SCS are archived in their native format and are not quality controlled. Data from CTD casts and XBT firings are archived in their native format.

## **6 Data Documentation**

### **6.1 Does the metadata comply with the Data Documentation Directive?**

Yes

#### **6.1.1 If metadata are non-existent or non-compliant, please explain:**

Not Applicable

### **6.2 Where will the metadata be hosted?**

Organization: An ISO format collection-level metadata record will be generated during pre-cruise planning and published in the NOAA OneStop catalog and an OER Web Accessible Folder (WAF) hosted for public discovery and access at:

URL: <https://data.noaa.gov/waf/NOAA/NESDIS/ncei/oer/iso/>

Metadata Standard: ISO 19115-2 Geographic Information with Extensions for Imagery and Gridded Data will be the metadata standard employed.

### **6.3 Process for producing and maintaining metadata:**

Metadata will be generated via xml editors or metadata generation tools.

## **7 Data Access**

### **7.1 Do the data comply with the Data Access Directive?**

Yes

#### **7.1.1 If the data will not be available to the public, or with limitations, provide a valid reason.**

Not Applicable

#### **7.1.2 If there are limitations, describe how data are protected from unauthorized access.**

Account access to mission systems are maintained and controlled by the Program. Data access prior to public accessibility is documented through the use of Data Request forms and standard operating procedures.

### **7.2 Name and URL of organization or facility providing data access.**

Organization: NOAA National Centers for Environmental Information (NCEI)

URL: <https://www.ncei.noaa.gov>

### **7.3 Approximate delay between data collection and dissemination. By what authority?**

Hold time: Data are considered immediately publicly accessible as soon as possible after the mission, unless there are documented restrictions.

Hold authority: not applicable

### **7.4 Prepare a Data Access Statement**

No data access constraints, unless data are protected under Section 304 of the National

Historic Preservation Act of 1966. Data collected and derivative data products produced by the *Okeanos Explorer* will be archived in a location where it can be withheld from public disclosure.

## **8 Data Preservation and Protection**

### **8.1 Actual or planned long-term data archive location:**

Data from this mission will be preserved and stewarded through the NOAA National Centers for Environmental Information. Refer to the *Okeanos Explorer* Data Management Plan at NOAA Central Library Institutional Repository for detailed descriptions of the processes, procedures, and partners involved in this collaborative effort.

### **8.2 If no archive planned, why?**

Not Applicable

### **8.3 If any delay between data collection and submission to an archive facility, please explain.**

The EM304 output data is a new format not currently read by NCEI archive systems. The new file format is being added to the system capability. There will be an unknown delay for the archive of these .kml files. All other data will be archived within 60-90 days of receipt.

### **8.4 How will data be protected from accidental or malicious modification or deletion?**

Data management standard operating procedures minimizing accidental or malicious modification or deletion are in place aboard the *Okeanos Explorer* and will be enforced.

### **8.5 Prepare a Data Use Statement**

Data use shall be credited to NOAA Office of Ocean Exploration and Research.

## Appendix C. Licenses, Permits, and 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 for NOAA Administrative Order 216-6A describes the agency's specific procedures for NEPA compliance.

An environmental review memorandum was completed for NOAA Ocean Exploration expeditions on NOAA Ship *Okeanos Explorer* 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 exist that require the preparation of an environmental assessment or environmental impact statement. This document is on file with NOAA Ocean Exploration and can be provided upon request.

See the "[NOAA Ship \*Okeanos Explorer\* FY23 Field Season Instructions](#)" for additional information regarding environmental compliance that applies to the entire field season (e.g., Endangered Species Act Section 7 consultation and potential impacts to essential fish habitat).

Final licenses, permits, or compliance documents will be appended to the associated expedition report.

# NEPA Categorical Exclusion Evaluation

## Categorical Exclusion (CE) Evaluation Worksheet

**Project Identifier:** EX2307

**Date Review Completed:** 7/20/2023

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

**OAR Functional Area:** OER

**Worksheet File Name:** 2023-07-OER-G3-EX2307

### 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 transit mapping expedition using the NOAA Ship Okeanos Explorer scientific deepwater sonar systems (Kongsberg EM 304 multibeam, Simrad EK60 and EK80 split-beam sonars, Knudsen 3260 Chirp sub-bottom profiler, and Teledyne acoustic Doppler current profilers) and expendable bathythermograph (XBTs). EX2307 Seascope Alaska: Gulf of AK (Transit Mapping) will depart from Seward, Alaska on September 23, 2023 and will conclude in San Francisco, California on October 14, 2023 for around 22 days at sea. The exact start and end dates may vary by a few days to a few months depending on weather and other logistical considerations.

During EX2307, the proposed actions of the expedition include acoustic exploration mapping operations forums on areas generally deeper than 200 m in Canada and U.S. waters offshore of Alaska, Washington, Oregon, and California and adjacent waters of the high seas as the EX transits to San Francisco, California. Mapping operations will be conducted at depths between 200 m and 6,000 m. In case of poor weather, the transit to San Francisco, California will go through the Inside Passage located within Canadian

waters. No scientific operations would take place during the contingency plan through the Inside Passage located in Canadian waters. This action has independent utility and has not been inappropriately segmented from a larger 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. 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. EX2307 will conduct mapping operations using the active acoustic sonars which would involve no permanent physical, chemical, or biological changes to the environment in areas deeper than 200 meters in depth throughout the expedition. XBT are dropped over the side of the ship collecting data to accurately plot depth measurements used by the multibeam sonars to create a profile of the water column within the area of interest. EX2307 will focus on performing mapping survey operations between Seward, Alaska and San Francisco, California 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 acoustic exploration mapping operations of the NOAA Ship Okeanos Explorer will take place in remote deep-sea (>200m) areas located offshore the U.S. waters of Alaska, Oregon, Washington, and California, offshore Canada, and in adjacent waters of the high seas. All acoustic exploration mapping operations by the EX are underwater and will have no human presence in the area besides those on onboard the EX2307. 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.



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**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 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 or direct impacts on the seabed or within the water column. The procedures that are employed when operating acoustic and ROV systems impacts are well-documented and would follow the accepted industry standards and best management practices for all operations onboard the vessel that have been tested 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 7 ESA endangered and threatened species found along Alaska, Canada, and the United States. 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. 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 any potential 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?**

All 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, 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 of Canada and along Alaska, Oregon, Washington, and California as the EX transits between Seward, Alaska and San Francisco, California during EX2307. There are no communities within or near the geographic scope of the expedition due to activities 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 EX2307, NOAA Ship Okeanos Explorer will not make landfall in areas other than commercial ports in Seward, Alaska and San Francisco, California. 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 conductivity, temperature, and depth (CTDO) 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 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 EX2307 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 an 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 EX2307 expedition report.

OER determined that MBTA authorizations are not required for EX's operations due to EX's operations occurring in waters 200 m and greater located outside MBTA protected areas. Evaluation of the potential impact of EX's operations on marine mammals protected under MMPA was conducted for 2018-2019 field season and in 2022 and beyond on a Programmatic level. OER leveraged the biological evaluation conducted as part of our informal and Programmatic ESA Section 7 consultation, which assessed the potential impacts of our operation on low and mid-frequency cetaceans, Phociid pinnipeds and otariid pinnipeds. Additional analysis evaluated the potential impacts of our operations on high-frequency marine mammals protected under MMPA in our operating area. OER evaluation has determined that, with continued implementation of our best management practices, operations would not result in a Level A or B take.

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

The exploration activities are considered small and 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 under NEPA, ESA, MMPA, and EFH 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:** Jennifer Lukens

**OAR Decision Maker's Position/Title:** Deputy Director, NOAA Office of Ocean Exploration and Research (OER)

**Date Signed:**

LUKENS.JENNIFER.  
LEIGH.1365832583

Digitally signed by  
LUKENS.JENNIFER.LEIGH.1365832  
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Date: 2023.08.09 14:00:56 -04'00'

# Canadian Letter of Acknowledgement



UNCLASSIFIED  
IGR-1340/42 [UPDATE]

August 1, 2023

Ms. Jennifer Becker  
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 Ms. Becker,

**Revised authorization for the Research Ship OKEANOS EXPLORER (May 1 – October 31, 2023).**

I am pleased to advise that the Government of Canada grants its consent to the request for the research ship **OKEANOS EXPLORER** to undertake marine scientific research in areas under Canadian jurisdiction or sovereignty during the above mentioned dates.

Enclosed is the Canadian Hydrographic Service (CHS) request for the submission of bathymetric data for this mission. 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. The attached document provides necessary information and directions.

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 (see: <https://www.dfo-mpo.gc.ca/species-especes/mammals-mammiferes/report-rapport/page01-eng.html>).

Please inform the applicant that 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 other vessels to conduct their mapping activities, please advise Canada's Department of Fisheries and Oceans immediately at [DFO.NCRForeignVesselClearance-DegagementnavireetrangerRCN.MPO@dfo-mpo.gc.ca](mailto:DFO.NCRForeignVesselClearance-DegagementnavireetrangerRCN.MPO@dfo-mpo.gc.ca).

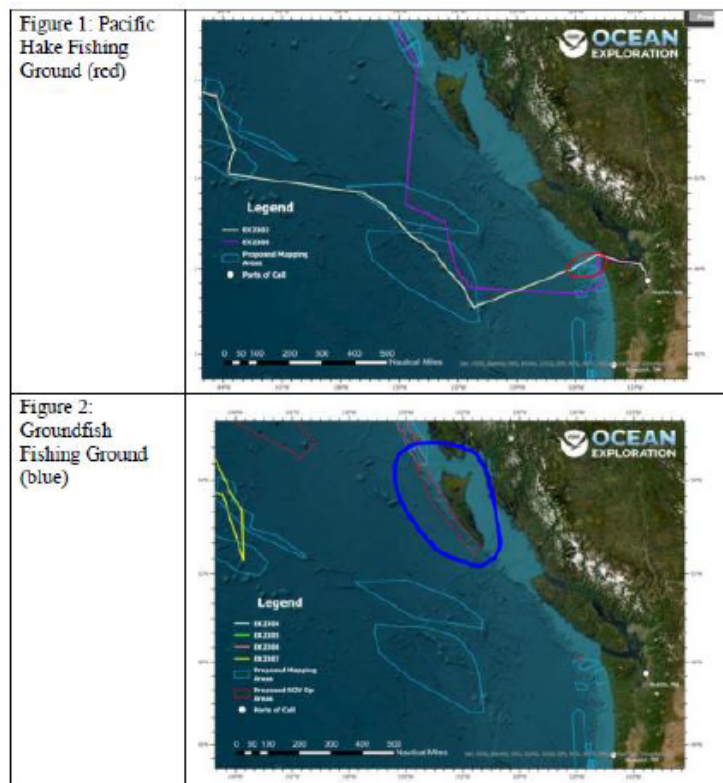
Canada



Please inform the applicant that the portion of the cruise pertaining to the contingency plan for ROV mapping (circled in blue on Figure 2) overlaps active groundfish 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](mailto:bruceturris@shaw.ca)
- Brian Mose Deepsea Trawlers Association [bmose@uniserve.com](mailto:bmose@uniserve.com)
- Rob Kronlund Canadian Sablefish Association [arkronlund@canadiansablefish.com](mailto:arkronlund@canadiansablefish.com)
- Chris Atcheson Canadian Sablefish Association [cacheson@canadiansablefish.com](mailto:cacheson@canadiansablefish.com)
- Chris Sporer Pacific Halibut Management Association [phma@citytel.net](mailto:phma@citytel.net)
- Jordan Belveal Outside ZN rep [jordan@jordanbelveal.com](mailto:jordan@jordanbelveal.com)

Please also cc DFO on any notifications ([DFO.NCRForeignVesselClearance-DegagementnavireetrangerRCN.MPO@dfo-mpo.gc.ca](mailto: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 Office Pacific:  
Phone: (604) 713-9840 and email: [NP12REXC01G@cbsa-asfc.gc.ca](mailto: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 is taking 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. We request copies of the preliminary and final cruise reports.

Yours sincerely,



Kevin Tunney,  
Deputy Director  
Security and Defence Relations Division

Encl.



## 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](mailto:DFO.NCRCHSInfo-InfoSHCNCR.MPO@dfo-mpo.gc.ca)

Subject: MSR Bathymetric Data

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Hydrographer General of Canada